Contact Filer Regarding Image Clarity

STATE OF NEVADA

PUBLIC UTILITIES COMMISSION OF NEVADA

1150 E. William Street
Carson City, Nevada 89701-3109

No. 43427

RECEIPT

Received from

Date 10/8/2014

ROBERT G JOHNSTON ATTORNEY AT LAW
204 N MINNESOTA ST STE 1A
CARSON CITY, NV 89703

AMOUNT $ 200.00

TWO HUNDRED ---------- and 00 /100 Dollars

	Cash	Check	Money Order	Draft
How Paid	☐	1094		

	Filing Fee	TDD	Copy Service	UEC	Mill or CMRS	Other
Type of Receipt	☑	☐	☐	☐	☐	☐
GL	3717		3818	3% to 3305 97% to LIHEA cc: Welfare	3920-3315 1038-3315	

Invoice#:

Memo

UEPA-Copper Mountain Solar 4, LLC

Received by CJ

Business Process Copy

ROBERT G. JOHNSTON
Attorney and Counselor at Law
204 NORTH MINNESOTA STREET, SUITE 1-A
CARSON CITY, NEVADA 89703-4151

775-461-3677
rjohnston@pyramid.net

October 8, 2014

Ms. Breanne Potter
Assistant Commission Secretary
Public Utilities Commission of Nevada
1150 East William Street
Carson City, NV 89701-3109

RE: Application for UEPA Permit to Construct the Copper Mountain Solar 4 Project

Dear Ms. Potter:

Copper Mountain Solar 4, LLC hereby transmits for filing its Application for a Permit to Construct Electric Utility Facilities under the Utility Environmental Protection Act, together with a Draft Notice as required by NAC 703.162. Our check for the filing fee in the amount of $200.00 is enclosed.

Please contact me at (775) 461-3677 or by email at rjohnston@pyramid.net should you have any questions or concerns regarding this filing.

Sincerely,

Robert G. Johnston

Attorney for Copper Mountain
Solar 4, LLC

PUBLIC UTILITIES COMMISSION OF NEVADA
DRAFT NOTICE
(Applications, Tariff Filings, Complaints, and Petitions)

Pursuant to Nevada Administrative Code ("NAC") 703.162, the Commission requires that a draft notice be included with all applications, tariff filings, complaints and petitions. Please complete and include **ONE COPY** of this form with your filing. (Completion of this form may require the use of more than one page.)

A title that generally describes the relief requested (see NAC 703.160(5)(a)):

Application for Permit to Construct Electric Utility Facilities pursuant to the Utility Environmental Protection Act.

The name of the applicant, complainant, petitioner or the name of the agent for the applicant, complainant or petitioner (see NAC 703.160(4)(b)):

Copper Mountain Solar 4, LLC

A brief description of the purpose of the filing or proceeding, including, without limitation, a clear and concise introductory statement that summarizes the relief requested or the type of proceeding scheduled AND the effect of the relief or proceeding upon consumers (see NAC 703.160(4)(c)):

Copper Mountain Solar 4, LLC ("CMS 4") is filing application under the provisions of the Utility Environmental Protection Act ("UEPA") for a permit to construct electric utility facilities in Clark County, Nevada to be known as the Copper Mountain Solar 4 Project ("CMS 4 Project").

CMS 3 states that the CMS 4 Project will include: (1) a nominal 94 MW solar PV electricity generating facility on an approximately 682 acre site in the City of Boulder City; (2) a nominal 230-kV generation-tie power line, consisting of a second circuit on some existing and some new pole structures, to deliver electricity to the Merchant Substation; and (3) a fiber-optic communications line constructed onto the generation-tie power line structures and a redundtant communications path connecting the electricity generating facility to the Merchant Substation and CMS 1 for grid protection and control systems.

CMS 4 states that its amended application is filed pursuant to Nevada Revised Statutes ("NRS") 704.870(2)(b) and Nevada Administrative Code ("NAC") 703.423.

CMS 4 states that the Project will provide a clean, renewable source of energy and will not emit potentially harmful pollutants or greenhouse gases that could have an adverse impact on the public health, safety and welfare of Nevada residents.

A statement indicating whether a consumer session is required to be held pursuant to Nevada Revised Statute ("NRS") 704.069(1)[1]:

A consumer session is not required by NRS 704.069.

If the draft notice pertains to a tariff filing, please include the tariff number AND the section number(s) or schedule number(s) being revised.

This draft notice does not pertain to a tariff filing.

[1] NRS 704.069 states in pertinent part:

1. The Commission shall conduct a consumer session to solicit comments from the public in any matter pending before the Commission pursuant to NRS 704.061 to 704.110 inclusive, in which:
(a) A public utility has filed a general rate application, an application to recover the increased cost of purchased fuel, purchased power, or natural gas purchased for resale or an application to clear its deferred accounts; and
(b) The changes proposed in the application will result in an increase in annual gross operating revenue, as certified by the applicant, in an amount that will exceed $50,000 or 10 percent of the applicant's annual gross operating revenue, whichever is less.

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

Application of COPPER MOUNTAIN SOLAR 4, LLC for a permit under the Utility Environmental Protection Act to construct the Copper Mountain Solar 4 Project, consisting of a 94 MW solar energy generating facility, 230 kV generation tie-line and associated facilities, to be located in Clark County, Nevada.	Docket No. 14-

APPLICATION FOR PERMIT TO CONSTRUCT ELECTRIC UTILITY FACILITIES

Applicant COPPER MOUNTAIN SOLAR 4, LLC files its application with the Public Utilities Commission of Nevada ("Commission") for a permit to construct utility facilities to be known as the Copper Mountain Solar 4 Project ("CMS 4 Project" or "Project") pursuant to the requirements of the Utility Environmental Protection Act, NRS 704.820 et seq. ("UEPA"). This UEPA application is being filed pursuant to NRS 704.870(1) and NAC 703.423.

1. Name and Address of Applicant and Applicant's Attorney

Communications concerning this application should be directed to:

Robert G. Johnston, Esq.
204 N. Minnesota Street, Ste. 1-A
Carson City, NV 89703
Phone: 775-461-3677
Fax: 775-414-0991
rjohnston@pyramid.net

Amy G. Nefouse
Senior Environmental Counsel
Sempra Energy
101 Ash St., HQ 11B
San Diego, CA 92101
Phone: 619-699-5046
Fax: 619-699-5150
anefouse@Sempra.com

with a copy to:

Marilyn Burke
Director, Commercial Development
Sempra U.S. Gas & Power
101 Ash Street
San Diego, CA 92101
Phone: 619-696-2681
Fax: 619-696-2122
MBurke@SempraUSGP.com

2. Introduction

Copper Mountain Solar 4, LLC ("CMS 4") is a Delaware limited liability company registered to conduct business in the State of Nevada. CMS 4 is a wholly-owned subsidiary of Sempra Solar Holdings, LLC, which is a wholly-owned subsidiary of Sempra Renewables, LLC. Sempra Solar Holdings, through other wholly-owned subsidiaries, is the owner and operator of three existing solar photovoltaic ("PV") generating stations currently under construction or operating in the Eldorado Valley near the location of the CMS 4 Project: Copper Mountain Solar 1 ("CMS 1"), Copper Mountain Solar 2 ("CMS 2") and Copper Mountain Solar 3 ("CMS 3").

The CMS 4 Project utility facilities will consist of three components: (1) a nominal 94-megawatt ("MW") Alternating Current ("AC") solar photovoltaic ("PV") electricity generating facility on an approximately 682 acre site in the City of Boulder City; (2) a gen-tie line of nominal voltage at 230-kV, consisting of a second circuit on some new and some existing pole structures, to deliver electricity to the Merchant Substation; and (3) a fiber-optic communications line constructed on the gen-tie pole structures and redundant communications paths connecting the electricity generating facility to the Merchant Substation and CMS 1 for grid protection and control systems.

3. Information Required by NAC 703.423

The information required by NAC 703.423 is provided as follows.

NAC 703.423(1). A description of the location of the proposed utility facility.

NAC 703.423(1)(a). A general description of the location of the proposed utility facility, including a regional map that identifies the location of the proposed utility facility.

The CMS 4 project site is located in the City of Boulder City, in the Eldorado Valley, approximately 17 miles south of the city of Henderson. The Project is located approximately 12 miles south of the intersection of Highway 93 and Highway 95, to the west of Highway 95 in the City of Boulder City's Eldorado Valley Energy Zone. The Project site is bordered on the west by Desert Star Energy and CMS 1, on the northeast by Nevada Solar One, and on the east by CMS 2. A regional map identifying the location of the Project is attached as Exhibit B.

(1) 94-MW Solar PV Electricity Generating Facility

The solar facility will be sited on property owned by the City of Boulder City and leased by CMS 4. The proposed site is within the City of Boulder City's Energy Zone. Land within the Energy Zone may be used for the development of private and/or public solar and gas-fired electric generation facilities, electrical gen-tie and distribution facilities, ancillary facilities, and other similar uses. The site is currently vacant with the exceptions of: (a) Eldorado Valley Drive running east to west through the site; (b) a Southwest Gas Corporation natural gas pipeline and tap station: (c) electric gen-tie and transmission lines: (d) fiber optic and communications lines: and (e) a City of Boulder City water line.

(2) 230-kV Merchant Gen-Tie Line

The Project's substation will connect to the Merchant Substation via a 230-kV gen-tie line, approximately 0.5 miles in length. The gen-tie line primarily will be a new, second circuit on some of CMS 2's existing common gen-tie poles within the gen-tie easement corridor along Eldorado Valley Drive. Some additional 230 kV structures may be constructed: (1) on the CMS 4 site to bring the circuit from the solar substation north to the existing CMS 2 gen-tie structures: and (2) to bring the circuit south from the existing CMS 2 gen-tie structures into the Merchant switchyard.

(3) Communication Lines

The fiber optic communications line and redundant communication path will connect the solar electricity generating facility to the Merchant Substation. The fiber optic line will be installed on the same path as the gen-tie line, using some of CMS 2's gen-tie poles. The redundant communication path will either be buried fiber or wireless via microwave technology. The decision as to which option to use will be made during final engineering.

Facility communications will also connect the solar field and solar substation with CMS 1. This path will either be buried fiber or wireless via microwave technology. The decision as to which option to use will be made during final engineering.

NAC 703.423(1)(b). A legal description of the site of the proposed utility facility, with the exception of electric lines, gas transmission lines, and water and wastewater lines, for which only a detailed description of the site is required.

(1) 94 MW Solar PV Electric Generating Facility

Portions of Section 6, Section 7 and Section 8 in Township 25 South, Range 63 East, M.D.B&M.

(2) 230-kV Merchant Gen-Tie Line and Communication Lines

Portions of Section 12 in Township 25 South, Range 62 East, M.D.B.&M, and Section 7 in Township 25 South, Range 63 East, M.D.B.&M.

NAC 703.423(1)(c). Appropriately scaled site plan drawings of the proposed utility facility, vicinity maps and routing maps.

Site plan drawings, vicinity maps, and routing maps are included as Exhibit C.

NAC 703.423(2). A description of the proposed utility facility.

NAC 703.423(2)(a). The size and nature of the proposed utility facility.

(l) 94-MW AC Solar PV Electricity Generating Facility and Substation

The generating facility will be an approximately 94 MW AC solar PV electricity generating facility, located entirely on approximately 682 acres of land leased by CMS 4 from the City of Boulder City. This acreage includes the solar field, driveways, fencing, substation, and other related infrastructure.

The solar generating facility will consist of: (a) a solar field of PV panels; (b) an electrical collection system that aggregates the output from the PV panels and converts the electricity from DC to AC; and (c) a solar substation where all of the facility output is combined and transformed to a voltage of 230 kV.

The CMS 4 project will utilize PV panel technology to collect solar radiation, which will be sent to an electrical collection system that will convert generated power from direct current to alternating current. The PV panels will be mounted on single axis tracking steel structures. The assembled PV panels will have a height of up to 10 feet. The PV panels will be arranged in rows aligned north to south and the PV panels will pivot, tracking the sun from east to west. Combiner boxes will be used to collect the power from multiple panels.

The panels and combiner boxes will be organized into electrical groups referred to as "arrays," with the size of each array depending upon the selected size of the inverter.

Conductors will be suspended under the PV panels and will extend underground to feed DC power to the inverters. The inverters convert the DC power to AC power and the AC output voltage is boosted to 34.5 kV through a Medium Voltage ("MV") Step-up Transformer. The inverter and MV transformer are together referred to as an Inverter Skid Assembly ("ISA"). From each such ISA, electricity will be conveyed via an overhead or underground 34.5 kV collector circuit to the 34.5 kV bus within the solar substation. Such collector circuits originating in the northern portion of the site will cross Eldorado Valley Drive. Each circuit coming into the solar substation will deliver between 20 MW and 50 MW of output capacity from the solar field to the electrical grid.

The solar substation will be a central hub for the 34.5-kV collector circuits and will step up the electrical voltage from 34.5 kV to nominally 230 kV. The CMS 4 substation site will be located within the Project site on the south side of Eldorado Valley Drive. The solar substation will include the following major components:

- 34.5 kV bus and associated switching devices
- 230 kV bus and associated switching devices
- 34.5/230 kV transformer
- 34.5 kV capacitors (as required)
- 230 kV metering equipment
- Grounding grid
- Prefabricated modular control building (unoccupied except during inspection and maintenance)

- Perimeter security fence
- Lighting

During daylight hours, power for plant auxiliaries will be provided by the Project's electrical generation. During non-daylight hours, the Project will require small amounts of power to keep transformers energized, and for plant lighting and security. This auxiliary power will be provided by back-feed from the electrical grid. Auxiliary power will be stepped down to an appropriate voltage to support plant auxiliaries and will be connected to the station service power switchgear.

Access to the Project will be from the existing paved Eldorado Valley Drive, which crosses through the Project. The access driveways to the site from Eldorado Valley Drive will be controlled-access (authorized personnel only) by employing swinging or rolling chain link gates.

Water service to the Project will be provided from an existing City of Boulder City water line along Eldorado Valley Drive.

A temporary construction workspace located adjacent to the solar field area will include a parking area, a construction office, and a laydown area. All of these facilities will be removed once Project construction is completed.

The perimeter of the Project site will be enclosed by a 7-foot high chain link fence, which may be topped with barbed ware, with an unpaved road extending around the perimeter inside of the fence.

(2) 230 kV Merchant Gen-Tie Line

The 230-kV Merchant gen-tie line will be a new, second circuit on some of CMS 2's existing common gen-tie poles within the gen-tie easement corridor along Eldorado Valley

Drive. The gen-tie line will run approximately 0.5 miles from the solar substation to the Merchant Substation. The common poles are monopole structures no more than 120 feet high on concrete pier foundations. The span between supporting structures ranges between 200 and 700 feet. Some additional 230 kV structures may be constructed on the CMS 4 site to bring the circuit from the solar substation north to the existing CMS 2 gen-tie structures, and to bring the circuit south from the existing CMS 2 gen-tie structures into the Merchant switchyard.

(3) Communication Lines

A fiber optic cable will be installed on the same poles as the gen-tie line to connect the solar electricity generating facility with the Merchant Substation. Redundant communication paths using either buried fiber or wireless via microwave technology will also be installed.

NAC 703.423(2)(b). The natural resources that will be used during the construction and operation of the proposed utility facility.

Natural resources anticipated for construction and operation include materials used for construction, such as steel for supports, structures, reinforcing rod and fencing; silicon, copper, and other metals used in the manufacturing of the PV modules; cable and electronic equipment; cement and aggregate for concrete for foundations; gravel and aggregate for roadways and mineral oil for transformers. Water will be required during construction for dust suppression, soil compaction and concrete fabrication. Very little water will be required during operations. Water will be supplied from an existing City of Boulder City water line that serves the Eldorado Valley.

NAC 703.423(2)(c). Layout diagrams of the proposed utility facility and its associated equipment.

Layout diagrams are provided in Exhibit D.

NAC 703.423(2)(d). Scaled diagrams of the structures at the proposed utility facility.

Scaled diagrams are provided in Exhibit E.

NAC 703.423(2)(e). A statement concerning whether the proposed utility facility is an electric generating plant or the associated facilities of an electric generating plant that uses renewable energy as its primary source of energy to generate electricity.

The proposed utility facility is an electric generating plant that uses renewable energy as its primary source of energy to generate electricity.

NAC 703.423(3). A copy and summary of any studies which have been made of the environmental impact of the proposed utility facility as required by subsection 1 of NRS 704.870.

An Environmental Statement for the CMS 4 Project by NewFields is attached as Exhibit A.

The Environmental Statement describes the existing environment of the Project site, and analyzes the environmental impacts of the Project and proposed mitigation measures for the following resources:

- Geology, Soils, Mineral Resources & Paleontology
- Water Resources
- Air Quality and Climate
- Biological Resources

- Cultural Resources
- Land Use
- Transportation
- Visual Resources
- Noise
- Waste Management and Hazardous Materials
- Socioeconomics

NAC 703.423(4). A description of any reasonable alternate locations for the proposed utility facility, a description of the comparative merits or detriments of each location submitted, and a statement of the reasons why the location is best suited for the proposed utility facility, as required by subsection 1 of NRS 704.870.

CMS 4 considered the following criteria in determining to locate the Project in the City of Boulder City's Eldorado Valley Energy Zone:

- Adequate solar irradiation
- Close proximity to a high capacity substation with access to multiple energy markets
- Adequate transmission capacity to convey the electrical output of the Project
- Minimal environmental concerns
- Relatively flat site to minimize the need for site grading
- Existing access to accommodate construction workforce needs
- Land parcel large enough to accommodate a utility scale facility
- Usable land parcel without large areas in a flood zone
- Access to nearby workforce sufficient to support Project construction

No reasonable alternate locations for the Project outside of the Energy Zone meeting these criteria were identified. Within the Energy Zone, the proposed Project site was the only suitable property that met CMS 4's key requirements that: (1) the length of the gen-tie line interconnection to the grid be less than 5 miles to minimize gen-tie line losses and costs; (2) the necessary gen-tie line Right-of-Way ("ROW") could be acquired; and (3) the land parcel does not contain areas in flood zones. The Project site meets these criteria by providing gen-tie access over an approximately 0.5 mile route to the Merchant Substation using existing CMS 2 gen-tie poles and because of its distance from the Eldorado Valley Dry Lake bed.

No alternative gen-tie routes were considered for the Project. Because an existing gen-tie power line runs through the Project site, the existing poles can be used for the gen-tie with minimal environmental impacts and minimal costs, and no alternative route could offer these advantages.

NAC 703.423(5). A copy of the public notice of the application or amended application and proof of the publication of the public notice, as required by subsection 4 of NRS 704.870.

A copy of the public notice of this application is attached as Exhibit F.

Proof of publication of the public notice of this application in Clark County, Nevada is attached as Exhibit G.

NAC 703.423(6). Proof that a copy of the application or amended application has been submitted to the Nevada State Clearinghouse within the Department of Conservation and Natural Resources to enable agency review and comment.

Proof of submission of this application to the Nevada State Clearinghouse to enable

agency review and comment, and proof of service on local governments in the area in which the facilities are to be located, is attached as Exhibit H.

NAC 703.423(7). An explanation of the nature of the probable effect on the environment.

NAC 703.423(7)(a). A reference to any studies described in subsection 3, if applicable.

Analysis of the proposed solar field is contained in the Environmental Statement, attached as Exhibit A.

NAC 703.423(7)(b). An environmental statement that includes:

(1) The name, qualifications, professions and contact information of each person with primary responsibility for the preparation of the environmental statement.

A list of preparers and reviewers of the Environmental Statement can be found in Exhibit A, Section 4 at page 68. The following is the contact information for each person with primary responsibility for the preparation of the Environmental Statement:

Name	Title	Contact Information
NewFields Environmental and Engineering, 8250 W. Charleston Blvd., Ste 100, Las Vegas, NV 89117		
Ken MacDonald	Partner	(702) 952-2072 kmacdonald@newfields.com
Anne DuBarton	Project Manager, Cultural Resource Specialist	(702) 952-2072 adubarton@newfields.com
Stephanie Locke	Project Manager, Biologist	(702) 952-2072 slocke@newfields.com
Justin Romanowitz	Environmental Scientist	(480) 231-3539

(2) The name, qualifications, professions and contact information of each person who has provided comments or input in the preparation of the environmental statement.

Name	Title	Contact Information
Copper Mountain Solar 4, LLC – c/o Sempra U.S. Gas & Power - 101 Ash Street, San Diego, California 92101		
Marilyn Burke	Director, Commercial Development	619-696-2681 mburke@semprausgp.com
Mike End CSP, CIH	Environmental Permitting and Safety	619-696-2078 Mend@SempraUSGP.com
Travis Jones	Project Engineer	(619) 696-4871 tjones@SempraUSGP.com

(3) A bibliography of materials used in the preparation of the environmental statement.

A complete bibliography of reference materials used in preparation of the Environmental Statement can be found in Exhibit A, Section 6 at pages 71-77.

(4) A description of:

(I) The environmental characteristics of the project area existing at the time the application or amended application is filed with the Commission.

The proposed Project site is in the Eldorado Valley in Clark County, Nevada. Eldorado Valley is a closed drainage basin bounded by the McCullough Range to the west, the River Mountains to the north, and the Eldorado Mountains and Opal Mountains to the east. The Project site is located on alluvial soils in an area dominated by creosote bush and burro bush vegetation. Surrounding land is characterized primarily by power generation facilities, energy transmission infrastructure, transportation infrastructure, and open space.

Section 3 of the Environmental Statement attached as Exhibit A describes the existing setting and environmental characteristics with respect to each of the resources studied.

(II) The environmental impacts that the construction and operation of the proposed utility facility will have on the project area before mitigation.

The Environmental Statement analyzed potential impacts on a suite of resources and did not identify any significant environmental impacts that would occur during construction, operation and maintenance of the Project. (Exhibit A, Section 3) A summary of the analyses in the Environmental Statement, including impacts and mitigation measures, is presented in the following list:

- Geology, Minerals, Soils and Paleontology: Potential impacts to the Project from earthquakes are minor. No important mineral deposits are known near the Project, and therefore no impacts to mining operations are expected. There are no known paleontological resources or fossils that are sensitive or legally protected in the Project area. A limited potential for erosion by wind and water exists from soils disturbed by grading, excavation and construction, but the applicant will obtain a dust control permit from Clark County, and design features for the solar field will address proper drainage controls. The Project will use best management practices ("BMP") to minimize the contribution to cumulative impacts.
- Water Resources: Water for construction and operation of the Project will be provided by the City of Boulder City from an existing water line in the Eldorado Valley. There will be no adverse impacts on surface water or groundwater resources in the area, with the exception that the possibility of increased erosion from soil disturbance during construction could potentially result in increased levels of sedimentation to the Eldorado Dry

Lake. These potential impacts will be mitigated by preparation and implementation of a Storm Water Pollution Prevention Plan ("SWPPP") and use of BMPs to control on-site surface flows and avoid off-site impacts during construction.

- Air Quality: Construction and operation will require compliance with all federal, state, and local air quality laws and regulations. Air emissions associated with the Project are expected to occur primarily during construction and will be chiefly associated with fugitive dust from ground-disturbing activities. Once operating, the facility will generate relatively few air emissions from on-road travel of vehicles associated with worker commutes for maintenance activities, and these *de minimis* emissions would result in no long-term impact on the existing ambient air quality. BMPs for fugitive dust and wind erosion control will be followed during construction. Water will be used to control dust in construction, and areas of high erosion or poor soils, outside of desert tortoise habitat, may require application of a palliative dust reducing agent.
- Vegetation: About 665 acres of the site will be graded during construction causing direct removal of vegetation and wildlife habitat. To reduce construction impacts on vegetation and wildlife habitat, all construction vehicle movement will be restricted to the Project area, pre-designated access roads and public roads, and contractors will avoid creating soil conditions that promote weed germination and establishment. (Biological Report, Exhibit A, Appendix D)

- Wildlife: There will be a direct loss of habitat and could be mortality to various wildlife species from clearing the solar field. Fencing will be installed to help exclude wildlife after construction. The Project will use BMPs/mitigation measures adapted from the Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement (Clark County 2002) to aid in preserving the quality of adjacent habitat and to lessen impacts on wildlife. (Biological Report, Exhibit A, Appendix D)
- Special Status Wildlife Species: Desert Tortoise: The entire Project site is within desert tortoise habitat, although no live tortoise sign was found in the Project site during surveys conducted in May 2014. The following BMPs/mitigation measures will be implemented to reduce effects on desert tortoise and other species during construction: (1) a preconstruction clearance survey to find and relocate desert tortoise prior to site grubbing and grading activities; (2) a Worker Environmental Awareness Program to educate all personnel on site during construction on the desert tortoise, its legal status, and reporting and procedures to be implemented if tortoises are encountered; (3) a trash and litter control program to reduce the attractiveness of the site to opportunistic predators such as ravens, coyotes and fox; and (4) payment of a one-time habitat loss compensation fee in the amount of $550/acre of surface disturbance under Clark County MSHCP Section 10.

- Special Status Wildlife Species: Migratory Birds and Western Burrowing Owl: Migratory birds could be killed or injured during construction or operation of the facility. BMPs/mitigation measures will be implemented to reduce effects on migratory birds and Western burrowing owls during construction. In compliance with the Migratory Bird Act of 1918, habitat-altering portions of the Project would be scheduled outside bird breeding season whenever possible. For work occurring during the nesting period, a qualified biologist will conduct a pre-construction survey to identify any active nests and establish no-construction buffer zones that would be maintained until the young birds fledge and have left the nest. To reduce impacts to burrowing owls, the Project will implement the protocols in the USFWS's pamphlet *Protecting Burrowing Owls at Construction Sites in Nevada's Mojave Desert Region.* (Exhibit A, Appendix B.)
- Special Status Wildlife Species: Gila Monster: Gila monsters may be injured or killed during construction activities. The following BMPs/implementation measures will be implemented to reduce effects on the Gila monster, in accordance with the Nevada Departments of Wildlife's protocols issued September 7, 2012 (Exhibit A, Appendix C): (1) Gila monsters found during the desert tortoise clearance survey will be relocated offsite; (2) an injured Gila monster will be transferred to a qualified veterinarian for evaluation of appropriate treatment; (3) NDOW will be immediately notified of any injury to a Gila monster and the veterinarian providing care; and (4) any Gila monster killed or found dead

will be immediately frozen and transferred to NDOW with a complete written description of the circumstances, date, time, habitat and mapped location.

- Cultural Resources: An archeological survey of the Project site was conducted in accordance with the Nevada BLM *Guidelines and Standards for Archaeological Inventory* (BLM 2012). (Cultural Resources Overview and Archaeological Investigations, Exhibit A, Appendix E) The survey found one historic site and five isolates that will be disturbed by the Project. However, because none of the artifacts found are eligible for listing in the NRHP, the cultural impacts are not expected to be extensive and are considered acceptable. If potential cultural resources are found during construction, work will be halted immediately and a professional archaeologist will be mobilized to the site to evaluate the find and determine appropriate further steps and mitigation measures as necessary. Work will not proceed until a notice to proceed has been issued from the appropriate authority.
- Land Use: Development of the Project falls into the appropriate zoning designations, will not impact or conflict with any current or future authorized land uses, and is consistent with other development activities occurring in the surrounding area. Because development of the Project will not impact current or future land use activities in the area, no mitigation measures are necessary.

- Transportation: During peak construction, there will be an estimated average of approximately 350 daily trips for arriving/departing construction workers, and 30 truck trips per day to supply concrete, construction materials and equipment to the Project site. Because this transportation will represent a negligible incremental increase to traffic on the area highways, no mitigation is required.
- Visual Resources: Construction of the Project's additional solar facilities next to existing solar facilities will result in little change to the existing landscape and its planned use as an energy zone. No mitigation measures are warranted.
- Noise: Construction of the Project will result in temporary increases in ambient noise levels for approximately 1.5 years, while operational noise from the tracking motors and electrical equipment will be negligible. Typical construction schedules are expected to be from 7:00 A.M. to 5:00 P.M, Monday through Friday, which will comply with the local noise ordinance restrictions for construction activity of 7:00 A.M. to 7:00 P.M., except Sundays and federal holidays. However, because there are no nearby noise sensitive receptors (i.e., schools, hospitals, churches, libraries, homes, parks, wilderness areas), extended construction hours may be acceptable.
- Waste Management and Hazardous Materials: The construction and operation of the Project is not expected to require the transportation, use or generation of hazardous materials or hazardous wastes that could create a

significant hazard to the public or environment. To comply with federal, state and local regulations for waste minimization, storage and disposal, a solid and hazardous waste management plan will be prepared and BMPs implemented for both the construction and operation of the Project.

- Socioeconomics: The Project will generate temporary employment during construction of the solar field, substation and gen-tie line, which will bring employment and income to Clark County. Because potential impacts to socioeconomic conditions may be beneficial, and construction and operation of the Project will not have long-term or adverse health or environmental impacts, no mitigation is required.

(III) The environmental impacts that the construction and operation of the proposed utility facility will have on the project area after mitigation.

Analyses of the environmental impacts after mitigation with respect to each of the resources analyzed is included in Section 3 of the Environmental Statement attached as Exhibit A. *See* the preceding response to NAC 703.423(7)(b)(4)(II), above, for a summary of the analyses in the Environmental Statement, including mitigation measures.

NAC 703.423(8). An explanation of the extent to which the proposed utility facility is needed to ensure reliable utility service to customers in this State.

Per paragraph (b) of subsection 1 of NRS 704.890, the proposed utility facility is exempt from this section. *See* response to NAC 703.423(2)(e), above.

NAC 703.423(9). An explanation of how the need for the proposed utility facility as described in subsection 8 balances any adverse effects on the environment as described in subsection 7.

The Environmental Statement demonstrates that the Project will not have a significant adverse impact on the environment with respect to any of the resources analyzed. *See* Exhibit A, Section 3.

NAC 703.423(10). An explanation of how the proposed utility facility represents the minimum adverse effect on the environment.

NAC 703.423(10)(a). The state of available technology.

The project is designed to use similar technology as other projects located in the Eldorado Valley. The exact specifications of the PV panel technology will be finalized before construction. Regardless of the supplier selected, the technology will optimize electrical output within the fixed project footprint. The project will be designed, constructed, and operated to meet all applicable environmental requirements.

NAC 703.423(10)(b). The nature of various alternatives.

No reasonable alternate locations meeting CMS 4's criteria for the Project were identified outside of the Energy Zone. *See* the response to NAC 704.323(4) above. Within the Energy Zone, the proposed Project site was the only suitable property that met CMS 4's key requirements that: (1) the length of the gen-tie line interconnection to the grid be less than 5 miles to minimize gen-tie line losses and costs; (2) the necessary gen-tie line Right-of-Way ("ROW") could be acquired; and (3) the land parcel did not contain areas in a flood zone. The Project site meets these criteria by providing gen-tie access over an approximately 0.5 mile route to the Merchant Substation using existing CMS 2 gen-tie poles and because it is not in a flood zone.

No alternative gen-tie routes were considered for the Project. Because an existing gen-tie power line runs through Project site, the existing poles can be used for the gen-tie with minimal environmental impacts and minimal costs, and no alternative route could offer these advantages.

NAC 703.423(10)(c). The economics of various alternatives.

As described in the response to NAC 703.423(10)(b), the economics of various alternative sites outside of the Energy Zone were not studied, and the selected site was the only site within the Energy Zone meeting CMS 4's key requirements.

NAC 703.423(11). An explanation of how the location of the proposed utility facility conforms to applicable state and local laws and regulations.

NAC 703.423(11) (a). All permits, licenses and approvals the applicant has obtained, including copies thereof.

Copies of all permits, licenses, and approvals obtained as of the date of the filing of this application are provided in Exhibit I.

NAC 703.423(11)(b). All permits, licenses and approvals the applicant is in the process of obtaining to commence construction of the proposed utility facility. The applicant must provide an estimated timeline for obtaining these permits, licenses and approvals.

A list of all major permits, licenses, and approvals the applicant or its contractors are in the process of obtaining in order to commence construction, and an estimated timeline for obtaining these permits, is provided below:

PERMITS AND APPROVALS REQUIRED	WHEN TO SUBMIT APPLICATION OR PLANS	DATE FILED (EXPECTED)	DATE ISSUED (EXPECTED)
STATE PERMITS REQUIRED			
Nevada Division of Wildlife – Energy Planning and Conservation Fund Payment	Concurrent with submittal of PUCN Application	October 2014	October 2014
Nevada Division of Environmental Protection - System General Stormwater Permit	Prior to construction activities	April 2015	May 2015
Nevada State Hazardous Material/"Roving" Permit	Prior to use	May 2015	June 2015
COUNTY PERMITS REQUIRED			
Clark County Department of Air Quality - Dust Control Permit	Prior to construction	April 2015	May 2015
CITY OF BOULDER CITY COORDINATION AND PERMITS REQUIRED			
City of Boulder City, Community Development – Grading Permit	Upon completion of 100% design	April 2015	May2015
City of Boulder City, Community Development – Building Permit	Upon completion of 100% design	May 2015	June 2015
City of Boulder City Fire Department – "One time" New Construction Permit	Upon completion of 100% design	May 2015	June 2015
City of Boulder City Fire Department - Permit for Flammable and Combustible Liquids and/or Motor Vehicle Fuel Dispensing Station	Upon completion of 100% design	May 2015	June 2015

NAC 703.423(12). An explanation of how the proposed utility facility will serve the public interest.

NAC 703.423(12)(a). The economic benefits that the proposed utility facility will bring to the applicant and this State.

The proposed utility facility will have a direct beneficial impact on the local and regional economy during the construction period. During peak activity, over 300 construction and supervisory personnel will be required on site to construct the solar field and associated facilities. The worker pool is expected to primarily draw from Clark County. In addition, the project will contribute to local and state taxes, providing an additional economic benefit.

NAC 703.423(12)(b). The nature of the probable effect on the environment in this State if the proposed utility facility is constructed.

The Environmental Statement contains a full analysis of the probable environmental effects of the proposed utility facility with respect to a full suite of resources. (Exhibit A, Section 3)

NAC 703.423 (12)(c). The nature of the probable effect on the public health, safety and welfare of the residents of this State if the proposed utility facility is constructed.

The proposed utility facility will provide a clean, renewable source of energy and will not emit potentially harmful pollutants or greenhouse gases that could have an adverse impact on public health, safety, and welfare of Nevada residents. In addition, construction and operation procedures will adhere to mitigation measures and design features intended to reduce the risk of exposure to hazardous materials, excessive noise, and other harmful conditions. Examples include following a Storm Water Pollution Prevention Plan, adhering to the Boulder City Municipal Code noise regulations, and helping Clark County and Nevada attain National Ambient Air Quality Standards.

NAC 703.423(12)(d). The interstate benefits expected to be achieved by the proposed electric transmission facility in this State, if applicable.

Construction of the gen-tie line will increase interstate deliverability options for renewable energy generated at the proposed utility facility.

4. Construction in Two Phases

CMS 4 is requesting the Commission's compliance order allow for the issuance of two permits to construct for two phases of construction. However, the phases of construction

may be executed with some overlap. The two phases of construction, and the outstanding state and local permits that must be obtained for each phase prior to issuance of a permit to construct, are:

Phase 1: This phase of construction will include all needed site grading and establishment of temporary construction facilities associated with the solar substation, solar generating facility, and 230 kV generation-tie power line. Phase 1 permits that will be acquired prior to commencing construction of this phase are listed below.

PHASE 1: GRADING/TEMPORARY CONSTRUCTION FACILITIES	
REQUIRED PERMIT	**ISSUING AGENCY**
System General Stormwater Permit	Nevada Department of Environmental Protection
Grading Permit	City of Boulder City Community Development
Dust Control Permit	Clark County Department of Air Quality

Phase 2: Activities will include construction of the solar substation, the 230kV gen-tie line from the solar substation to the Merchant Substation, the solar generating facility, including the solar modules, electrical collection equipment and related improvements. Permits that will be acquired prior to commencing Phase 2 are shown below.

PHASE 2: SUBSTATION, GEN-TIE AND SOLAR FIELD CONSTRUCTION	
REQUIRED PERMIT	**ISSUING AGENCY**
Hazardous Material Permit/"Roving" Permit	Nevada State Fire Marshall
Building Permit	City of Boulder City Community Development
"One time" New Construction Permit	City of Boulder City Fire Department
Permit for Flammable and Combustible Liquids and/or Motor Vehicle Fuel Dispensing Station	City of Boulder City Fire Department

Providing for the issuance of the two permits to construct the described utility facilities will allow construction to proceed on the Project while still providing assurance to the Commission that, consistent with the intent of the UEPA, no construction of any utility facility necessary to the Project will occur until CMS 4 has verified to the Commission that all necessary permits have been obtained for construction of that particular facility.

WHEREFORE, CMS 4 respectfully requests the Commission:

(1) grant this application, subject to submission to the Commission of the permits described above; and

(2) issue its compliance order authorizing the construction of the utility facilities in two phases as described above by authorizing the issuance of two permits to construct, with each permit to construct specifying the utility facilities included in that phase.

DATED this 8th day of October, 2014.

By: _____

Robert G. Johnston, Esq.
Nevada Bar No. 02256
402 Minnesota Street, Suite 1-A
Carson City, NV 89703
775-461-3677
rjohnston@pyramid.net

Attorney for CMS 4

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

Application of COPPER MOUNTAIN SOLAR 4, LLC for a permit under the Utility Environmental Protection Act to construct the Copper Mountain Solar 4 Project, consisting of a 94 MW solar energy generating facility, 230 kV generation tie-line and associated facilities, to be located in Clark County, Nevada.	Docket No. 14-

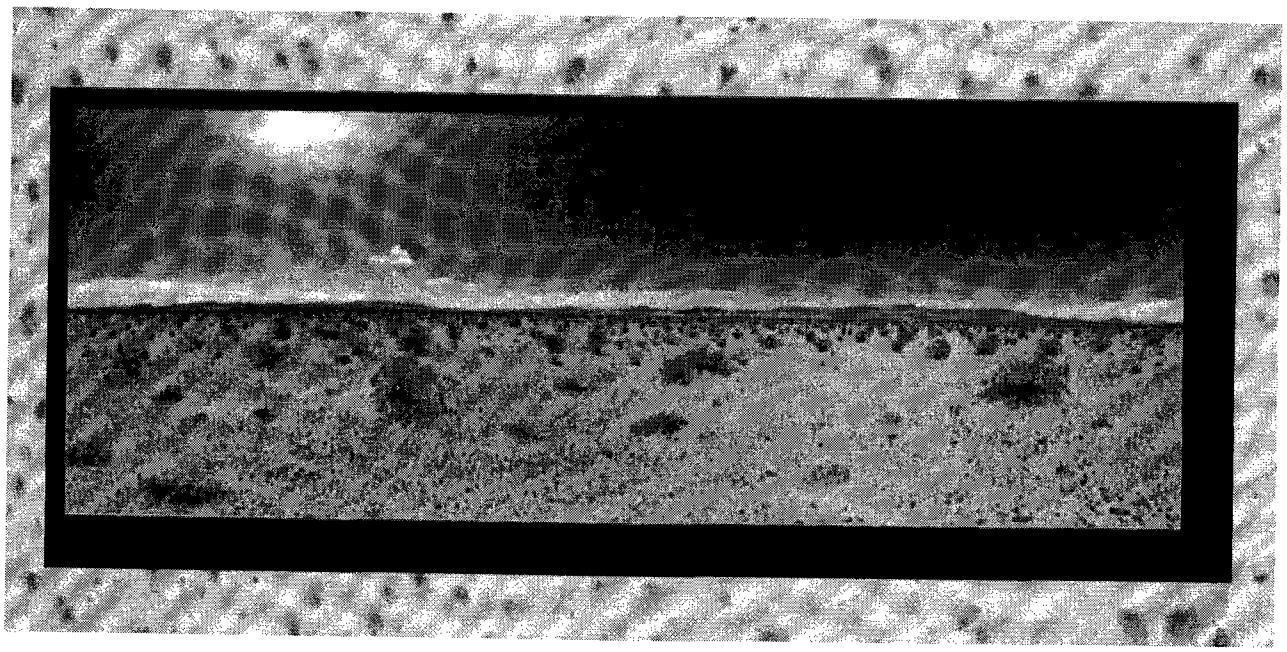
LIST OF EXHIBITS

Exhibit A	**Environmental Statement – October 2014**
Exhibit B	**Project Location Map**
Exhibit C	**Site Plan Drawings, Vicinity Maps & Routing Maps**
Exhibit D	**Layout Diagrams**
Exhibit E	**Scaled Diagrams of Utility Structures**
Exhibit F	**Public Notice**
Exhibit G	**Affidavits of Publication**
Exhibit H	**Proof of Submission**
Exhibit I	**Permits, Licenses and Approvals Obtained**

Exhibit A

Environmental Statement

Environmental Statement
Copper Mountain Solar 4 Project
Clark County, Nevada



Prepared for:

Copper Mountain Solar 4, LLC

101 Ash Street
San Diego, California 92101

Prepared by:

NewFields

8250 West Charleston Boulevard, Suite 100
Las Vegas, Nevada 89117

October 2014

Table of Contents

Tables

Figures

1. Introduction

Copper Mountain Solar 4, LLC ("CMS4"), a wholly-owned subsidiary of Sempra Renewables, LLC, is proposing the construction, operation, and maintenance of a solar energy generating facility of 94 megawatts ("MW") on 682 acres of land owned by the City of Boulder City ("City") and leased by CMS4. The Copper Mountain Solar 4 Project ("Project") will share poles with an existing gen-tie to transmit the generated energy to the grid and also will utilize an existing waterline to provide water for construction and maintenance activities. This Environmental Statement ("ES") will evaluate environmental impacts of the Project, which will be reviewed by the Public Utility Commission of Nevada ("PUCN") in order to comply with the Utilities Environmental Protection Act ("UEPA").

The proposed site is located within City's Eldorado Valley Energy Zone. Land within the Energy Zone may be used for the development of private and/or public solar and gas-fired electric generation facilities, electrical gen-tie and distribution facilities, ancillary facilities, and other similar uses.[1]

1.1. Project Purpose and Need

The economics of photovoltaic ("PV") solar energy have improved over the past several years, making solar energy an electricity source of choice. Solar energy offers the opportunity to protect the environment by avoiding the production of greenhouse gases and other air emissions, decreasing our dependence on fossil fuels, and reducing the need for construction of fossil fueled power plants. Solar energy also benefits the economy generating jobs, business income, and tax revenue for Clark County and Nevada. Because solar energy is produced when demand for electricity is at its highest (during bright daylight hours), it helps to meet peak demand.

1.2. Authorizing Actions

The primary approval required for this Project will be issued by PUCN. The PUCN will review the Project ES in accordance with UEPA guidelines. Should the Project be approved, the PUCN will issue a Permit to Construct.

The PUCN list of potential federal, state, and local permits was reviewed and Table 1 lists those permits that may be necessary for the Project in order for the PUCN to issue a Notice to Construct. These permits and requirements are typical and well understood for projects of this nature in the Eldorado Valley. Details about the permits are described in the Permit Plan, included as Appendix A. Table 1 also lists the issuing agency for each permit and the anticipated completion date.

[1] See Boulder City, Nevanda zoning ordinance, Title 11, Chapter 19, ER Energy Resource Zone.

Table 1. Regulatory Permits and Approvals that May Be Required

Permit Type/Name	Issuing Agency	Projected Completion Date
UEPA Permit	PUCN	December 2014
UEPA Permit to Construct	PUCN	April 2015
Nevada State Hazardous Materials Roving Permit	Nevada State Fire Marshall	April 2015
Stormwater Pollution Prevention Plan	NDEP	April 2015
Dust Control	Clark County DAQEM	April 2015
Grading Permit (Endangered Species Act Compliance under Section 10 as disclosed the Clark County Multiple Species Habitat Conservation Plan requires a tortoise remuneration fee of $550/acre to be submitted with grading permit fees)	Boulder City	April 2015
Building Permit	Boulder City	April 2015
Fencing Permit	Boulder City	April 2015
Installation Permit for Fire Protection and Protection Systems	Boulder City	April 2015
Permit for Flammable and Combustible Liquids and/or Motor Vehicle Fuel Dispensing Station	Boulder City	April 2015

1.3. Environmental Statement Organization

To aid the reviewers and decision-makers, this section outlines the organization of the Environmental Statement.

- Introduction - This provides a brief general description of the Project and its purpose and need. Also summarized is the Project location, the state and local reviews, regulatory approvals, and permits likely to be required.
- Description of Proposed Action and Alternatives -This describes the Project as well as the alternatives that were considered but eliminated from detailed consideration along with the rationale for their elimination.
- Existing Setting, Environmental Consequences, and Mitigation Measures - This describes the existing environment at and near the site. It also details the potential environmental consequences of the Project and mitigation measures designed to reduce, minimize, or avoid impacts so they are reduced to an acceptable level. In addition, a table summarizing the potential effects, the recommended mitigation measures, along with the timing of those measures and identification of entities responsible for implementation and monitoring, has been included.

- List of Preparers - Lists persons who contributed to the preparation and review of this Environmental Statement.
- List of Acronyms - Contains the abbreviations and acronyms contained in this Environmental Statement.
- References - Lists references used in this Environmental Statement.
- Appendices – Supplemental information on permitting and mitigation measures.

2. Description of Proposed Action and Alternatives

2.1. Project Location and Access

The Project consists of a 94 MW solar PV generating facility located on approximately 682 acres in the Eldorado Valley, approximately 17 miles south of the city of Henderson. The Project is located approximately 13 miles south of the intersection of Highway 93 and Highway 95, and is located to the west of Highway 95 (Figure 1). The site currently is vacant with the exceptions of (a) Eldorado Valley Drive running east to west, (b) Southwest Gas natural gas pipeline and tap station, (c) electric power lines, (d) fiber optic lines, and (e) a water line. The site is bordered on the west by Desert Star Energy, on the southwest by Copper Mountain Solar 1 ("CMS1"), on the northeast by Nevada Solar One, and on the east by Copper Mountain Solar 2 ("CMS2").

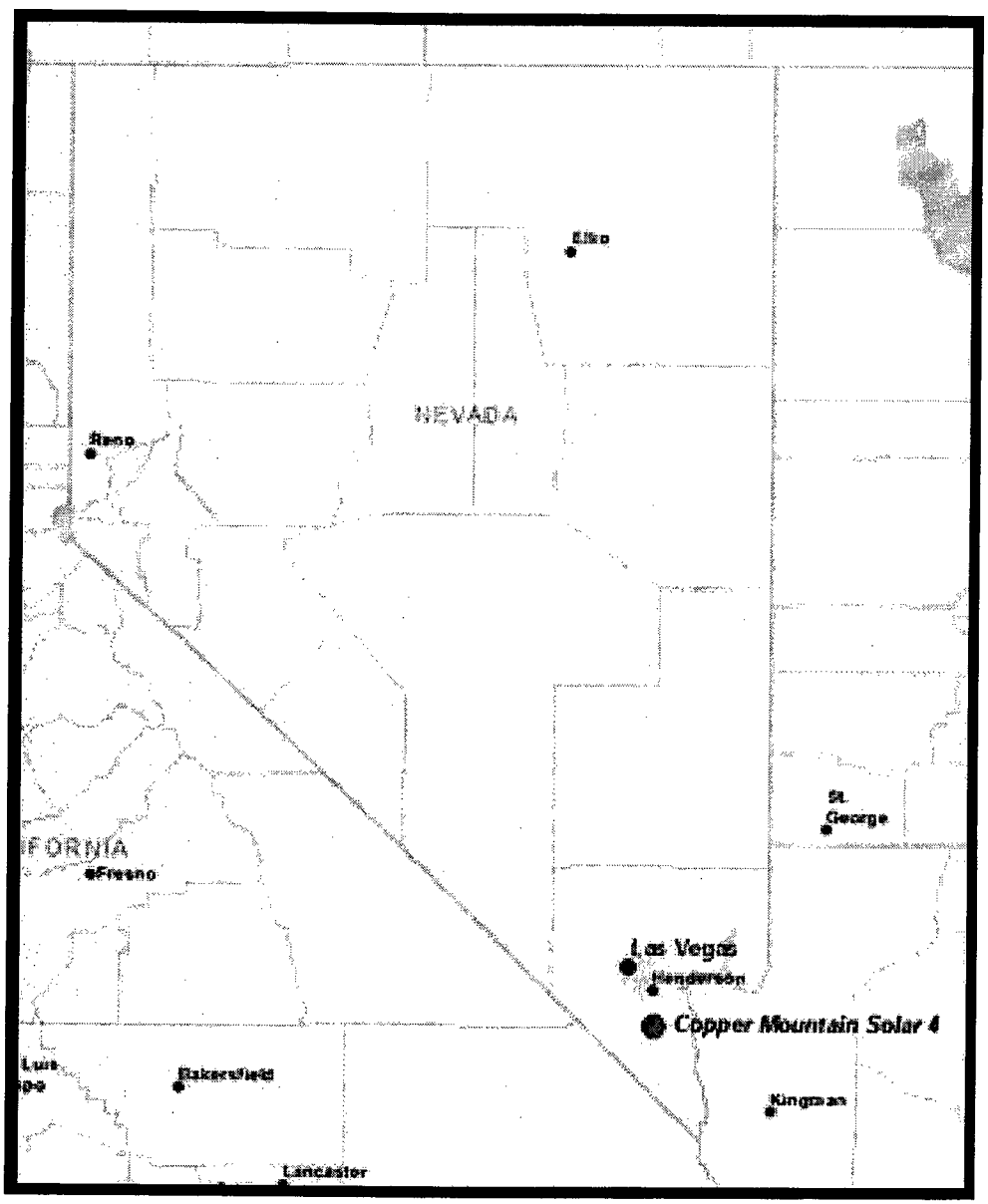


Figure 1. Project Location

Main access to the Project will be via Eldorado Valley Drive (a private road), which connects the site with interstate highway 95 (Figure 2). Eldorado Valley Drive is shared by other users; agreements and coordination with City and other Project owners may be required to use the road.

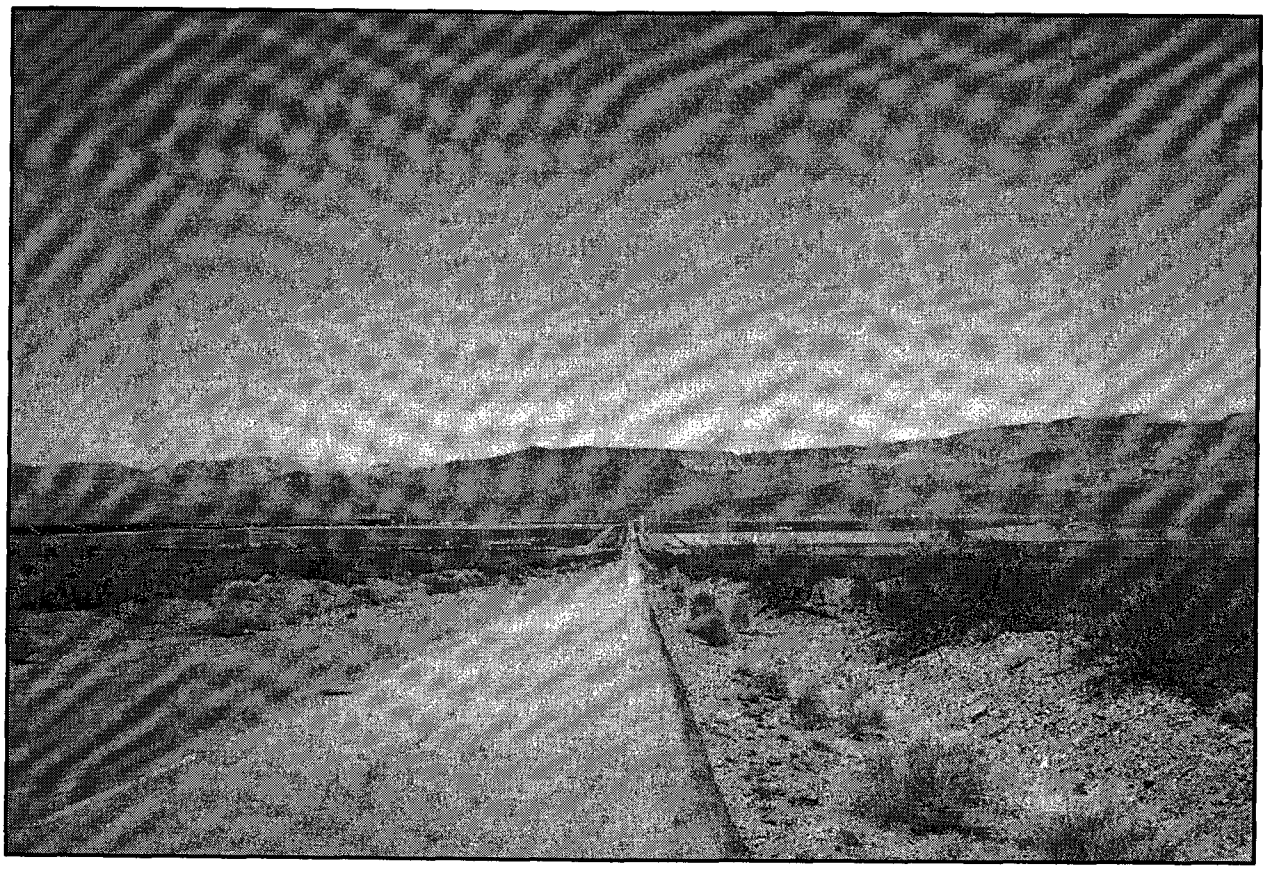


Figure 2. View of Eldorado Valley Drive Looking West from Highway 95.

2.2. Project Facilities

This Chapter discusses the Project layout and design for the solar facility and associated structures. Refer to Figure 3, which illustrates the conceptual layout of the facilities.

2.2.1. Major Equipment and Site Arrangement

The solar energy generation facility employs PV panels that absorb sunlight and directly produce electricity. The facility consists of (a) a solar field of PV panels mounted on single axis tracking steel structures, (b) an electrical collection system that aggregates the output from the PV panels and converts the electricity from direct current ("DC") to alternating current ("AC"), (c) a solar substation where all of the facility output is combined and transformed to a voltage of 230 kV, (d) a generation tie line used to transmit the electrical power to the electrical grid, and (e) civil infrastructure including driveways, drainage channels, and fencing.

The Solar PV facility's major equipment includes:

- PV modules
- Single-Axis Tracking Module Racking System
- DC Combiner Boxes
- Inverter Skid Assemblies (ISA) including
    - DC to AC inverters
    - Medium Voltage (MV) transformers;
- Solar Substation including a 34.5-230kV step-up transformer
    - 34.5 kV Capacitor Banks as required
- Plant Control System

The design will include PV modules, inverters, and medium voltage transformers combined into units that are repeated to reach the required capacity. The proposed PV facility will use commercially proven PV modules, inverters, and transformers. Inverter and transformer manufacturers and capacities will be selected based on cost, efficiency, reliability, and market availability.

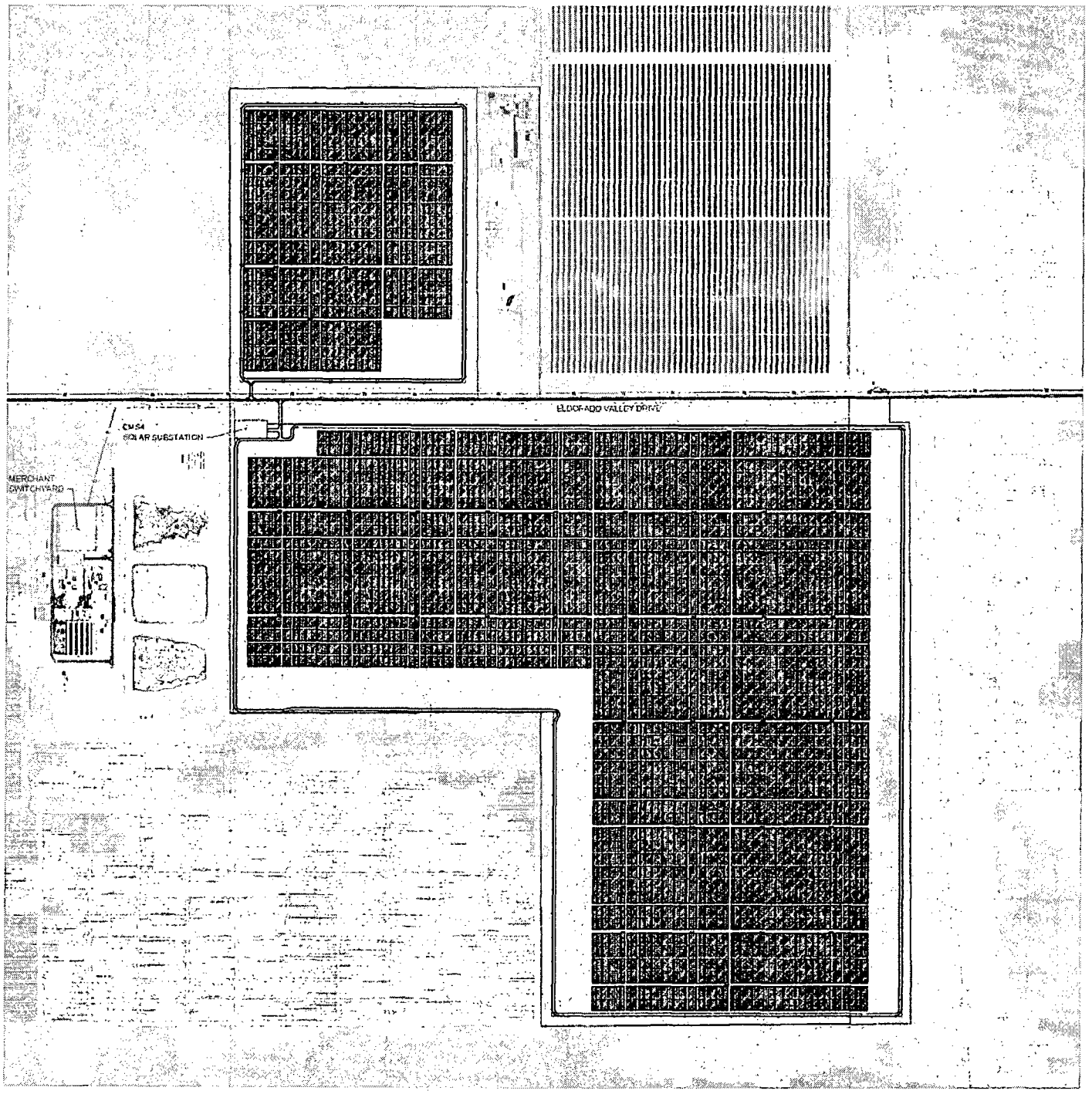


Figure 3. Conceptual Layout

2.2.1.1. PV Modules

The solar field will consist of PV panels mounted on single-axis tracking steel support structures. The assembled PV panels installed height will not exceed 10 feet. The rows will be aligned north to south and the PV panels will pivot, tracking the sun, east to west.

2.2.1.2. Electrical Collection System

PV panels convert the sun's energy into DC power. Combiner boxes are used to collect the power from multiple panels. Multiple combiner boxes concentrate the DC power to the power conversion inverters which convert the DC power to AC. The panel / combiner boxes will be organized into electrical groups referred to as "arrays." The size of each array will depend upon the selected size of the inverter.

Conductors will be suspended under the PV panels and will extend underground to feed DC power to the inverters. The inverters convert the DC power to AC power and AC output voltage is boosted to 34.5 kV through a Medium Voltage ("MV") Step-up Transformer. The inverter / MV transformer together are referred to as an Inverter Skid Assembly ("ISA"). From each such transformer, electricity will be conveyed via an overhead or underground collector circuit to the Solar Substation. Such collector circuits originating in the northern portion of the site will cross Eldorado Valley Drive. Each circuit coming into the Solar Substation will deliver between 20 MW and 50 MW of output capacity from the solar field to the electrical grid.

2.2.2. Solar Substation

The solar substation will be located on the south side of Eldorado Valley Drive (as shown on Figure 3). The substation is a central hub for the 34.5 kV collector circuits and increases the electricity voltage from 34.5 kV to 230 kV. The substation includes, but is not limited to the following major components:

- 34.5 kV bus and associated switching devices
- 230 kV bus and associated switching devices
- 34.5/230 kV transformer
- 34.5 kV capacitors (as required)
- Grounding grid
- Prefabricated modular control building (unoccupied except during inspection and maintenance)
- Perimeter security fence.

2.2.3. Gen-tie lines and associated structures

The gen-tie power line route from this facility will be within Boulder City's Eldorado Valley Energy Zone. The 230-kV gen-tie power line will consist of a new, second circuit on some of Copper Mountain Solar 2's existing common structures in the gen-tie easement corridor along

Eldorado Valley Drive. The common structures are monopole towers no more than 120 feet high on concrete pier foundations. The span between supporting structures ranges between 200 and 700 feet.

Access for construction and maintenance of the gen-tie and the solar facility will be along Eldorado Valley Drive. A driveway from Eldorado Valley Drive will access a parking area located adjacent to the on-site solar switchyard.

The design characteristics of the existing 230 kV gen-tie line are listed in Table 2.

Table 2. Typical Design Characteristics for a 230 kV Gen-tie Line

Feature	230 kV Characteristics
Type of structure	Tubular Steel Structures
Structure height	Between 105 - 120 feet
Span length	Between 200 feet to 700 feet
Number of structures per mile	Approximately 10
Voltage	230 kV
Conductor size	up to 795 kcmil ACSR
Ground clearance of conductor	Minimum 30 feet
Pole foundation depth	19 to 24 feet

Figure 4 shows the existing CMS2 gen-tie line monopole structures where the new circuit will be suspended.

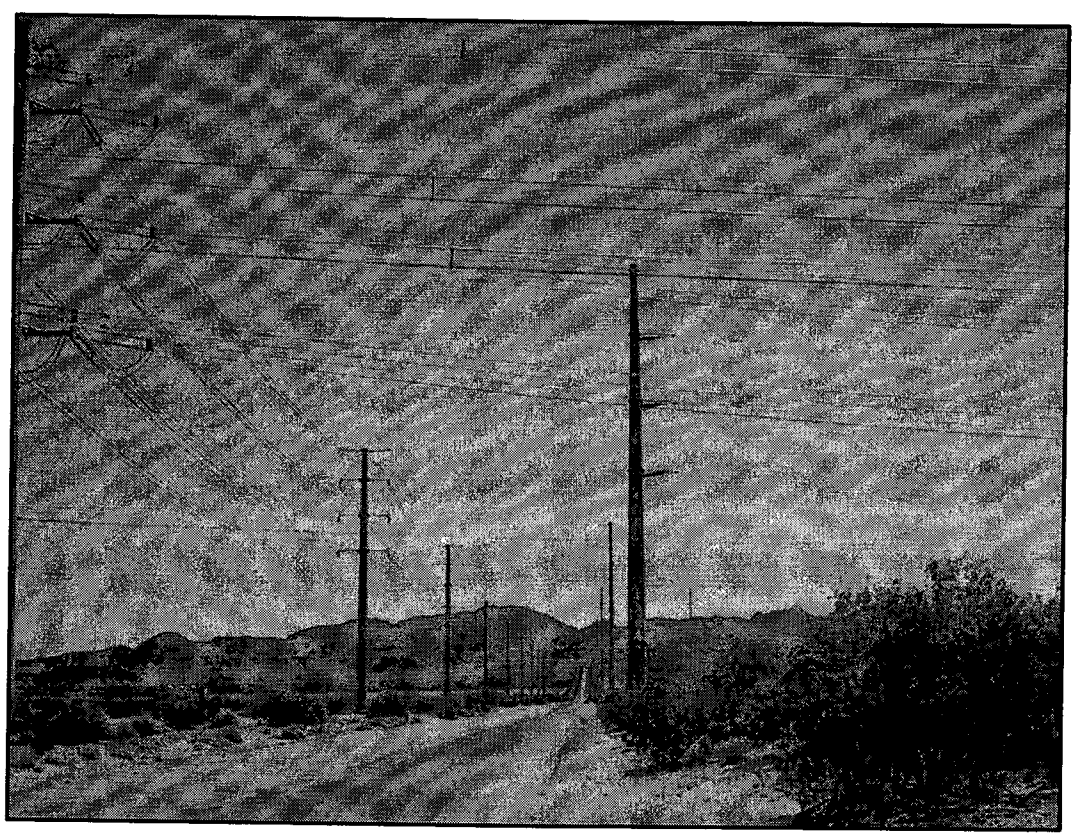


Figure 4. Existing Gen-tie Steel Monopoles along Eldorado Valley Drive Corridor.

2.2.4. Gen-tie Interconnection

The Project's substation will connect to Merchant Switchyard via a 230 kV gen-tie power line of approximately 0.5 miles from the proposed Project Solar Substation. The gen-tie will share some existing pole structures with the Copper Mountain Solar 2 Project. The gen-tie will also provide a communication path via OPGW fiber optic cable from the Project Solar Substation to Merchant Switchyard. A redundant communication path is also required.

2.2.5. Electrical System for Plant Auxiliaries

During daylight hours, power for plant auxiliaries will be provided by the Project's electrical generation. During non-daylight hours, the Project will require small amounts of power to keep transformers energized, and for plant lighting and security. This auxiliary power will be provided by back-feed from the electrical grid. Auxiliary power will be stepped down to an appropriate voltage to support plant auxiliaries and will be connected to the station service power switchgear.

2.2.6. Plant Auxiliaries Process Description

The following subsections describe the various power plant auxiliary systems associated with the Project.

2.2.6.1. Water

CMS4 proposes to utilize an existing waterline along Eldorado Valley Road that connects to Boulder City's water main. This connection would provide water during construction of the solar facility and gen-tie. Under the terms of an agreement with the City of Boulder City, water will be made available to the Project from the City's water supply. Water is provided by connection to the Boulder City's 14 inch water main located along the west side of US-95.

During the construction phases of the Project, water will primarily be used for grading and for dust control. Construction is estimated to take 18 months to complete. It is assumed that dust control will be required up to the point when the panels are installed. Total water needs for the Project including dust control were estimated to be up to 295 acre-feet per year during construction.

2.2.6.2. Plant Control System

The microprocessor-based plant control system ("PCS") will provide control, monitoring, alarm, and data storage functions for plant systems as well as communication with the Solar Field SCADA system. Redundant capability will be provided for critical PCS components so that no single component failure will cause a plant outage.

All field instruments and controls will be hard-wired to local electrical panels. Local panels will be hard-wired to the plant PCS system.

Operator interface for plant control will be via Human Machine Interface (HMI) work stations located within the Copper Mountain Solar 3 (CMS3) Operations and Maintenance Building. Communications between CMS4 and CMS1 will be

2.2.6.3. Lighting System

The Project's lighting system will provide operation and maintenance personnel with illumination for both normal and emergency conditions. Lighting will be designed to provide the minimum illumination needed to achieve safety and security objectives and will be downward facing and shielded to focus illumination on the desired areas only. There will be no lighting in the solar field, so light trespass on the surrounding properties will be minimal. If lighting at individual solar panels or other equipment is needed for night maintenance, portable lighting will be used. There will be lighting at the substation to provide personnel with illumination for substation operation and maintenance under normal conditions, and means of egress under emergency conditions.

2.2.6.4. Cathodic Protection Systems

Underground metal structures will have cathodic protection, as necessary, based on soil conditions, to avoid corrosion of metal surfaces.

2.2.6.5. Site Access, Roads, Fencing, and Security

As depicted in Figure 2, the existing paved Eldorado Valley Drive crosses through the Project site. An additional unpaved road will extend around the perimeter of the site. Subsidiary unpaved roads will provide operations and maintenance access to the facility.

The perimeter of the solar site will be enclosed by a 7-foot-high chain link fence that may be topped with a one-foot barbed wire section. The two access points from Eldorado Valley Drive to the site will be controlled-access (authorized personnel only) by employing swinging or rolling chain link gates.

2.3. Fabrication and Construction

2.3.1. Preconstruction Site Drainage Characteristics

Most of the Project site will be drained by sheet flow to perpetuate the existing flow patterns through the site. Areas of the facility that may release contaminants, such as the control building, inverters and substation, will be elevated above the 100-year flood event, as appropriate. On- and off-site drainage is being coordinated with the City's Public Works Department and the Clark County Regional Flood Control District.

2.3.2. Clearing, Grubbing, and Grading

Minor grading will occur throughout the solar field to create a uniformly graded site. Vegetation will be removed as needed; however, there is minimal vegetation on the Project site. Minor

grading will include cuts and fills that are not expected to exceed 24 inches. The minor grading will be limited to that necessary for the technology chosen.

2.3.3. Assembly and Construction

A temporary construction workspace located adjacent to the solar field area would include a parking area, a construction office, a warehouse, and a laydown area. All of these facilities would be removed once Project construction is completed.

Assembly of the solar panel units and construction of the solar array will occur concurrently. The solar panel units will be assembled within the Project area footprint. Multiple temporary staging and laydown areas will be located throughout the Project site to support final assembly and installation.

As construction progresses across the site, equipment will be removed from each temporary staging and laydown area, and solar panel units will be installed. To provide concrete during construction, an off-site ready mix plant will be used and trucks will be required to deliver concrete.

Construction of the solar array will occur in a series of approximately 1- to 3-MW blocks. Each block will be connected to the electrical grid as it is completed. Improved (earthen or gravel) roads will be located in a generally north-south orientation to allow access within the solar array.

Stringing lines on the existing 230-kV gen-tie poles will occur concurrently with the solar array construction and solar panel unit assembly. Structure heights are no more than 120 feet. Span lengths are approximately 200 feet to 700 feet, with approximately 10 structures per mile. Conductor stringing will occur by stationing stringing equipment at stringing sites along the gen-tie route, with smaller equipment (pickup trucks and flatbed trucks) traveling along the gen-tie line route as the conductor is installed. Stringing will take place within the existing gen-tie line right-of-way.

Typical equipment expected to be used for gen-tie line stringing includes:

- crane,
- line truck with air compressor,
- various pickup and flatbed trucks,
- bucket trucks, and
- truck-mounted tensioner and puller.

2.3.4. Design and Construction Schedule

CMS4 anticipates that construction of the solar facility will begin in early-2015 and continue for approximately 1.5 years, to be completed late in 2016. The anticipated design and construction period for the solar facility is presented in Table 3 below.

Table 3. Construction Schedule

Milestones	Dates
Receive CEC Pre-Certification as eligible for California's Renewables Portfolio Standard	1/21/2014
Obtain control of all lands and rights-of-way comprising the Site	6/24/2014
File UEPA permitting application	10/3/2014
Execute Interconnection Agreement ("LGIA")	10/17/2014
Execute Affected Participating Transmission Owner Upgrades Facilities Agreement	10/31/2014
Receive UEPA permit approval from PUCN	12/192014
Execute an Engineering, Procurement and Construction ("EPC") contract	11/30/2014
Deliver full notice to proceed ("FNTP") under EPC contract	4/30/2015
Begin construction of Project	4/30/2015
Execute Meter Service Agreement and Participating Generator Agreement	12/31/2015
Achieve initial operation	02/01/2016
Achieve substantial completion	09/30/2016
Receive CEC Certification and Verification	12/31/2016

Typical construction work schedules are expected to be from 7:00 A.M. to 5:00 P.M., Monday through Friday, which complies with the local noise ordinance restrictions for construction activity of 7:00 AM to 7:00 PM, except Sundays and federal holidays.

2.3.5. Construction Sequencing

Given the proposed Commercial Operation Date is September 30, 2016, CMS4 will commence construction on April 30, 2015. The construction period is approximately 1.5 years. The engineering process may commence before starting construction and is divided between the basic design phase and detail design phase. During the basic design phase, key information drawings and technical specifications will be developed. The RFP for the GCC (General Construction Contractor) will be developed and issued at the stage as well. At the detail design phase, the Engineering, Procurement and Construction contract will be executed and the detail drawings and specifications for all equipment will be completed. Procurement of equipment will be conducted at the time of construction commencement.

There will be two phases of construction as follows:

1. Grading/Temporary Construction Facilities. Grading of the pad for the collector substation and establishment of temporary construction facilities associated with the collector substation and 230 kV transmission line. Grading of the site for the solar photovoltaic facility and establishment of temporary construction facilities associated with the solar photovoltaic facility.

2. Substation, Gen-Tie and Solar Field Construction. Construction of the collector substation facilities and the 230 kV transmission line extending from the collector substation to Merchant Substation. Construction of the solar photovoltaic facilities.

The construction stage will commence with site mobilization. Site clearing and grading work will last for approximately 3 months or as required to support Project schedule. Piling work will then commence. Following normal installation processes for similar PV plants, the mounting structure will first be installed. Next, the modules will be installed and connected to each other in series as a string. The solar generation facility will be installed as a unit block concept with 94 MW_{AC} capacity. The construction of the Solar Substation is expected to last for approximately 5 months including its commissioning, and expected to commence between 2015Q2 and 2015Q3. The commissioning for all components of the plant will be conducted separately. Upon completion of conventional commissioning, a "Performance and Acceptance" test will be performed.

Temporary construction facilities will include:

- Full-length trailer offices or equivalent
- Parking for construction worker vehicles
- Construction equipment parking
- Chemical toilets
- Holding Tanks and/or Temporary Septic System
- Tool sheds/containers
- Covered assembly area
- Solar field equipment laydown area
- Water Holding Pond
- Diesel Power Generator(s).

Construction materials such as concrete, pipe, wire and cable, fuels, reinforcing steel and small tools and consumables will be delivered to the site by truck. Initial grading work will include the use of excavators, graders, dump trucks, and end loaders, in addition to support pickups, water trucks, and cranes. It is anticipated that the following equipment will be required:

- Scraper(s)
- Concrete truck(s)
- Motor grader(s)
- Backhoe/loader(s)
- Excavator(s)
- Truck-mounted crane(s)
- Dozer(s)
- Grader-all(s)
- Dump truck(s)
- Flatbed truck(s) for pre-cast foundations
- Pad drum vibrato' roller(s)
- Trencher(s)
- Water truck(s)
- Pile driver(s)
- Lightweight truck(s).

2.3.6. Construction Staff

The workforce needed for the Project will vary during construction, with the peak personnel during construction to be close to 400 people. Table 4 and Figure 5 depict the anticipated construction workforce for the duration of construction.

Table 4. Estimated Personnel During Construction

Company	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16
Engineering	2	6	6	10	15	20	20	20	20	20	20	15	10	10	5	2	2
Electrical			50	100	200	200	200	200	200	150	150	120	75	40	10	2	2
Racking			25	60	60	60	60	60	60	60	60	20	20				
Civil		25	50	50	50	50	50	50	50	50	50						
Post Installation			20	30	30	30	30	30	30								
Fencing		15	15	15	15	15	15										
Biological Monitoring		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Soil Testing				2	3	3	3	3	3	2	2	2					
Total	**2**	**47**	**167**	**268**	**324**	**379**	**379**	**364**	**364**	**314**	**283**	**158**	**108**	**51**	**16**	**5**	**5**

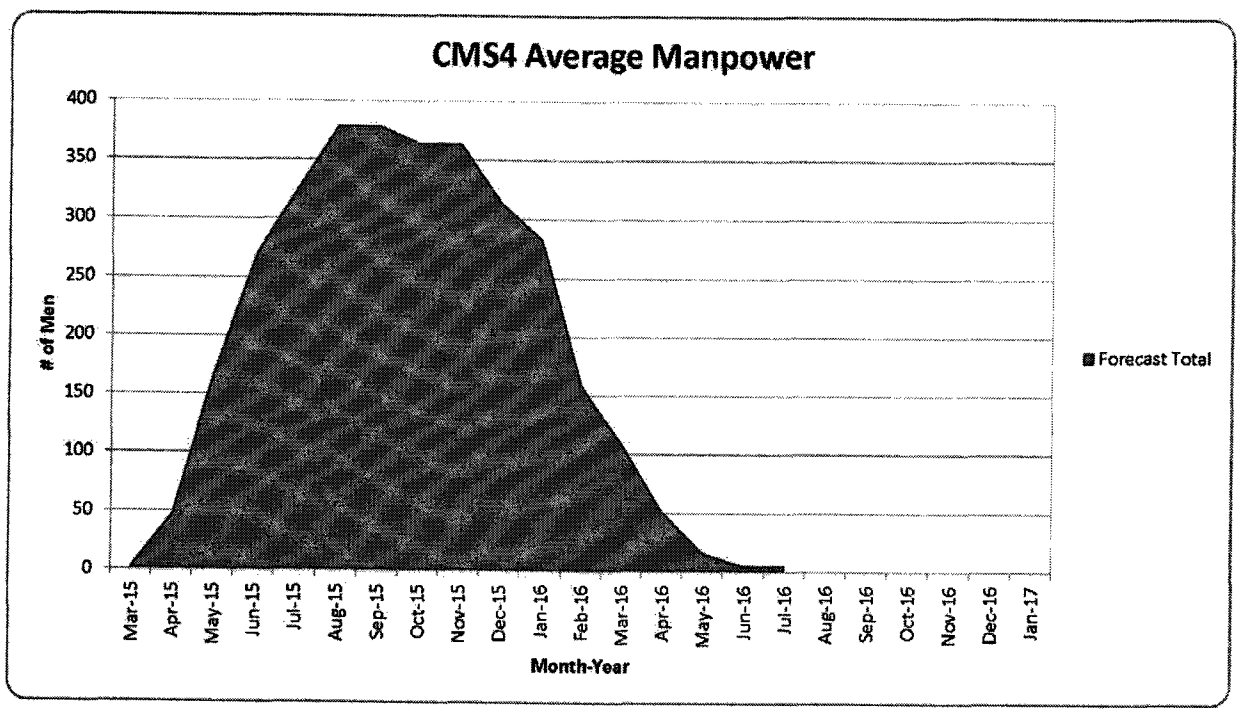


Figure 5. Average Manpower During Construction

2.3.7. Construction Waste Management

During construction, the primary waste generated will be solid non-hazardous waste. However, some non-hazardous liquid waste and hazardous waste (solid and liquid) will also be generated. All of the waste generated by the Project will be at the Project site. The types of waste potentially generated during construction are described in the following discussion.

2.3.7.1. Non-hazardous Solid Waste/Wastewater

Project construction could potentially generate the following non-hazardous waste streams:

Paper, Wood, Glass, and Plastics: Paper, wood, glass, and plastic wastes are typically generated from packing materials, waste lumber, insulation and empty non-hazardous chemical containers. These wastes will be recycled to the extent practical. Waste that cannot be recycled will be disposed of weekly at an appropriately licensed landfill. On site, the waste will be placed in dumpsters.

Metal: Metal wastes that include steel (from welding and cutting operations, packing materials, and empty non-hazardous chemical containers) and aluminum waste (from packing materials and electrical wiring) will be generated during construction. Metal waste will be recycled where practical and non-recyclable waste will be deposited in an appropriately licensed landfill.

2.3.7.2. Wastewater

During construction, wastewater will be collected in self-contained systems which will be pumped and disposed of in accordance with local requirements. Wastewater generated during construction will include sanitary waste, stormwater runoff, and equipment washdown water. These wastewaters may be classified as hazardous or nonhazardous depending on their chemical quality, and handled and disposed of in accordance with applicable laws. See Section 2.3.7.3 for additional discussion of hazardous wastewaters.

2.3.7.3. Hazardous Waste

Most of the hazardous waste generated during construction will consist of liquid waste, such as flushing and cleaning fluids, passivating fluid (to prepare pipes for use), and solvents. Some hazardous solid waste, such as welding materials and dried paint, may also be generated during construction.

When pipes are cleaned and flushed, waste liquid will be generated. The volume of flushing and cleaning liquid waste generated is estimated to be one to two times the internal volume of the pipes cleaned. The quantity of welding, solvent, and paint waste is expected to be minimal. Wastewaters generated during construction could also be identified as hazardous, based on sampling and testing results.

2.3.8. Erosion and Sediment Control Measures

Due to the removal or disturbance of soil and vegetation during construction, appropriate water erosion and dust-control measures will be required to minimize dust and sediment load to water bodies.

2.3.8.1. Water Erosion Control Measures

The Project will implement Best Management Practices ("BMPs") erosion-control measures to control stormwater runoff. Site-specific BMPs will be implemented by the contractor in compliance with regulations and permit conditions. As appropriate, the Project will implement practices for temporary and final erosion control, including:

- Monitor the weather using National Weather Service reports during construction to track conditions and alert crews to the onset of rainfall events.
- Preserve existing vegetation where feasible. Conduct clearing and grading only in areas necessary for Project activities and equipment traffic. Install temporary fencing or signage prior to construction along the boundaries of the construction zone to clearly mark this zone, preventing vehicles or personnel from straying onto adjacent off-site habitat.
- Sequence construction activities with the installation of erosion control and sediment control measures. Arrange the construction schedule as much as practicable to leave existing vegetation undisturbed until grading begins.
- Stabilize non-active areas as soon as feasible on those portions of the Project site where construction has temporarily or permanently ceased.
- Place covers over stockpiles prior to forecasted storm events and during windy conditions as necessary to prevent erosion of stockpiles. Place sediment controls (e.g., fiber rolls, straw bales, silt fencing) around the perimeter of stockpiled materials to control sediment runoff.
- Maintain sufficient erosion control materials on-site to allow implementation of BMPs. This includes implementation requirements for active areas and non-active areas that require deployment before the onset of rain.
- Promptly repair and reapply controls according to BMPs in areas where erosion is evident.

2.3.8.2. Wind Erosion Control Measures

The Project will implement the following practices for wind erosion control:

- Minimize vegetation removal and grading to the extent practicable.
- Apply water to disturbed soil areas of the Project site to control dust and maintain optimum moisture levels for compaction as needed. Apply the water using water trucks. Minimize water application rates as necessary to prevent runoff and ponding.

- During windy conditions forecast or actual wind conditions of approximately 25 miles per hour or greater, apply dust control to haul roads to adequately control wind erosion. Cover exposed stockpiled material areas.
- Suspend excavation and grading during periods of high winds when dust cannot be reasonably controlled.
- Cover all trucks hauling soil and other loose material or maintain at least 2 feet of freeboard.

2.4. Operation and Maintenance

2.4.1. Facility Operation

O&M activities associated with a PV power plant are much different than those associated with conventional power plants. Operation of the facility would be managed, remotely monitored, and controlled by the existing staff of the CMS3 facility, and maintained by operations and maintenance personnel shared with the neighboring CMS1 facility. CMS1 was completed in December 2010 and has been operating for nearly four years. The primary third-party maintenance and security services will be based out of the greater Las Vegas area.

Daily operation of the plant will begin when there is sufficient sunlight to begin operation of the single-axis tracking solar arrays. Operators work rotating 12-hour shifts, and will be on site during generation hours. Operators will be on site weekends and may work nights to complete maintenance requirements. After the Project is constructed, a security contract will be shared with CMS1 and CMS2. Security staff, either employees or contract personnel, may conduct patrols and monitoring of the site during nighttime hours.

2.4.2. Maintenance

Long-term maintenance schedules will be developed to include periodic maintenance and equipment replacement in accordance with manufacturer recommendations. Solar panels may be warrantied for 20 to 25 years and are expected to have a life of 40 years. Moving parts, such as tracker motors, motorized circuit breakers and disconnects, and inverter ventilation equipment, will be serviced on a regular basis, and unscheduled maintenance will be conducted as necessary.

Due to the efficiencies gained by adopting solar panel technology, the cost and time for O&M is expected to be minimal compared to that of conventional power plants.

2.4.3. Waste Management

The primary waste generated at the Project site during operations will be non-hazardous solid waste. However, varying quantities of liquid non-hazardous waste and solid and liquid hazardous waste will also be generated. The types of wastes and their estimated quantities are discussed below.

2.4.3.1. Non-hazardous Solid Waste

The Project will produce non-hazardous waste, including rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, typical refuse generated by workers and small office operations, and other miscellaneous solid wastes. Large metal parts will be recycled. Other non-hazardous wastes will be disposed of in an appropriately licensed landfill.

Only limited hazardous materials are associated with the operation of the Project. However, during maintenance activities, the potential for a vehicle petroleum spill exists. Spill cleanup kits will be available on equipment so that spills or leaks of vehicle fluids could be quickly cleaned up for proper disposal. Material storage yards, and access roads will be kept in an orderly condition throughout the construction period. Refuse and trash, including stakes and flags, will be removed from the sites and disposed of in an approved manner. No construction equipment oil or fuel will be drained on the ground. Oils or chemicals will be hauled to an approved site for disposal.

2.4.3.2. Non-hazardous Wastewater

During operation, routine semi-annual or annual panel cleaning is not anticipated due to clear local conditions and occasional rainfall. If the panels become soiled over time, water would be used to wash dust and dirt off each solar panel for a cleaning. This water will be non-hazardous and will be allowed to flow onto the ground.

2.4.3.3. Hazardous Waste

Limited quantities of hazardous materials will be used and stored at CMS1 for operation and maintenance that may require disposal as hazardous waste. These materials will include oils, diesel fuel, lubricants, solvents, janitorial supplies, office supplies, laboratory supplies, paint, degreasers, herbicides, pesticides, air conditioning fluids (chlorofluorocarbons [CFC]), sulfur hexafluoride (SF6), gasoline, hydraulic fluid, propane, and welding rods. These materials will generally be used in small quantities.

Any hazardous materials will be stored in the warehouse area of the CMS1 O&M building. Flammable materials, such as paints and solvents, will be stored in flammable material storage cabinets with built-in containment sumps. The remainder of the materials will be stored on shelves, as appropriate. Due to the small quantities involved, the controlled environment, and the concrete floor of the CMS1 O&M building, a spill will be able to be cleaned up without resulting in any considerable environmental consequences.

The PV panels and inverters produce no waste during operation. However, the PV panels may include solid materials that are considered to be hazardous, such as cadmium telluride. As such materials are in a solid and non-leachable state, broken PV panels would not be a source of pollution to storm water.

2.4.4. Decommissioning

CMS4 would operate the Project for the foreseeable future. However, CMS 4 will be required to remove its facilities following the termination of the Project site lease from the City. When the Project ultimately is decommissioned, the PV panels, support structures, and electrical equipment would be removed. The PV panels and inverters produce no waste during operation, and the panels and related equipment are solid and in a non-leachable state. Thus, no ground decontamination or remediation would be required. All panels removed from the site would be returned to the manufacturer or trucked off-site to an appropriate disposal facility.

2.4.5. Health and Safety

The health and safety of employees and contractors is a high priority. All employees and contractors will be required to adhere to the appropriate health and safety plans and emergency response plans. All construction and operation contractors will be required to operate under a health and safety program that meets industry standards.

An operational Environmental Health and Safety Plan will be prepared for the proposed solar facility and gen-tie line. The Safety Plan will outline all Project activities, identify all hazardous substances and chemicals used at the site, and ensure compliance with Occupational Safety and Health Administration (OSHA) Standards, the Nevada Division of Industrial Relations requirements, and all other local, state, and federal regulatory requirements. The Safety Plan will identify site-specific safety control measures, site health and safety roles and responsibilities, speed limits, and site safety hazards and controls.

2.4.6. Site Security and Lighting

The Project site will be secured with 7-foot chain-link fencing that may be topped with barbed wire. Lighting will be provided at the control building, and the main plant access road. Lighting will be directed downward and shielded as required by County and local ordinance to minimize light trespass. A perimeter security system may also be installed as necessary.

2.5. Alternatives Considered but Eliminated from Detailed Consideration

Potential alternatives for the proposed CMS4 Project were evaluated to determine whether they could substantially achieve the Project goals and objectives in order to be considered feasible and appropriate for further consideration. This section describes the evaluation criteria, interconnection options, and technologies eliminated because they did not meet the Project objectives and/or did not reduce environmental consequences compared to the proposed action.

2.5.1. Facility Location Criteria

The primary objective of CMS4 was to locate the solar facility in southern Nevada. A number of criteria were developed and used in evaluating appropriate sites including:

- adequate solar irradiation;
- close proximity to a high capacity substation with access to multiple energy markets;
- adequate transmission capacity to convey the electrical output of the Project;
- minimal environmental concerns;
- relatively flat site to minimize the need for site grading;
- existing access to accommodate construction workforce needs;
- land parcel large enough to accommodate a utility scale solar facility; and
- access to nearby workforce sufficient to support Project construction.

The Project site is located within Boulder City's Eldorado Valley Energy Zone, which meets all of the Project's siting objectives. Boulder City has established a zoning category of Energy Resource Zone[2] ("ER") in which land may be used for the development of private and/or public solar and gas-fired electric generation facilities, electrical transmission and distribution facilities, ancillary facilities, and other similar uses as permitted uses. The Eldorado Valley Energy Zone is an approximately 8,000 acre area specifically designated for this use. The remote location of the Energy Zone with respect to the Boulder City population center minimizes the potential for impacts affecting the local population. Noise, visual, and traffic impacts are all minimized by locating the Project in the Energy Zone. Four utility-scale solar generating facilities are already in commercial operation or under construction within the Energy Zone (Nevada Solar One, CMS1, CMS2 and CMS3). Other commercial solar projects are contemplated in the Energy Zone. Environmental pre-permitting of the Energy Zone by the City allows the Project to proceed based on the issuance of a building permit by Boulder City. Species mitigation is accomplished through payment of an established Clark County fee.

The Project site is located near several electrical substations/switchyards, including Merchant, Nevada Solar One, Eldorado, Marketplace and McCullough. These substations could provide the Project with access to multiple energy markets including direct interconnection to the California Independent System Operator, NV Energy, and municipal systems.

2.5.2. Gen-tie Power Line Criteria

Another key objective of CMS4 was to locate the PV facility and the gen-tie line in an area such that: (1) the length of the gen-tie line interconnection to the electrical grid is less than 5 miles to minimize gen-tie line losses and costs; and (2) necessary gen-tie line ROW can be acquired. The Project site meets these criteria through use of the existing CMS2 gen-tie poles to convey power to the grid at the nearby Merchant substation.

[2] See Boulder City, Nevada's Zoning Ordinance, Title 11, Chapter 19.

2.5.3. Alternatives Considered and Eliminated

Alternative gen-tie route options and technologies were considered and eliminated are summarized below.

2.5.3.1. Alternative Gen-tie Routes

No alternative Gen-tie line routes were considered for the Project. Because an existing gen-tie power line runs through the Project area, the existing poles can be used for the proposed Project with minimal environmental impacts and minimal cost, and a different route would not have any advantages.

2.5.3.2. Alternative Technologies

The CMS4 Project is designed to utilize crystalline silicon or thin-film PV technology mounted on single-axis tracker racking. Other solar technologies considered by CMS4 for the Project included concentrating PV and solar thermal technologies. The water demand is significantly greater for solar thermal technology and therefore presents greater environmental concerns. Crystalline silicon and thin film are commercially-proven technologies already in use by affiliates of CMS4 in the Eldorado Valley.

CMS4 determined that using crystalline silicon or thin film PV solar panels is the preferred technology for this Project given the comparatively low water requirements, and reliable, proven technology. Additionally, none of the alternative technologies mentioned above are considered to be capable of reducing the potential environmental impacts associated with the proposed action. Concentrating solar would have greater impacts on visual and biological resources and solar thermal would increase water use. Therefore, other alternative solar technologies were eliminated from further consideration.

3. Existing Setting and Environmental Consequences

The proposed Project site is located in the Boulder City Solar Energy Zone in the Eldorado Valley, Clark County, Nevada. This site is approximately 17 miles south of Henderson, Nevada and within the incorporated City of Boulder City.

The Eldorado Valley is within the southern portion of the Basin and Range province characterized by north-south trending valleys. Specifically, this portion of the Eldorado Valley is flanked by the McCullough Mountain Range directly west and the Eldorado Range directly to the east.

Resources analyzed in this ES include the following:

- Geology, Minerals and Soils, Section 3.1
- Water Resources, Section 3.2
- Air Quality and Climate, Section 3.3
- Biological Resources Section 3.4
- Cultural Resources, Section 3.5
- Land Use Section 3.6
- Transportation, Section 3.7
- Visual Resources, Section 3.8
- Noise, Section 3.9
- Waste Management and Hazardous Materials, Section 3.10
- Socioeconomics, Section 3.11

3.1. Geology, Soils, and Paleontology

This section describes the geological, soils, and paleontological resources in the area, the impacts of the proposed Project on these resources, and the best management practices (BMPs) / mitigation measures designed to reduce these impacts.

3.1.1. Existing Setting

Eldorado Valley has an area of roughly 530 square miles (State of Nevada 1966). It is a closed drainage basin bounded to the west by the McCullough Range, to the north by the River Mountains, and the east by the Eldorado Mountains and the Opal Mountains. The mid-Tertiary volcanic and plutonic rocks occur in the McCullough, River, and Eldorado Mountains. The southern part of the McCullough Range and the Opal Mountains are formed primarily of Pre-Cambrian foliated metamorphic rock. The Eldorado Mountains were uplifted during the Miocene Basin and Range Uplift. The valley floor of Eldorado Valley is between 1,708 and 1,760 feet (State of Nevada 1966).

The Project site is located on alluvial soils in the Eldorado Valley. The Eldorado Valley is within the southern portion of the Basin and Range Province characterized by north-south trending valleys, bounded by normal faults, with alluvial fill underlain by older bedrock units. Based on the Geologic Map of the Boulder City 15-Minute Quadrangle, Clark County, Nevada (USGS 1977), the site is underlain by Holocene alluvium and fanglomerate. The alluvium is reportedly unlithified, poorly sorted basin-fill clastic deposits that form fans and sheets in the Eldorado Valley. The thickness of the alluvium below the site is approximately 1,000 feet, where it is underlain by bedrock of the Bridge Spring formation, a Miocene-age rhyolitic ash-flow tuff.

The soil textures in the Project area are sandy clay loam, very gravelly, loamy sand, silty clay loam, and very gravelly, fine sandy loam (NRCS 2012). The soil slopes range from 0 to 2 percent. The soil erosion potential for the entire Project area is low. The Project area has a moderate wind erosion potential, soils with rapid permeability (rare frequency of flooding), and very deep soil depths.

According to the Supplemental Environmental Impact Statement for the Clark County Regional Flood Control District (BLM 2004), the Quaternary alluvial deposits that cover most of the valley floors (Las Vegas Valley and Boulder City) including the Project site, have little or no paleontological potential.

3.1.2. Environmental Consequences

This section summarizes potential geologic and soil hazards or constraints on the proposed solar facility, gen-tie line, and access road.

Soils: The erosion susceptibility of the soils in Eldorado Valley ranges from low to moderate under the proposed action (BLM 1992). Soils disturbed by grading, excavation, and construction

will have a higher potential for erosion by wind and water. Grading of the solar field will include cuts and fills that are not expected to exceed 24 inches. The minor grading will be limited to that necessary for the technology chosen.

Some potential for soil erosion exists from the proposed solar field site, due to soil disturbance and removal of vegetation. The Project will utilize BMPs for soil protection thereby minimizing the contribution to cumulative impacts. In addition, a fugitive dust plan will be developed with mitigation measures to reduce the potential for fugitive dust.

Faulting: The nearest potentially active fault is a 2-mile long feature located within the Eldorado Valley. Based on the estimated ages of faulted deposits and scarp-profile interpretation, the most recent surface faulting event probably occurred less than 11,000 years ago. Diffusion-equation modeling of the scarp suggests that the age of the fault ranged from 5,500 to 8,200 years ago (City of Las Vegas 2010). This site, as well as most of the southern Nevada region, may experience ground shaking from possible future earthquakes in the region. In Clark County there have never been any major earthquakes (City of Las Vegas 2010). However, tremors of intensities ranging between VI and VII on the Modified Mercalli Scale have been felt in the Clark County area as a result of strong earthquakes in west-central Nevada and Southern California. Because of these occurrences, the Las Vegas area is classified in Seismic Zone 2B of the Uniform Building Code (UBC) so that construction should remain sound if subjected to Modified Mercalli Scale intensities of VII (City of Las Vegas 2010). Therefore, potential impacts to the Project from earthquakes are minor.

Mineral Resources: River Mountains Area of Critical Environmental Concern (ACEC) is an area of about 45 km^2, east of the City of Henderson, near Boulder City. The area is underlain by Miocene volcanic rocks, but no important mineral deposits are known nearby (USGS 2004). The Keyhole Canyon ACEC is about 4 km east of U.S. 95, just west of Boulder City. There has been no known mining in the immediate area of Keyhole Canyon (USGS 2004), therefore, no impacts to mining operations are expected as a result of the Project.

Paleontological Resources: There are no known paleontological resources or fossils that are sensitive or legally protected in the Project area (Longwell, et al. 1965).

3.1.3. Mitigation Measures

Before the start of construction, the construction contractor will address potential impacts from erosion and obtain a dust control permit from the Clark County Department of Air Quality and Environmental Management as required. Other potential BMPs/mitigation measures may include, but are not limited to, the following:

- Minimize grading and vegetation removal, and limit surface disturbance during construction to the time just before PV module support structure installation;

- Limit vehicular speeds on non-paved roads (Clark County ordinance speed limit is 25 miles per hour mph);
- Apply water to disturbed soil areas of the Project site to control dust and maintain optimum moisture levels for compaction, as needed. Apply the water using water trucks. Minimize water application rates, as necessary, to prevent runoff and ponding;
- Apply dust control measures to haul roads to adequately control wind erosion during windy conditions (forecast or actual wind conditions of approximately 25 miles per hour or greater). Cover exposed stockpiled material areas;
- Suspend excavation and grading during periods of high winds;
- Cover all trucks hauling soil and other loose material or maintain at least 2 feet of freeboard;
- Use gravel or other similar material where dirt access roads intersect the paved roadways to prevent mud and dirt track-out;
- All paved roads will be kept clean of objectionable amounts of mud, dirt, or debris, as necessary;
- Applying soil stabilizers, where permissible;
- Installing a construction entrance with track-out control devices;
- Stabilizing of disturbed surfaces after construction is completed;
- All construction vehicle movement will be restricted to the Project area, pre-designated access roads, and public roads
- Site inspections will be conducted by the construction contractor during the construction period to ensure that erosion-control measures were properly installed and are functioning effectively;
- Prohibiting construction activities when the soil is too wet to adequately support construction equipment;
- Construction activities will be limited to the Project area to reduce soil compaction, erosion, and vegetation loss;
- Implement BMPs such as locating waste and excess excavated materials outside drainages to avoid sedimentation; and,
- Install silt fences, temporary earthen berms, temporary water bars, sediment traps, stone check dams, or other equivalent measures (including installing erosion-control measures around the perimeter of stockpiled fill material), as necessary.

3.2. Water Resources

Hydrologic resources include groundwater, surface water, and wetlands. Groundwater quality and the issuance of permits for the use of both groundwater and surface water are overseen by the State Engineer under authority granted by the Nevada Revised Statutes 533 and 534. Wetlands are managed by the US Army Corps of Engineers. This section describes the water resources in the area, the impacts of the proposed Project on these resources, and the best management practices/mitigation measures that will reduce these impacts.

3.2.1. Existing Setting

3.2.1.1. Groundwater

The Eldorado Valley is part of the Las Vegas Flow System, a subsystem of the regional Colorado Flow System. Precipitation originating in the mountains surrounding the Eldorado Valley flows toward the axis of the basin and then northward into either the Las Vegas Valley or eastward to the Colorado River Valley, eventually becoming groundwater. An estimated 1,000 acre-feet of groundwater discharges annually to the Colorado River Valley (Harrill et al. 1988).

The two sources from which groundwater in the Eldorado Valley area is derived include the recharge of the basin via precipitation (an estimated 1,100 acre-feet/year) and as subsurface inflow from Hidden Valley. The inflow from Hidden Valley is thought to be less than 300 acre-feet per year (Rush and Huxel 1966).

Eldorado Valley's groundwater has high concentrations of total dissolved solids, medium to high salinity hazard, and is primarily sodium-bicarbonate (Rush and Huxel 1966). Historically, some areas of the Eldorado Valley have groundwater that exceeds drinking water standards for concentrations of total dissolved solids, sulfate, and chloride. Other trace constituents and soluble metals may also be present in parts of the aquifer as a result of the presence of historic mining districts in the area. Iron, lead, manganese, mercury, and nitrate have been detected in the groundwater at levels which exceed their respective maximum contaminant levels according to records with the Clark County Department of Health Services (Buqo and Giampaoli 1988).

According to the Nevada Division of Water Resources, Eldorado Valley is a designated groundwater basin with high variability in the depth of water. Records from the Nevada Division of Water Resources list a borehole near the Marketplace substation, approximately 1.6 miles northwest of the Project site. The depth in the borehole to static groundwater was measured at 315 feet below land surface in 1994 (NDWR, 1994).

The Safe Drinking Water Act sets up barriers against pollution to drinking water which includes the protection of source waters. States and water suppliers are responsible for ensuring that these sources are protected. The state of Nevada's Division of Environmental Protection (NDEP) has

primary authority granted under this Act granted by the United States Environmental Protection Agency and has delegated responsibility to the owners, managers and operators of public water systems (NDEP 2013). Since source waters will not be contaminated as a result of any activities associated with the Project within Eldorado Valley, there is no regulation.

3.2.1.2. Surface Water

The presence of surface water resources in the Eldorado Valley is very limited. Estimated runoff within the basin, though not known, is estimated at less than 100 acre-feet/year (Scott et al., 1971). There is infrequent runoff from the surface which occurs as ephemeral flow in streambeds and, rarely, ponding of water occurs on the Eldorado Dry Lake. It is likely that the flooding characteristic of the Eldorado Valley basin exhibit shallow flash flooding over large areas as observed in surrounding basins. An earthen berm bordering the east side of U.S. Highway 95 serves in directing the infrequent stormwater runoff northward.

The Project site is located within Eldorado Valley, portions of which have been designated as a special flood hazard area subject to inundation by the 100-year floodplain. Areas to the north and southwest of the Project are within a designated floodplain. However, the Project is not within the 100-year floodplain. "Water of the United States," defined in 33 CFR 328.3(a) to include navigable waters as well as intermittent streams, are not present in the Eldorado Valley. Additionally, the Project site does contain hydric soils and habitat in the area does not meet the definition of a wetland. It does not contain: (1) wetlands, wetland fringes or adjacent wetlands, or (2) spawning, feeding, or nesting areas for fish or other important aquatic species.

As the Eldorado Valley is a closed basin in which surface water runoff from the surrounding mountains is directed to the Eldorado Dry Lake, a permit is not expected to be required for this project; however, a jurisdictional determination report can be submitted to the U.S. Army Corps of Engineers if an official determination is necessary. No permanent surface waters or wetlands exist on or near the Project area. Narrow and shallow ephemeral drainage washes flow from south to north across the site. Though water does flow during infrequent storm events, since there is no connection of this flow to the Colorado River system, there is no regulation under section 404 of the Clean Water Act.

3.2.2. Environmental Consequences

3.2.2.1. Groundwater

Activities associated with the construction and operation of the Project will not have impacts at depths exceeding 30 feet, and therefore will not intercept or impact the groundwater, at approximately 315 feet, in any way. Groundwater will not be utilized for either the construction or operation of the Project.

Water for construction activities and for operation of the Project will be provided by a connection to the Boulder City Public Works Department's water main which is located along the west side of U.S. Highway 95. CMS4 will utilize a waterline that runs along Eldorado Valley Drive to transport water to the Project.

Water use during construction will be used primarily for dust control and will total approximately 295 acre-feet per year for the estimated 1.5 year construction period. A temporary lined pond and/or storage tanks will provide buffer for water storage and use.

Water use during the operation of the Project will also be provided by the water meter connection to the Boulder City Public Works department water main. Water may be used for dust control activities. It is anticipated that panel washing will not be necessary; however, in the event that it is water would be used for panel cleaning. Annual water usage is not expected to exceed 8 acre feet per year.

3.2.2.2. Surface Water

Activities associated with the construction and operation of the Project will not divert flows from areas of perennial flow or from ephemeral washes and will not divert water from downstream habitats. As no discharge of hazardous materials to surface water resources will occur, considerations under the Safe Drinking Water Act will not be required.

Increased soil disturbance will occur during construction of the Project, potentially resulting in increased levels of erosion. It is possible that this erosion will result in increased levels of sedimentation to the Eldorado Dry Lake. Potential impacts resulting from this increased erosion and sedimentation due to soil disturbance will be reduced through the use of BMPs and mitigation measures.

3.2.3. Mitigation Measures

3.2.3.1. Groundwater

As no excavation activities will be expected to exceed 30 feet in depth and the groundwater level is at approximately 315 feet, no groundwater mitigation measures will be necessary.

Project maintenance operations may require occasional cleaning of solar panels using water from the Boulder City Public Works Department's water main. While runoff from these activities will occur, no impacts will result from these activities due to the use of non-hazardous water sources as well as the extreme depth of the groundwater; therefore, no mitigation is required.

During construction of the Project, a sanitary facility will provide and maintain on-site portable toilets so no impacts to groundwater resources from discharge of sanitary wastewater will occur; therefore, no mitigation is required.

3.2.3.2. Surface Water

As no existing water bodies are located down gradient of the Project, no impacts to surface waters are anticipated; therefore, no mitigation is required.

The construction and operation of the Project will require a general permit for stormwater discharge which will include the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP). Mitigation measures will also be in place for control of on-site surface flows, impacts from increased erosion, and sedimentation due to soil disturbance activities as described in Chapter 2.

3.3. Air Quality

For the analysis, air quality is characterized by the existing concentrations of various pollutants and those conditions that influence the quality of the ambient air surrounding the proposed Project. The primary factors that determine the air quality of the region are the locations of air pollution sources, the type and magnitude of pollutant emissions, and the local meteorological conditions. This analysis takes into account these factors and provides a reliable and conservative prediction of the air impacts that would occur during construction and operation of the proposed Project. The Federal Clean Air Act (CAA) and subsequent amendments have provided the authority and framework for United States Environmental Protection Agency (USEPA) regulation of air emission sources. The USEPA regulations serve to establish requirements for the monitoring, control, and documentation of activities that affect ambient concentrations of certain pollutants that may endanger public health or welfare.

As an enforcement tool, the CAA established National Ambient Air Quality Standards (NAAQS), which have historically applied to six criteria pollutants—sulfur dioxide (SO2), carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter equal to or less than 10 microns in diameter (PM10), ozone (O3), and lead (Pb) (Table 5). These standards are defined in terms of threshold concentration (e.g., micrograms per cubic meter [μg/m3]) measured as an average for specified periods of time (averaging times). Short-term standards (i.e., 1-hour, 8-hour, or 24-hour averaging times) were established for pollutants with acute health effects, while long-term standards (i.e., annual averaging times) were established for pollutants with chronic health effects. More recently, additional standards for 8-hour average O3 concentrations and particulate matter equal to or less than 2.5 microns in diameter (PM2.5) were added.

This section describes the air quality in the area, the impacts of the proposed Project on air quality, and the best management practices (BMPs)/mitigation measures that will reduce these impacts.

Table 5. National Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards	
	Concentration	Averaging Time	Concentration	Averaging Time
Carbon monoxide	9 ppm (10 mg/m^3) 35 ppm (40 mg/m^3)	8-hour [(1)] 1-hour [(1)]		None
Lead	0.15 µg/m^3 [(2)]	Rolling 3-month average	Same as primary	
Nitrogen dioxide	0.053 ppm	Annual (arithmetic mean)	Same as primary	
	1 ppm	1-hour	None	
Particulate matter (PM_{10})	150 µg/m^3	24-hour [(3)]	Same as primary	
Particulate matter ($PM_{2.5}$)	15.0 µg/m^3	Annual [(4)] (arithmetic mean)	Same as primary	
	35 µg/m^3	24-hour [(5)]	Same as primary	
Ozone	0.075 ppm (2008 standard)	8-hour [(6)]	Same as primary	
	0.12 ppm	1-hour [(8)]	Same as primary	
Sulfur Dioxide	0.03 ppm	Annual (arithmetic mean)		
	0.14 ppm	24-hour [(1)]	0.5 ppm	3-hour [(1)]
	0.075 ppm	1-hour [(9)]		

Source: EPA 2011

mg/m^3 = milligrams per cubic meter, µg/m^3 = micrograms per cubic meter, ppm = parts per million by volume

Assumptions/Notes:

(1) Not to be exceeded more than once per year.

(2) Final rule signed October 15, 2008.

(3) Not to be exceeded more than once per year on average over three years.

(4) To attain this standard, the three-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

(5) To attain this standard, the three-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3 (effective December 17, 2006).

(6) To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

(7) (a) To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.

(7) (b) The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.

(8) (a) The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than 1.

(8) (b) As of June 15, 2005, EPA has revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas. For one of the 14 EAC areas (Denver, Colorado), the 1-hour standard was revoked on November 20, 2008. For the other 13 EAC areas, the 1-hour standard was revoked on April 15, 2009.

(9) Final rule signed June 2, 2010. To attain this standard, the 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 parts per billion.

Geographic areas are designated as attainment, non-attainment, or unclassified for each of the six criteria pollutants with respect to the NAAQS. If sufficient monitoring data are available and air

quality is shown to meet the NAAQS, the USEPA may designate an area as an attainment area. Areas in which air pollutant concentrations exceed the NAAQS are designated as non-attainment for specific pollutants and averaging times. Typically, non-attainment areas are urban regions and/or areas with higher-density industrial development. Because an area's status is designated separately for each criteria pollutant, one geographic area may have more than one classification.

Currently, Clark County meets the PM2.5 and NO2 and CO NAAQS, and is unclassifiable for Pb and SO2. The County is developing a maintenance plan for PM10. Clark County was re-designated to attainment for carbon monoxide in 2010 (Federal Register Vol. 75, No. 145, July 29, 2010), was re-designated to attainment for PM_{10} in 2010 (Federal Register Vol. 75, No. 148, August 3, 2010), and was re-designated to attainment for ozone in 2011 (Federal Register Vol. 76, No. 60, March 29, 2011).

Currently there are no emission limits for so-called greenhouse gases (GHG), and no technically defensible methodology for predicting potential climate changes from GHG emissions. However, there are, and will continue to be, several efforts to address GHG emissions.

Ongoing scientific research has identified the potential impacts on the global climate of anthropogenic (manmade) GHG emissions and changes in biological carbon sequestration due to land management activities. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks cause a net warming effect on the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back to space. Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused carbon dioxide concentrations to increase dramatically, and are likely to contribute to overall global climatic changes.

3.3.1. Existing Setting

The Project area and surrounding region is located near a dry lake bed in the low-elevation arid Mojave Desert, surrounded by desert mountain terrain, all within Clark County, Nevada. Clark County maintains an arid climate year round, with an average temperature of 68 degrees Fahrenheit. The hottest month is July with an average temperature of 90 degrees and the coldest month is December with an average temperature of 47 degrees (The Weather Channel). The Project lies within the Eldorado Valley, between the McCullough Range to the west and the Eldorado Range to the east. Within the valley elevation in the vicinity of the Project area is approximately 470 feet above mean sea level (MSL), the highest elevations in the area included peaks of more than 7,000 feet above MSL in the McCullough Range and 5,060 feet above MSL in the Eldorado Range. The elevation of these mountain ranges along with the lower elevations of the valley creates existing discernible air quality effects in the valley as the mountain ranges keep pollutants within the valley.

There are no ambient air quality monitoring stations within the Project area. The nearest station, which monitors O_3 and PM_{10} is located approximately 15 miles to the northeast of the Project area in Boulder City, Nevada.

3.3.2. Environmental Consequences

It is anticipated that there will be impacts to air quality due to emissions associated with the construction and operation of the 94 MW photovoltaic solar generation facility. Air emissions associated with the Project are expected to occur primarily during construction and will be chiefly associated with fugitive dust during construction from ground-disturbing activities include grading, pad construction and installation of the gen-tie line, as well as some emissions associated with engine exhaust from construction equipment, the transportation of goods and construction workers, all of which are included in this analysis. Once the facility is operational relatively few contributions to air emissions will be generated due to on-road travel of vehicles associated with worker commutes for maintenance activities.

Construction of the proposed project is projected to take approximately 18 months. Construction traffic is estimated at 300 trips per day and 400 workers during peak construction. Truck traffic during construction is expected to average approximately 20 truck trips per day. The emissions for the paved road components were based upon maximum trucks per month and number of workers at peak construction.

Emissions of criteria pollutants for the proposed Project were calculated for three distinct Project elements. Those elements considered were:

1. The initial land disturbance that includes clearing, grading, grubbing, etc.
2. Construction of the solar field.
3. Operation and maintenance of the facility following construction.

During site development, the Project would include grading approximately 665 acres of the approximately 682-acre site resulting in localized, short-term increases in fugitive dust (PM_{10} emissions). The increase in PM_{10} would be primarily from soils disturbed during clearing and grubbing of vegetation and grading the site. The other criteria pollutants associated with site development would result in insignificant quantities of emission associated with the combustion of fuel from the various construction equipment.

Criteria pollutant emissions during construction activities would result from employee and construction vehicles, and heavy equipment moving across the site during construction of the solar array. Those emissions from worker travel to and from the Project site have been included in this analysis. Exhaust from construction vehicles and heavy equipment would result in localized, short-term increases in CO and NO_x emissions.

During operations, criteria pollutant emissions would result from vehicle traffic within the facility fence line during the operation and maintenance of the solar arrays. These emissions can be characterized as *de minimis* and would result in no long-term impact on the existing ambient air quality.

The methodologies and calculated criteria pollutant emissions data associated with the aforementioned phases are further discussed below. Each element of site development and its associated mass emissions were calculated as worst-case scenarios using USEPA and/or Clark County DAQEM-approved pollutant emission factors and methodologies.

Emission estimates were compiled for construction of the facility and routine ongoing operations and maintenance. Primary sources of criteria pollutant emissions for construction activities are related either to fuel use in internal combustion engines or to dust emitted into the air from various activities. Criteria pollutant emissions from both of these source types are described in detail below and are summarized in Table 6.

Table 6. Criteria Air Pollution Emissions (Tons/Year) Over the 18 Month Proposed Project Construction Duration

Source	CO	CO_2	NO_X	VOC	SO_2	PM_{10}	$PM_{2.5}$
Solar Field construction	136	1,435	12.9	7.8	0.04	62	8
General Conformity de *minimis* Thresholds	**100**	**NA**	**100**	**100**	**NA**	**70**	**NA**

CO = carbon monoxide; CO_2 = carbon dioxide; NO_X = nitrogen oxides; PM_{10} = particulate matter with a mean aerodynamic diameter of 10 micrometers or less; $PM_{2.5}$ = particulate matter with a mean aerodynamic diameter of 2.5 micrometers or less; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

The PM_{10} emission factor for construction (0.11 tons/acre-month) was obtained from the March 2001 Clark County PM_{10} State Implementation Plan (SIP). Based on the emissions factors for unpaved roads (*Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Areas Sources* [AP-42], EPA 2008, Section 13.2.2), the $PM_{2.5}$ emission factor is 10% of the PM_{10} factor. For the purpose of this inventory, it was assumed that 700 acres would be disturbed by construction activities.

Emissions associated with constructing the solar field and the gen-tie line are from heavy trucks delivering materials and employee vehicles. Emission sources include fugitive dust emissions for vehicle travel on paved and unpaved roads, motor vehicle exhaust, and wind erosion. Fugitive dust emissions from paved and unpaved roads were calculated using AP-42 emission factors, the estimated number of vehicles, vehicle parameters, paved and unpaved road travel distances, and an estimated 55 percent control factor for watering the unpaved roads during construction (AP-42 Section 13.2.1 and Section 13.2.2). Wind erosion emissions for the

disturbed area were calculated, based on an AP-42 emission factor (Section 11.9), and an AP-42 particle size distribution for PM_{10} and $PM_{2.5}$ (Section 13.2.5).

Emissions associated with operating the facility are from employee vehicles and wind erosion (Table 7). Emission sources include fugitive dust emissions for vehicle travel on paved and unpaved roads, motor vehicle exhaust, and wind erosion. Fugitive dust emissions from paved and unpaved roads were calculated using AP-42 emission factors, the estimated number of vehicles, vehicle parameters, paved and unpaved road travel distances, and an estimated 55 percent control factor for dust suppressants planned for the facility roads (AP-42 Section 13.2.1 and Section 13.2.2). Wind erosion emissions for the area were calculated, based on an AP-42 emission factor (Section 11.9), an AP-42 particle size distribution for PM_{10} and $PM_{2.5}$ (Section 13.2.5), and an estimated 90 percent control factor for the planned mitigation measures.

Vehicle exhaust emissions (NO_x, SO_2, CO, PM_{10}, $PM_{2.5}$, and VOC,) can come from on-road and non-road motor vehicles. On-road vehicles would include heavy trucks and employee vehicles. It was assumed that both the trucks and employee vehicles would travel 30 miles each way.

Based on the criteria pollutant emission data and the Project not having triggered a federal action, the Project is not required to carry out criteria pollutant dispersion modeling for a demonstration of compliance with the NAAQS.

Table 7. Criteria Air Pollutant Emissions (Tons/Year) During the Proposed Project O&M Duration of 12 Months

Source	CO	CO_2	NO_X	VOC	SO_2	PM_{10}	$PM_{2.5}$
Emissions generated by maintenance and operation site traffic	2.7	25	0.16	0.15	0.001	1	0.1
Windblown dust from exposed ground	NA	NA	NA	NA	NA	1	0.2
TOTAL	**2.7**	**25**	**0.16**	**0.15**	**0.001**	**2**	**0.3**
General Conformity *de minimis* Thresholds	**100**	**NA**	**100**	**100**	**NA**	**70**	**NA**

CO = carbon monoxide; CO_2 = carbon dioxide ; NO_X = nitrogen oxides; PM_{10} = particulate matter with a mean aerodynamic diameter of 10 micrometers or less; $PM_{2.5}$ = particulate matter with a mean aerodynamic diameter of 2.5 micrometers or less; SO_2 = sulfur dioxide; VOCs = volatile organic compounds

3.3.3. Mitigation Measures

The construction of the Project will temporarily cause fugitive dust related to grading and other construction activities. In order to comply with Clark County dust control requirements, water would be used to control dust. Areas of higher erosion or poor soils, outside of desert tortoise

habitat, may require application of a palliative dust reducing agent. The Project will implement the following BMPs for fugitive dust and wind erosion control:

- Minimize grading and vegetation removal, and limit surface disturbance during construction to the time just before PV module support structure installation;
- Limit vehicular speeds on non-paved roads (Clark County ordinance speed limit is 25 miles per hour mph);
- Apply water and/or palliatives (as allowed) to disturbed soil areas of the Project site to control dust and maintain optimum moisture levels for compaction, as needed. Apply the water using water trucks. Minimize water application rates, as necessary, to prevent runoff and ponding;
- During windy conditions (forecast or actual wind conditions of approximately 25 miles per hour or greater), apply dust control measures to haul roads to adequately control wind erosion. Cover exposed stockpiled material areas;
- Suspend excavation and grading during periods of high winds;
- Cover all trucks hauling soil and other loose material or maintain at least 2 feet of freeboard; and
- Gravel or other similar material will be used where dirt access roads intersect the paved roadways to prevent mud and dirt track-out. All paved roads will be kept clean of objectionable amounts of mud, dirt, or debris, as necessary.

3.4. Biological Resources

The term "biological resources" refers to the plants and animals that inhabit the Project area. These are divided into three categories: vegetation, referring to plants; wildlife, referring to animals; and special status species, which refers to plants, animals, or other organisms that are protected by the Endangered Species Act or the Nevada Administrative Codes NAC.501 and NAC.503. This section describes the biological resources in the area, the impacts of the proposed Project on these resources, and the best management practices (BMPs)/mitigation measures that will reduce these impacts.

3.4.1. Existing Setting

3.4.1.1. Vegetation

Boulder City lies in the Mojave Basin and Range ecoregion. This is an arid desert environment, receiving approximately 2-8 inches of rain annually. Mojave Creosote Bush Scrub is the major vegetation type in the Project area. This vegetation type consists mostly of creosote shrub (*Larrea tridentate*), white bursage (*Ambrosia dumosa*), and burro-weed (*Ambrosia dumosa*) in a sparse, widely-spaced pattern of growth that appears on slopes, fans, and valleys (UCSB 2004, BLM 2012). Additional species that were documented during field visits in May 2014 are presented in Table 8.

Table 8. Plants Observed in the Project Area

Common Name	Scientific Name
beavertail cactus	*Opuntia basilaris*
buck horn cholla	*Cylindropuntia acanthocarpa*
Devil's spineflower	*chorizanthe rigida*
Mediterranean grass	*schismus barbatus*
desert marigold	*Baileya multiradiata*
wingnut cryptantha	*Cryptantha pterocarya*
cotton top cactus	*Echinocactus polycephalus*
Freemont's pincushion	*Chaenactis fremontii*
cheesebush	*Ambrosia salsola*
soft prairie clover	*Dalea mollisima*
six-weeks grama	*Bouteloua barbata*
Parry's sandmat	*Chamaesyce parryi*

Non-Native Invasive Plant Species

Four non-native invasive plant species are known to have colonized within or near the Project area: Sahara mustard (*Brassica tournefortii*), Mediterranean grass (*Schismus* spp.), red brome (*Bromus madritensis*), and Russian thistle/tumbleweed (*Salsola iberica*; NextLight 2009). These invasive plants occupy the Project area in low numbers, and none of them are particularly abundant (NextLight 2009). Sahara mustard is the only one designated as a noxious weed by the

Nevada Department of Agriculture. It is classified as a Category B weed species. Category B species are defined as "weeds established in scattered populations in some counties of the state; actively excluded where possible, and actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur" (NVDA 2005).

Cactus and Yucca

Cactus and Yucca are protected under NRS 527.060-527.120, Nevada State Protection of Christmas Trees, Cacti, and Yucca and addressed in this section. During field surveys, cactus plants were observed in the proposed Project area including cotton top cactus (*Echinocactus polycephalus*) and beavertail cactus (*Opuntia basilaris*). No yucca was observed within the proposed Project area.

3.4.1.2. Wildlife

Species known to inhabit the area include species typical of the Mojave Desert. Wildlife and wildlife sign observed during field surveys (May 2014) are presented in Table 9.

Table 9. Wildlife and Wildlife Sign Observed in the Project Area.

Common Name	Scientific Name
Reptiles	
western whip-tail lizard	*Cnemidophorous* spp
common zebra-tailed lizard	*Callisaurus draconoides*
desert horned lizard	*Phrynosoma platyrhinos*
Western shovel-nosed snake	*Chionactis occipitalis*
Desert tortoise (sign only)	*Gopherus agassizii*
Birds	
common nighthawk	*Chordeiles minor*
raven	*Corvus corax*
red-tailed hawk	*Buteo jamaicensis*
Mammals	
black-tailed jack rabbit	*Lepus californicu*
kit fox	*Vulpes macrotis*
coyote	*Canis latrans*
ground squirrel	*Spermophilus* sp.

Other common wildlife in this area may include turkey vultures (*Cathartes aura*), cactus mice (*Peromyscus* spp.) and kangaroo rats (*Dipodomys* spp.) as well as several bat and migratory bird species.

3.4.1.3. Special-Status Species

The only federally-protected special-status species that may occur in the Project area was the desert tortoise (*Gopherus agassizii*), which is classified as Threatened under the Endangered

Species Act (ESA) and migratory birds, which are protected under the Migratory Bird Treaty Act (MBTA). State-protected special-status species that have the potential to occur in the Project area include the western burrowing owl and Gila monster (*Heloderma suspectum*; BLM 2012).

Desert Tortoise

The desert tortoise was listed as Endangered under the ESA in 1990 (USFWS 2011a) and subsequently reclassified as Threatened. It occurs in the Mojave and Sonoran deserts in Southern California, southern Nevada, Arizona, and the southwestern tip of Utah in the United States, as well as Sonora and northern Sinaloa in Mexico (USFWS 2011a). As per USFWS (2011a), the "Mojave population" of this animal includes: "all individuals living north and west of the Colorado River in the Mojave Desert in California, Nevada, Arizona, and southwestern Utah, and in the Sonoran (Colorado) Desert in California".

Throughout their range, primary threats to desert tortoise populations include habitat loss and alteration, illegal collection by human beings, disease, and predation (USFWS 2011a). Desert tortoise habitat is affected by urbanization, transportation infrastructure, off-road vehicle activity, poor grazing management, colonization by invasive plants, and wildfire (USFWS 2011a). All of these factors can cause alteration, fragmentation, or even the outright elimination of desert tortoise habitat. While desert tortoise is protected by the ESA, illegal take of desert tortoises for food, pets, or other purposes does still occur (USFWS 2011a). Existing evidence suggests that upper respiratory tract disease has had a significant negative impact on desert tortoise populations (USFWS 2011a). There is some evidence to suggest that exposure to environmental contaminants, especially heavy metals, predisposes desert tortoises to contracting upper respiratory tract disease (USFWS 2011a). Desert tortoise populations are also threatened by various naturally-occurring predators, the most important of which are ravens and coyotes.

In May 2014, regionally experienced biologists conducted pre-project tortoise surveys (See Appendix D) within the entire action area in accordance with 2010 USFWS protocols (USFWS 2010). According to the USFWS, the objective of the field surveys is to determine presence or absence of desert tortoise, estimate the number of tortoises (abundance), and assess the distribution of tortoises within the Project area (USFWS 2010). The survey area included the entire proposed Project site (682 acres) and was located using topographical maps, aerial photographs, and global positioning system (GPS) coordinates. Physical landmarks such as roads, surveyor markers, existing transmission lines, solar power plants and substations were also used for orientation.

No live tortoises were found within the Proposed Action area; therefore, relative tortoise abundance could not be estimated using the USFWS estimation equation. Desert tortoise sign observed is discussed in detail in the Biological Survey Report, and summarized in Table 10:

Table 10. Desert Tortoise Sign Observed in the Project Area.

Sign Type	Number Observed
Live Tortoises	0
Tortoise Burrows	29
Scat	2
Carcasses	2
Egg Shell Fragments	1

Migratory Birds Including Western Burrowing Owl

Executive Order (January 11, 2001) defines the MBTA of 1918 and subsequent amendments (16 U.S.C. 703–711) state that it is unlawful to take, kill, or possess migratory birds. Numerous bird species travel through Nevada during spring and fall migrations. A complete list is published at the USFWS web site (USFWS 2006). A list of those that are protected birds is in 50 CFR 10.13. The list of birds protected under this regulation is extensive and the Project area has potential to support many of these species. Typically, the breeding season is when these species are most sensitive to disturbance, which generally occurs from March 1 through August 31.

Migratory birds that were observed during desert tortoise surveys include the common raven, common nighthawk, and red-tailed hawk. It is assumed that the Project area contains potential nesting and foraging habitat for a wide range of migratory birds including the burrowing owl.

Burrowing owl habitat typically consists of open, dry, treeless areas on plains, prairies, and desert floors (Haug et al. 1993). Burrowing owls most frequently use mammal burrows created by other animals such as kit fox, coyotes or desert tortoises. Burrow presence is the limiting factor to burrowing owl distribution and abundance (Coulumbe 1971; Martin 1973; Green and Anthony 1989; Haug et al. 1993). The burrows are used for nesting, roosting, cover, and caching prey (Coulumbe 1971; Martin 1973; Green and Anthony 1989; Haug et al. 1993).

Western burrowing owls are protected by the Migratory Bird Treaty Act (MBTA) and are a state-protected species in Nevada (NRS 503.620). Threats to burrowing owl populations throughout their range include alteration of breeding and wintering habitat, illegal hunting, predation, disease, inadequacy of existing regulatory mechanisms, pesticides, and various other natural or manmade factors (such as collisions with stationary/moving structures, or disease; USFWS 2003).

No western burrowing owls or owl burrows were observed in during field visits and desert tortoise surveys. However, the Project area does have the potential for burrowing owl use, as it contains potential nesting and foraging habitat (BLM 2012).

Gila Monster

Gila monsters are carnivorous/insectivorous lizards in the genus *Heloderma* (USFWS 2011b) whose range is centered in western and southern Arizona, and extends south through Sonora, Mexico (USGS 2006). They inhabit rocky slopes, washes, and sandy valleys in the desert environment, and can spend more than 95 percent of their time in underground shelters (USFWS 2011b). At the time of this writing, gila monsters are not a federally-protected species. They are, however, classified as State Sensitive Reptiles in Nevada (NAC 503.080) and are protected under Nevada state laws NAC 503.090 and NAC 503.093.

No Gila monsters were observed during the 2014 surveys for this Project. Data compiled by Nevada Natural Heritage Program (NNHP) from previous surveys reported the Gila monster occurs near the proposed Project.

3.4.2. Environmental Consequences

3.4.2.1. Vegetation

About 665 acres of the proposed site will be graded causing direct removal of vegetation and wildlife habitat. About 17 acres comprising the Eldorado Valley Drive easement corridor will not be graded for solar facility installation. Additionally, construction activities could facilitate the introduction or spread of noxious or invasive weed species that can displace native vegetation, increase fire frequency, and reduce the quality of wildlife habitat.

During field surveys, only a few cactus plants were observed in the Project site, which are protected for commercial sale and transport under NRS 527.060-527.120, Nevada State Protection of Christmas Trees, Cacti, and Yucca. Grading activities will cause direct removal of a few cactus plants. Few cacti were observed in the proposed Project site: however, it is probable that a cactus could be crushed or removed during construction activities.

3.4.2.2. Wildlife

During construction of the solar facility and associated facilities, ground-disturbing activities could directly result in mortality to various wildlife species as about 665 acres will be graded. Fencing will be installed to help exclude wildlife after construction. Some species that are particularly mobile might be able to avoid injury or mortality by leaving the area. However, some wildlife, such as nocturnal species or species that use burrows, might be more susceptible to injury or mortality. Although temporary in nature, noise and activity associated with construction could cause animals to avoid the area, thus altering their normal behavior patterns.

Increased traffic on established roads could result in more vehicle/wildlife collisions, thereby resulting in injury or death to wildlife. This might be of particular concern for reptiles and species that utilize roads for heat sources or for other less mobile wildlife.

3.4.2.3. Special Status Wildlife Species

Desert Tortoise

The entire 682 acre proposed site is within desert tortoise habitat. However, during surveys conducted in May 2014, no live tortoise sign was found in the Project site. Development of the solar facility is on private lands (i.e. those owned by Boulder City) and therefore will utilize the existing Clark County MSHCP Section 10 permit which allows take of desert tortoise.

Tortoises may be injured or killed during construction activities. Although not required under the Clark County MSHCP prior to construction, the project clearance survey will be conducted. If a tortoise is found during the pre-construction survey, it will be removed and appropriately relocated by an authorized biologist.

Increased human activity and construction vehicle traffic may also result in tortoise/vehicle collisions that result in tortoise injury or death. Tortoise may take shelter under parked vehicles and be killed, injured, or harassed. Minimization measures such as a Worker Environmental Action Plan (WEAP), and speed limits on roads, will reduce or eliminate these effects.

Indirect effects could be caused by access roads, newly constructed fencing and the new gen-tie circuit which may facilitate increased predation. Predators such as ravens, coyotes, or other raptors may be attracted to the construction site due to an increase in food opportunities including construction site litter and voluntary feeding from construction staff; an increased number of perching opportunities due to new gen-tie lines, fences, or other opportunities; or increased water sources due to dust control protocols. An increased presence of predators could lead to a predation increase on smaller, more vulnerable tortoises.

Ground disturbing activities during construction may result in an increase of noxious and invasive plant species in the area. Construction machinery may facilitate the spread of existing noxious or invasive species throughout the site, or may facilitate the introduction of new noxious weeds or invasive species. Noxious and invasive plants may displace native species that provide forage for tortoises.

Effects to desert tortoises due to stringing the gen-tie circuit will be the less than those described for construction of the Project Site because the impacted area has previously been disturbed. In addition, the gen-tie line right-of-way will not be fenced so desert tortoises will be able to access the area.

Migratory Birds

Migratory birds could be injured or killed during construction activities such as vegetation removal and grading activities. Adult birds may be able to flee the area; however, during

migratory bird nesting season, eggs and juvenile birds that are confined to nests may be injured or destroyed. During operation of the facility birds may be injured, electrocuted, or killed from collisions with power lines or construction vehicles. During decommissioning, impacts to birds would be similar as those described for construction. Birds may be injured or killed during gen-tie line pole removal.

Approximately 665 acres of native plant communities that provide potential habitat to nesting migratory birds would be removed as a result of the proposed Project.

Gila Monster

Gila monsters may be injured or killed during construction activities. The entire 682 acre proposed site is within Gila monster habitat. Therefore, the grading, construction, and fencing associated with Project will result in a loss of 682 acres of potential Gila monster habitat.

Increased human activity and construction vehicle traffic may also result in Gila monster/vehicle collisions that result in Gila monster injury or death. Minimization measures such as a WEAP, and speed limits on roads, will reduce or eliminate these effects.

Indirect effects that could be caused by fencing and the gen-tie circuit include increased predation. Predators such as ravens, coyotes, or other raptors may be attracted to the construction site due to an increase in food opportunities including construction site litter and voluntary feeding from construction staff; an increased number of perching opportunities due to the new gen-tie circuit, fences, or other opportunities; or increased water sources due to dust control protocols. An increased presence of predators could lead to a predation increase on smaller, more vulnerable Gila monsters.

Ground disturbing activities during construction may result in an increase of noxious and invasive plant species in the area. Construction machinery may facilitate the spread of existing noxious or invasive species throughout the site, or may facilitate the introduction of new noxious weeds or invasive species. Noxious and invasive plants may displace native species that provide forage for the prey of Gila monsters.

3.4.3. Mitigation Measures

3.4.3.1. Vegetation

The following BMPs/mitigation measures will be implemented to reduce construction impacts on vegetation and wildlife habitat:

- All construction vehicle movement will be restricted to the Project area, predesignated access roads, and public roads; and

- The Project proponent will avoid creating soil conditions that promote weed germination and establishment;

3.4.3.2. Wildlife

These general conservation measures are adapted from the Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement (Clark County 2002). The following BMPs/mitigation measures will aid in preserving the quality of adjacent desert tortoise habitat and will benefit other species:

- Store, use, and dispose chemicals, fuels, and other toxic materials in an appropriate manner;
- Keep equipment in good condition with no significant leaks of fuel or other substances that could be toxic to animals and fish. Equipment should be washed prior to first site use to prevent the spread of invasive species;
- Keep materials to absorb small spills of toxic materials available onsite;
- Ensure that roads are engineered to adequately spread runoff to minimize erosion; and
- Minimize soil compaction, erosion, and vegetation loss to preserve habitat by limiting construction activities to the Project site.

3.4.3.3. Special Status Wildlife Species

Desert Tortoise

The following BMPs/mitigation measures will be implemented to reduce effects on the desert tortoise and other species during construction:

- **Pre-Construction Clearance Survey:** Field biologists would conduct a single-pass clearance survey immediately prior to any construction activities. Tortoises found during this survey would either be collected and/or relocated outside the Project area by Clark County Desert Tortoise Pick-Up Program.
    - Burrows with the potential to be occupied by tortoises within the construction area would be searched for tortoise presence. In some cases, a fiber optic scope would be used to determine presence or absence within a deep burrow. If a tortoise-occupied burrow is located, the tortoise would be excavated using hand tools by a qualified biologist in accordance with standard USFWS protocols.
- **Worker Environmental Awareness Program (WEAP):** A WEAP would be presented to all personnel onsite during construction. This program would contain information concerning the biology and distribution of the desert tortoise, desert tortoise activity patterns, and its legal status and occurrence in the proposed Project area. The program would also discuss the definition of "take" and its associated penalties, measures

designed to minimize the effects of construction activities, the means by which employees limit impacts, and reporting requirements and procedures to be implemented if tortoises are encountered. Personnel would be instructed to check under vehicles before moving them as tortoises often seek shelter under parked vehicles.

- **Trash and Litter Control:** Trash and food items would be disposed properly in predator proof containers with resealing lids. Trash would be emptied and removed from the Project site on a weekly basis. Trash removal reduces the attractiveness of the area to opportunistic predators such as ravens, coyotes and fox.
- **Habitat Compensation:** Prior to surface disturbance activities, the Project proponent would pay a one-time remuneration fee (per acre of proposed disturbance). The compensation rate for habitat loss under Section 10 through the MSHCP is $550/acre for development on private lands.

Migratory Birds

The following BMP and mitigation measures will be implemented to reduce effects on the migratory birds and Western burrowing owls during construction:

- In compliance with the Migratory Bird Act of 1918, habitat-altering portions of the Project would be scheduled outside bird breeding season (generally March 1st to August 31st) whenever possible. For work occurring during the nesting period, a qualified biologist would survey the area for nests within 5 days prior to initial grading and vegetation removal. If any active nests (containing eggs or young) are found, a 100-foot diameter no-construction buffer area for small passerine (perching birds) and a 500-foot diameter no- construction buffer for western burrowing owls) would be established and maintained until the young birds fledge and have left the nest.

- To reduce impacts to burrowing owls, CMS4 would implement the protocols in the USFWS's pamphlet: *Protecting Burrowing Owls at Construction Sites in Nevada's Mojave Desert Region* (Appendix B).

Gila Monster

The following BMP and mitigation measures will be implemented to reduce effects on the Gila monster (Note: these measures are in accordance with Nevada Department of Wildlife (NDOW) protocols issued September 7, 2012 [Appendix C])

- Gila monsters found during the desert tortoise clearance survey would be relocated offsite.

- In the event a Gila monster is injured, it would be transferred to a veterinarian proficient in reptile medicine for evaluation of appropriate treatment. Rehabilitation or euthanasia expenses will not be covered by the Nevada Department of Wildlife (NDOW).
- NDOW will be immediately notified of any injury to a Gila monster and which veterinarian is providing care for the animal.
- If an animal is killed or found dead, the carcass will be immediately frozen and transferred to NDOW with a complete written description of the discovery and circumstances, date, time, habitat, and mapped location. .

3.5. Cultural Resources

Cultural Resources are defined as "physical features, both natural and manmade, associated with human activity. Cultural properties are unique and nonrenewable resources" (Fowler 1999). They may include: structures, archaeological sites, historical archaeological sites, buildings, Native American graves and cultural items, shipwrecks, religious sites, cultural landscapes, and traditional cultural properties that are listed or eligible for listing on the National Register of Historic Places (NRHP). This section summarizes the results of cultural resources investigations conducted for the Project site, impacts of the proposed Project on those resources, and the BMP/mitigation measures that would be implemented to reduce impacts (DuBarton 2014).

3.5.1. Existing Setting

Cultural resources with potential to affect the Project location were identified through archeological investigations located on approximately 682 acres within the Project site. The investigations included an archeological site file search for entire Project area and surrounding region, and a Class III inventory of the area. The archeologists located one new historic site, and six isolate artifacts.

3.5.1.1. Historic Context

Little historical information is available for the Eldorado Valley and its relationship to local and regional archaeological cultures. The region is generally considered to be part of the Southern Paiute culture area. It is believed to have served both prehistorically and historically as a major travel corridor between the Colorado River and the Las Vegas Valley with the majority of activity occurring from 1,500 to 200 years before present day. Based on previous cultural resources surveys, a number of cultural influences were present in the Project area, including Anasazi, Patayan, and Numic. Because of these multiples influences, determining a sequence of phases for the area is difficult. However, a chronological framework has been developed for the area based on works from Ezzo and Majewski (1995); Ahlstrom (2003); Ahlstrom and Roberts (1999, 2001a, 2001b); Roberts and Ahlstrom (2000); Roberts et al. (2003a, 2003b). It includes four major periods: Paleo-Archaic (10,000-5500 BC), Archaic (5500 BC – 500 AD), Ceramic (500 AD – 1800 AD) and Historical (1,500 AD – 1900 AD). The first three periods (10,000 BC–AD 1800) are defined with reference to archaeological data, whereas the fourth period (AD 1800–1950) is based on historical and ethnohistorical data. Summaries of each period are available below in Table 11.

Table 11. Chronological Sequence of the Las Vegas Valley

Paleo-Archaic	Fluted Point Tradition Stemmed Point Tradition	10,000–9200 BC 9200–5500 BC
Archaic	Middle Late	5500–3000 BC 3000 BC–AD 500
Ceramic	Early Middle Late	AD 500–1000 AD 1000–1500 AD1500–1800
Historical Paiute, Chemehuevi, and Mohave		AD 1600–1905
Historical Euro-American	Exploration/Pioneering Transportation Mining Power Generation and Transmission	AD 1800–1855 AD 1856–Modern AD 1863–1941 AD 1931–1950

Paleo-Archaic Period (10,000–5,500 BC)

The Paleo-Archaic period includes the end of the Pleistocene epoch and the first several millennia of the Holocene epoch, and it combines what have generally been termed the Paleo-Indian and Early Archaic periods. Today, Great Basin archaeologists (Grayson 1993; Schroedl 1991) generally distinguish two artifact traditions within the Paleo-Archaic period: the Fluted Point (Paleo-Indian) and the Stemmed Point (Lake Mojave) traditions. Little evidence of either the Fluted or Stemmed Point traditions has been found in southern Nevada, although Projectile points associated with these traditions have been found in surrounding areas.

Middle Archaic (5500–3000 BC) and Late Archaic (3000 BC–AD 500) Periods

The Archaic Tradition is characterized by a broad-spectrum adaptation to the animal and plant resources of a Holocene environment with conditions resembling those of the historic and modern-day environment. Jesse Jennings (1957) coined the concept of the Desert Archaic to refer to the Western expression of the American Archaic. His view emphasized the continuity of this hunting-and-gathering adaptation from the Early Archaic period until the adoption of agriculture. In southern Nevada, the earliest clear evidence of this generalized hunting and gathering lifeway does not appear until around 5500 BC, that is, in the Middle Archaic period.

Characteristic artifacts of the Middle and Late Archaic periods include large Projectile points that would have been hafted to darts that were propelled with atlatls. The bow and arrow was introduced sometime prior to A.D. 400. Grinding tools appear to be an important part of tool assemblages dating to the Middle Archaic, and they are common in Late Archaic assemblages. The Middle Archaic has also been called the Pinto period, in reference to the Pinto point, and the Late Archaic the Gypsum period, in reference to the Gypsum point (Ezzo and Majewski 1995; Warren and Crabtree 1986). This usage reflects the fact that both Pinto and Gypsum points have been considered useful Archaic temporal markers (Bettinger et al. 1991).

The Ceramic Period (AD 500–1800)

The introduction of pottery for cooking and storage marks the beginning of the Ceramic period. As previously noted, the bow-and-arrow was apparently introduced to the Southern Nevada region before ceramic technology. The replacement of lightweight basketry with heavier ceramic containers is usually associated with a farming economy and greater sedentism. Because pottery types vary from region to region, and because they correlate with other traits such as architecture and settlement patterns, pottery often forms the basis for defining prehistoric cultures. In the past, the Ceramic period in southern Nevada was defined and subdivided into subperiods and phases with specific reference to the Virgin Branch (Anasazi) cultural sequence, specifically the sequence developed for the Moapa and Virgin River valleys (Ezzo and Majewski 1995; Lyneis 1982). This temporal and cultural framework does not take into account the strong Patayan presence in Southern Nevada from around AD 1000 to AD 1500 (Seymour 1997, 1999).

Ceramic data suggest that, during the Early Ceramic period, outside contacts were with Virgin Branch culture area, located to the east. Later, during the Middle and Late Ceramic periods, these contacts shifted to the Patayan area, located to the south. Also during the Middle Ceramic period, Paiute ceramics first appeared in the Las Vegas Valley.

Historical Paiute, Chemehuevi, and Mohave (1600–1905).

During the period from 1600 to 1905 Southern Paiute people inhabited the Las Vegas Valley and surrounding region. They utilized wild plants and animals, but also practiced small-scale horticulture where water sources were sufficient. They practiced what has been termed a "double-loop" subsistence strategy, planting crops and harvesting mesquite in the lower valleys and then moving to higher elevations in late summer and fall to harvest agave and pine nuts (Warren 1981).

The Chemehuevi, often described as an off-shoot of the Las Vegas Paiute, occupied the region between the Las Vegas Paiute and the Mojave. They were influenced by the Mojave, and took on traits such as vocabulary, floodplain farming, earth-covered houses, songs, emphasis on dreams, and a complex of elements related to warfare (Laird 1976). They also adopted the squared metate, balsa rafts, ferrying pots, ceramic forms and ornaments, paddle-and-anvil pottery techniques and hair dye.

The ancestors of the Mojave (known archaeologically as the Lowland Patayan), have lived along the Colorado River since about AD 500. These groups practiced a form of floodwater farming, growing crops such as pumpkins, squash, corn, beans, sunflower, and amaranth. After contact, they also grew introduced crops such as wheat and watermelon (Fowler 1999). There is growing evidence that the Mojave utilized portions of the Las Vegas Valley along the Las Vegas Wash (Seymour 1999).

Historical Euro-American (1600–1950)

While exploration of the Lower Colorado River region began as early as 1540, the Spanish explorers found the river inhospitable and did not attempt any permanent settlement along its banks until the early 1800s. Prospecting and mining began around this time, although the lack of roads impeded such activities in the Eldorado Valley.

Cultural Resource Survey

An archeological survey (See Appendix E) of the Project site was conducted utilizing the Nevada BLM Cultural Resource Inventory General Guidelines (BLM 2012). The survey area was located "on the ground" using U.S. Geological Survey topographic maps and physical landmarks such as roads. A crew consisting one crew chief and three technicians surveyed the Project area walking parallel transects spaced no more than 30 meters apart. Survey of most portions of the Project area was accomplished utilizing transects oriented along primary directions, while in other areas topography or man-made landmarks served to orient the survey routes.

The archeological survey recorded one small historic site and six isolates (isolated occurrences of resources). The historic site consisted of five food cans lids and two can bodies. Isolates discovered include mainly historic debris, consisting mostly of crushed metal food and motor oil cans. The only prehistoric isolate consisted of a basalt biface fragment (an early stage of production in making a projectile point or knife (NewFields 2014).

3.5.2. Environmental Consequences

The construction of the Project will result in adverse impacts to the one historic site and six isolates found at the site, through physical disturbance associated with construction and construction activities as well as operation of the solar facility. However, being that none of the artifacts are eligible for listing in the NRHP these impacts are not expected to be extensive and are considered acceptable.

3.5.3. Mitigation Measures

If potential resources are found during Project construction, work will be halted immediately and a professional archaeologist will be mobilized to the site to evaluate the find and determine appropriate further steps and mitigation measures as necessary. Any cultural and/or paleontological resource discovered during construction will be reported immediately to the appropriate authority. Work will not proceed until a notice to proceed has been issued. SHPO and appropriate Tribes will be notified and consulted with on eligibility and suitable treatment options. If significant resources are discovered, they will be recovered, transported, and stored at an approved curation facility that meets the standards specified in Title 36 CFR Part 79.

3.7. Land Use

Land use is the way in which a community uses land. This includes what is built, where it is built, and includes aspects such as the ownership of land as well as the governing entities' management plans and zoning which regulate development and define types of land use. This section describes the land uses in the area and the Project's consistency with the zoning criteria of the area.

3.7.1. Existing Setting

In 1958, acting on the behalf of the State of Nevada, the United States Congress Public Law 85-339 provided for the direct sale of 126,775 acres of public land located in the Eldorado Valley of Clark County, Nevada to the Colorado River Commission. In 1995, the Colorado River Commission also purchased 107,412 acres of land from the United States Department of the Interior, Bureau of Land Management (BLM). This land was then sold to the City of Boulder City and is now referred to as the Eldorado Valley Transfer Area. This resulted in a substantial extension of the City's corporate limits to the south and west. The sale of this land was subject to specified land uses. The City designated 8,000 acres for the development of energy; 6,000 acres were designated for recreational use, and remaining areas were designated to conserve and protect the desert tortoise (BLM 1994)

The Project site and the surrounding area is part of the Eldorado Valley Transfer area which is zoned by the Boulder City Comprehensive Master Plan as "ER" for Energy Resource Zone. Boulder City zoning ordinance permits the use of this type of zone for the development of private and/or public electric generation facilities, electrical transmission and distribution facilities, ancillary facilities, and other similar uses (Boulder City 1997).

Land adjacent to the "ER" zone is zoned for government use. These areas may be used for public or quasi-public uses or for open space preservation. As a condition of the sale by the BLM, Boulder City granted an easement to Clark County for these adjacent lands, consisting of approximately 85,000 acres. The easement is managed by the Desert Conservation Program for the preservation and protection of the desert tortoise and its habitat (Boulder City 1988).

The Project is located on vacant, undisturbed land within the ER zone. Several substations already exist within a few miles of the Project. These substations, which connect the transmission systems of southern Nevada, California, and Arizona, include: the El Dorado Substation, the McCullough Substation, the Marketplace Switching Station, the Nevada Solar One Substation, and the Merchant Substation.

The Project site is located within a sparsely populated area of Clark County approximately 17 miles to the south of Henderson within the Eldorado Valley. The surrounding land is primarily

characterized by power generation facilities, energy transmission infrastructure, transportation infrastructure, and open space. Some portions of the Eldorado Valley are used recreationally for off-road vehicles. Activities such as land sailing and remote control aircraft flying take place on the dry lake. The Project will share an existing 230 kV gen-tie line route and structures with the Copper Mountain Solar 2 Project. The gen-tie line will be located entirely on land owned by the City of Boulder City.

3.7.2. Environmental Consequences

Construction of the Project will convert approximately 682 acres into a solar generation facility and associated infrastructure. As described above, the Project site will be located in an area of Boulder City that is zoned specifically for energy resource development. Several similar solar energy generation facilities currently exist in the area surrounding the Project. Development of the Project falls into the appropriate zoning designations, will not impact or conflict with any current or future authorized land uses, and is consistent with other development activities occurring in the surrounding area.

3.7.3. Mitigation Measures

Because development of the Project will not impact current or future land use activities in the area, no mitigation measures are necessary.

3.8. Transportation

This section describes the traffic and transportation facilities in the area, the impacts of the proposed Project on these resources, and BMPs/mitigation measures that will reduce these impacts.

3.8.1. Existing Setting

The Project site is adjacent to several major roadways that provide access to the Project site and to surrounding areas. U.S. Highway 95 (US 95) extends in a north-south manner through Eldorado Valley and is divided with two lanes in each direction. At the northern end of the valley, US 95 intersects U.S. Highway 93 approximately half the distance between Boulder City, Nevada, and Henderson, Nevada. U.S. Highway 93/95 continues northwestward through Henderson and through Las Vegas where it intersects Interstate 15. At the southern end of the valley at Searchlight, Nevada, US 95 intersects east-west trending State Route 164, a single lane in both directions (see Figure 6).

Nevada Department of Transportation (NDOT) maintains Annual Average Daily Traffic (AADT) Count Stations. The nearest to the site, Station 0031014, is located about 0.1 miles south of the Railroad Pass intersection on US 95. Annual Average Daily Traffic at this station is shown in Table 12 below.

Table 12. Annual Average Daily Traffic Nearest to the Project Location

	2005	2006	2007	2008	2009	2010	2011	2012	2013
AADT at Station 0031014	12,300	12,700	12,000*	10,000	9,900	10,000*	7,000	8.000	8,200

*Data adjusted or estimated
Source: NDOT 2013

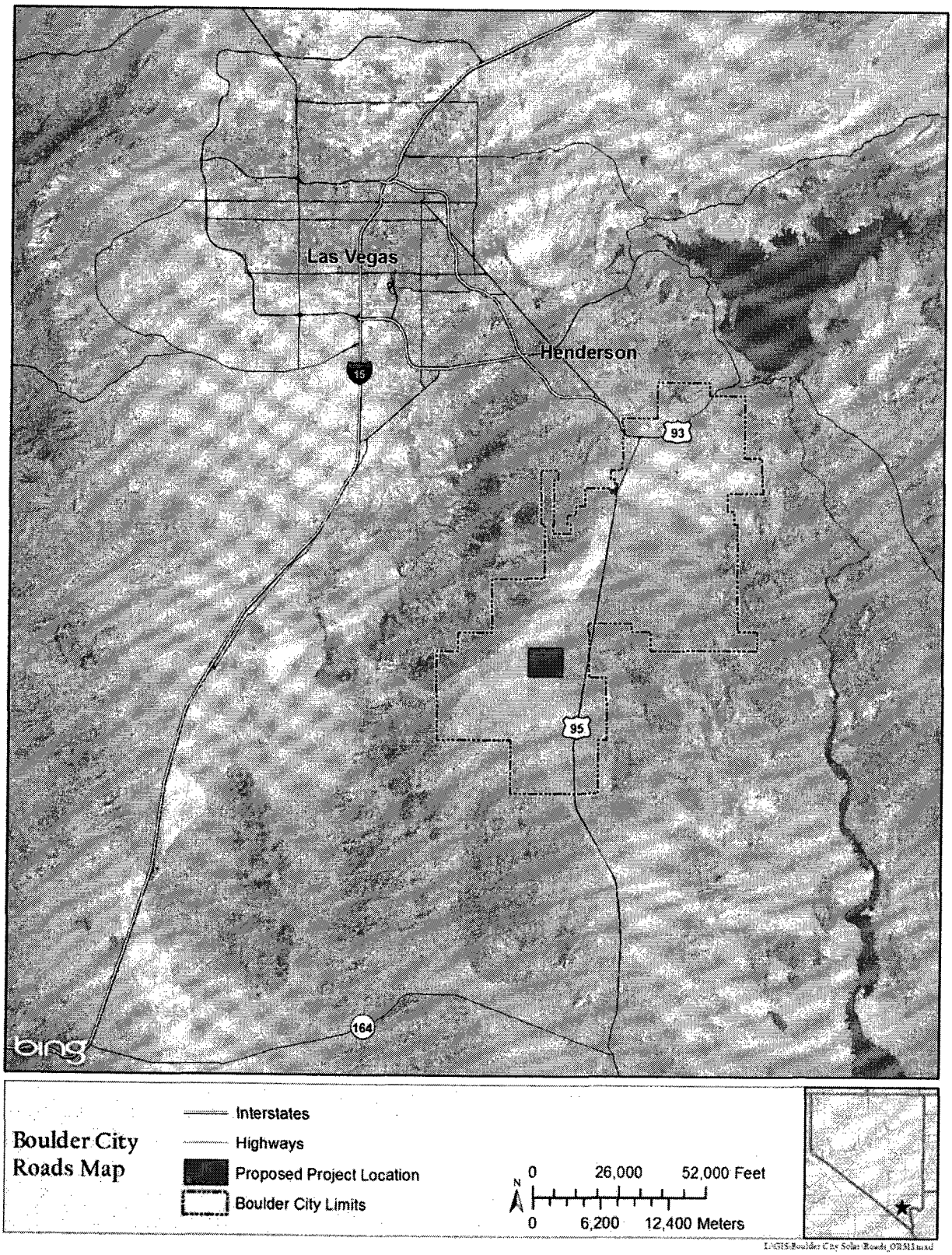


Figure 6. Major Roadways Adjacent to the Project Area

3.8.2. Environmental Consequences

During peak construction, an estimated average of approximately 350 daily trips for arriving/departing construction workers, and 30 truck trips per day will be required to supply concrete, construction materials, and equipment to the Project site. To provide concrete during construction, an off-site ready mix plant will be used. In either event, a similar number of trucks will be required to supply either concrete or concrete raw materials. Traffic associated with the construction, maintenance, and operation of the solar facility is not expected to present a noticeable incremental increase to traffic in the area.

As the most recent traffic count of 8,200 is less than the historic high of 12,700 AADT (as seen in Table 12, above), this will represent a negligible incremental increase in traffic and be well within the normal variability where the roads have demonstrated historic capacity to handle the traffic. Therefore, no impacts to level of service are anticipated. The turning movements of vehicles exiting US 95 during peak construction have a minor potential to affect the flow of traffic. Traffic is also expected to increase minimally as a result of maintenance operations to the gen-tie line and solar panels.

3.8.3. Mitigation Measures

Because the proposed Project would not result in major impacts to traffic; no mitigation is required.

3.9. Visual Resources

Aesthetics can be defined as a mix of landscape character, the context in which the landscape is being viewed, and the scenic integrity of the landscape. This section describes visual characteristics of the area, the impacts of the proposed Project on the visual setting, and the best management practices (BMPs)/mitigation measures that will reduce these impacts, if any.

3.9.1. Existing Setting

The city limit of Boulder City is inclusive of the Eldorado Valley with a residential area/business area in the northeast section of the city limits. The Project site is located at the south end of the Eldorado Valley, approximately 15 miles from the residential area of Boulder City, Nevada. The Project will share poles with an existing gen-tie line and utilize Eldorado Valley Drive.

The Eldorado Valley landscape is monotone with mostly hues of brown, tan and dark green. The area is sparsely vegetated. Located in the Mojave Desert, the Project area is generally flat and dominated by sandy soils and scattered low-growing vegetation. Mountain ranges can be seen in the distance and surrounding the Project site; however, the topography of the site itself is flat. Some small, ephemeral drainage channels occur on the site and in the immediate vicinity.

Manmade elements are abundantly evident on the landscape. U.S. Highway 95, an asphalt four lane highway, runs through the center of the city boundary. U.S. Highway 95 does offer broad views of the surrounding landscape; however the landscape is not particularly pristine. In the Project area there are five major transmission line corridors, containing multiple transmission lines within each corridor. Given the generally flat topography, the infrastructure can be seen for long distances and is very visible from the roadways. There are four major substation sites within the Project vicinity (varying in size from 100 acres to over 350 acres) and existing solar facilities in the area (varying from 180 acres to over 1000 acres).

There are six solar facilities in the Project vicinity west of U.S. Highway 95. The facilities are visible from the highway. Overall, the current landscape in the Project area has been significantly altered by human influence and includes a variety of utility infrastructure. Infrastructure includes transmission lines, major highways, gas pipelines, substations, a natural gas-fired power plant and solar facilities.

The Project area can be classified as having a low visual value based on the above description of the visual character of the Project site. The visual sensitivity level, i.e. the level of public concern for scenic quality at the site, is also considered low. Overall, visual values at the Project site are considered low.

3.9.2. Environmental Consequences

The construction of additional solar facilities under the proposed Project will result in little change to the existing landscape. Eldorado Valley is currently dominated by solar installations, collection facilities and accompanying gen-tie lines. The degree of modification to this existing setting attributable to the proposed new facility will be minimal and will not represent a substantial departure from the nature of development that has already occurred in the surrounding vicinity. Overall, implementation of the Project will result in minimal impacts to visual resources.

3.8.3. Mitigation Measures

Because potential impacts to visual character are consistent with the existing setting and planned use in the Energy Zone, mitigation is not warranted.

3.10. Noise

Noise refers to unwanted sound that interferes with normal activities or reduces the quality of the environment. Response to noise varies according to its type, its perceived importance, its appropriateness in the setting, time of day, and the sensitivity of the individual receptor.

A decibel (dB) is a unit of measurement used to define sound levels. Sound measurement is further defined by using an "A-weighted" decibel (dBA) scale that describes how an individual perceives sound. There are differing sensitivities to noises relative to the time of day. Therefore, a day-night average noise level (Ldn) is used to determine whether noise will be perceived adversely. The United States Environmental Protection Agency (USEPA) has developed an index (threshold) to assess noise impacts from a variety of sources using residential receptors (EPA 1974).

Noise is one of the major public concerns associated with construction and operational activities. Some of the factors to consider when assessing an acceptable level for a specific area are distance from major thoroughfares and airports, population density, age of the neighborhood, and time of day. Noise sensitive receptors are defined as the occupants of a facility or a location where a state of quietness is a basis for use or where excessive noise interferes with the normal use of the facility or location. Typical noise sensitive receptors include schools, hospitals, churches, libraries, homes, parks, and wilderness areas.

This section describes the existing ambient noise in the area, the impacts of the proposed Project on these resources, and the best management practices (BMPs)/mitigation measures that will reduce these impacts, if any.

3.10.1. Existing Setting

The Project site is located in a rural area. Day-night ambient noise levels of 40 to 50 dB on the A-weighted scale (dBA) are expected in rural areas (USEPA 1974). There is low to moderate ambient noise levels in the Project area. Sources of noise include the power generating stations at Desert Star Energy, Copper Mountain Solar 1, the Nevada Solar One (NSO), and Copper Mountain Solar 2. Other sources include the natural gas line regulating station, traffic on U.S. Highway 95, and off-road vehicles. The Project area experiences low to moderate noise levels. Although no specific data are available, background noise levels at the Project site will be expected to range from 40 dBA (rural area during the day) to 60 dBA (commercial area heavy traffic), with occasional spikes related to equipment operation and off-road vehicles passing the site.

3.10.2. Environmental Consequences

Construction

Construction of the Project will result in temporary increases in ambient noise levels for approximately 1.5 years. A variety of construction equipment such as scrapers, concrete trucks, motor graders, backhoes/loaders, excavators, truck-mounted cranes, bulldozers, grader-alls, dump trucks, flatbed trucks, pad drum vibrator rollers, trenchers, water trucks, and lightweight trucks will generate noise intermittently during daylight hours. As seen in Table 13 below, typical construction equipment noise levels measure at less than 90 dBA at a distance of 50 feet from the site (BLM 2005).

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate of 6 to 7.5 dBA per doubling of distance from the source, depending on the topography of the area and environmental conditions (e.g., atmospheric conditions and noise barriers, either vegetative or manufactured). Thus, a noise measured at 90 dBA 50 feet from the source will be about 84 dBA at 100 feet, 78 dBA at 200 feet, 72 dBA at 400 feet, and so forth (Lawrence Berkeley National Laboratory 2007).

Table 13. Noise Levels at Various Distances from Typical Construction Equipment

Construction Equipment	Noise Level $L_{eq(1-h)}$ [a] at Distances (dBA)					
	50 ft	250 ft	500 ft	1,000 ft	2,500 ft	5,000 ft
Bulldozer/scraper	85	71	65	59	51	45
Concrete mixer	85	71	65	59	51	45
Concrete pump	82	68	62	56	48	42
Crane, derrick	88	74	68	62	54	48
Crane, mobile	83	69	63	57	49	43
Front-end loader	85	71	65	59	51	45
Generator	81	67	61	55	47	41
Grader	85	71	65	59	51	45
Shovel	82	68	62	56	48	42
Truck	88	74	68	62	54	48

Source: BLM 2005

Note: An assumed propagation rate is 6 dBA per doubling of distance.

[a] $L_{eq(1-h)}$ is the equivalent steady-state sound level that contains the same varying sound level during a 1-hour period.

Operation

Operational noise from the single-axis tracking solar panel arrays that will be installed on the proposed site will be negligible and will likely be inaudible against ambient levels. Performing outdoor maintenance, repositioning test equipment, and using tools in the test areas of the

proposed PV site will temporarily increase ambient noise levels but no receptors will be impacted.

Operational noise from the electrical equipment, primarily corona noise from the new gen-tie circuit, will also be negligible. Gen-tie line corona noise is the noise sometimes generated from the strong electric field at the surface of a high-voltage power line conductor ionizing the nearby air, resulting in an audible, continuous, low-level noise or "buzz" during operation of transmission lines and substation equipment. The amount of corona produced by a gen-tie circuit is a function of the voltage of the line, the diameter of the conductor, the elevation of the line above sea level, the condition of the conductor and hardware, and the local weather conditions.

3.10.3. **Mitigation Measures**

Typical construction work schedules are expected to be from 7:00 A.M. to 5:00 P.M., Monday through Friday, which complies with the local noise ordinance restrictions for construction activity of 7:00 AM to 7:00 PM, except Sundays and federal holidays. This construction schedule will mitigate noise impacts for the surrounding areas because noise from construction activities will only occur from 7:00 A.M. to 5:00 P.M., Monday through Friday. However, because no nearby sensitive receivers exist, extended construction hours may be acceptable.

3.11. Waste Management and Hazardous Materials

This section addresses potential site contamination issues: the use, handling and storage of hazardous and toxic substances and the generation and disposal of hazardous materials associated with the proposed construction and operations of the Project. Hazardous materials are substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present a substantial danger to public health or the environment if released. In relation to this Project hazardous materials may include fuels, lubricants, and other liquid materials that will be used at the site during construction and operations. Non-hazardous solid waste refers to waste that is commonly discarded during everyday activities and for this Project may include construction debris, landscaping waste, and household waste from construction workers and operational staff.

3.11.1. Existing Setting

A Phase I Environmental Site Assessment was conducted in 2014 of the Project site in general accordance with American Society for Testing and Materials (ASTM) International Practice E-1527-05 (Ninyo and Moore 2014). That study included a review of the site history, including ownership records; historical aerial photographs, and interviews with representatives of the City of Boulder City, and review of environmental databases. The assessment described the site as vacant desert land with a Southwest Gas natural gas pipeline traversing the site in a north-south direction. Based on a review of historical sources the Project area has not been previously developed with structures. No drums, unidentified substance containers, or other evidence of the storage or disposal of hazardous substances were observed on the Project site. Review of environmental databases indicated that there are three facilities in the vicinity of the Project that have handled hazardous materials or petroleum products and/or have been listed as having reported releases of hazardous materials or petroleum products. Based on the distance from the Project area, regulatory status of these facilities, and/or assumed groundwater flow direction in the vicinity of the Project area, there is a low likelihood that these facilities represent an environmental concern to the Project site at this time (Ninyo and Moore 2014).

The nearest site for municipal solid waste disposal is a Class I Municipal Landfill in the City of Boulder City. Municipal solid waste is collected under contract by private solid waste services from residencies and businesses and it disposed of at the landfill location at the end of Utah Street at the southeast portion of the city. A Class I site is one that refers to a municipal solid waste landfill unit including all contiguous land structures for the disposal of solid waste and accepts more than 20 tons of solid waste per day on an annual average. In addition, Republic Services operates the Apex Regional Class I Landfill, which handles commercial and municipal wastes from incorporated and un-incorporated areas within the Las Vegas Valley. The next closest Class I municipal waste landfill is the Mesquite Municipal Waste Landfill, located in Mesquite, Nevada approximately 100 miles from the site (NDEP 2012).

3.11.2. Environmental Consequences

The construction of the Project will generate solid waste in the form of soil and brush from clearing and grubbing, as well as materials from installation of the PV panels, gen-tie circuit, access road, and parking area. Solid waste generated during construction will be transported for disposal at a licensed waste management facility. The operation of the Project is expected to generate limited amounts of solid waste stemming from routine maintenance activities. Any waste generated as a result of these activities will be disposed of at a licensed waste management facility.

The construction and operation of the Project is not expected to require the transportation, use, or generation of hazardous materials or hazardous wastes that could create a significant hazard to the public or environment. The types of materials that will potentially be present during construction will be minimal volumes of vehicle fuels, lubricating oils, paints, adhesives and sealants. The ordinary use of these materials will not result in the generation of hazardous wastes. To comply with federal, state and local regulations for waste minimization, storage and disposal, a solid and hazardous waste management plan will be prepared and implemented for both the construction and operation of the Project. As the construction contractors will be required to comply with environmental and workplace safety laws and procedures, no significant risks to public health and safety are expected from the proposed action.

3.11.3. Mitigation Measures

The following BMP and mitigation measures that be implemented to prevent and reduce impacts caused by hazardous waste:

- Spill cleanup kits will be available on construction equipment and vehicles so that spills or leaks of vehicle fluids would be quickly cleaned up for proper disposal.
- Construction sites, material storage yards, and access roads will be kept in an orderly condition throughout the construction period.
- Refuse and trash, including stakes and flags, will be removed from the sites and disposed of in an approved manner.
- No construction equipment oil or fuel will be drained on the ground.
- Oils or chemicals will be hauled to an approved site for disposal. No open burning of construction trash will occur.
- An operational Environmental Health and Safety Plan will be prepared for the Project. The Safety Plan will outline all Project activities, identify all hazardous substances and chemicals used at the site, and ensure compliance with OSHA Standards, the Nevada Division of Industrial Relations requirements, and all other local, state, and federal

regulatory requirements. The Safety Plan will identify site-specific safety control measures, site health and safety roles and responsibilities, speed limits, and site safety hazards and controls.

- A Solid and Hazardous Waste Management Plan will need to be prepared and implemented for both construction and operation of the Project. Included in the solid and hazardous waste management plans will be stipulations and procedures regarding compliance with federal, state, and local regulations for waste minimization, storage, and disposal. The construction contractor shall prepare BMPs that describe the methods for working with hazardous materials during construction.

3.12. Socioeconomics

3.12.1. Existing Conditions

The Project site is located in the undeveloped, uninhabited, and rural area that Boulder City, Nevada, acquired from the Bureau of Land Management in 1994. The inhabited area of Boulder City is over 15 miles from the Project site, although the site is located within the official city boundary. Boulder City is locally recognized as a "rural oasis" for the residents of the urban center of Las Vegas, Nevada (Hughes 2011), which is located approximately 22 miles to the northwest of Boulder City. Both Las Vegas and Boulder City are located in Clark County, Nevada.

Boulder City, Nevada, is a small town of 208 square miles (U.S. Census Bureau 2012a) known for its recreational opportunities and rural lifestyle (Hughes 2011). Its population remained almost totally stable during the period 2000 to 2010, growing only 0.4% from 14,966 in 2000 to 15,023 in 2010 (Census 2012a). Clark County, Nevada had a population of almost 1.4 million in 2010, with Las Vegas city comprising over 30% of the county population.

Median household income in 2010 was $62,171, which decreased 5.2% from the high of $65,572 in 1999 (U.S. Census Bureau 2012a). In comparison, Clark County, Nevada had a median household income of $56,258 in 2010, approximately $6,000 less than the median household income in Boulder City.

The civilian employed population in Boulder City (including civilian workers of age 16 or older) was 6,473 in 2010 (U.S. Census Bureau 2012b). Tourism and recreation businesses, due to its proximity to Las Vegas, are very important to Boulder City's economy (Hughes 2011). The three top employing sectors in Boulder City in 2010 were:

- Construction (18.4% of total employment);
- Arts, entertainment, recreation, and accommodation and food services (17.5% of total employment); and
- Educational services, health care, and social assistance (13.6% of total employment). (U.S. Census Bureau 2012b)

In Clark County, the civilian employed population was 907,510. The top employing industries in Clark County are:

- Arts, entertainment, recreation, and accommodation and food services (27.9% of total employment);
- Educational services, health care, and social assistance (13.3% of total employment);
- Retail sales (11.1% of total employment); and
- Construction (9.4% of total employment).

3.12.1.1. Environmental Justice

The U.S. EPA defines a community with potential environmental justice populations as one that has a higher proportion of minority or low-income populations than does an identified reference community. An environmental justice assessment requires an analysis of whether low income or poverty populations will be disproportionately and adversely affected by a Project. For this analysis, "minority" includes all racial groups other than "white, not Hispanic or Latino." Low-income populations are defined as those individuals that are considered living below poverty levels, as defined by the U.S. Census Bureau. The U.S. Census Bureau defines poverty level thresholds for individuals and a family of four as income levels below $11,139 and $22,314, respectively (U.S. Census Bureau 2012c). Populations in either group are considered significant if their share of the population is more than ten percentage points higher than the minority/low-income population's share of the state and the county.

Table 14 shows that Boulder City as a whole has a higher proportion of white, non-Hispanic residents and lower proportions of low income residents when compared to those in Clark County and Nevada. The Project is located in two Census Tracts, which are located to the south and west of the inhabited area of Boulder City. These Tracts show larger proportions of minority populations relative to Boulder City, but similar or smaller proportions of minorities when compared to Clark County. Census Tract 300573 shows a higher portion of low income residents than in Boulder City, Clark County or the state.

Table 14. 2010 Race, Ethnicity and Low Income Indicators

Environmental Justice Indicator	Nevada	Clark County	Boulder City	Census Tract 3005703	Census Tract 3005711
White, Non-Hispanic	54.1%	48.0%	88.0%	72.2%	70.8%
Black	10.5%	8.1%	0.9%	6.4%	2.7%
American Indian and Alaska Native	1.2%	0.7%	0.8%	1.1%	0.4%
Asian	7.2%	8.7%	1.1%	5.9%	10.9%
Native Hawaiian and Other Pacific Islander	0.6%	0.7%	0.3%	0.1%	0.4%
Two or More Races	4.7%	5.1%	3.0%	3.6%	5.1%
Hispanic or Latino, Total	26.5%	29.1%	7.1%	12.4%	11.6%
Low-Income Population	11.9%	11.7%	8.2%	24.8%	0.9%

Source: US Census Bureau 2012a,d,e

3.12.2. **Environmental Consequences**

The Project will generate temporary employment during construction of the solar field, substation, and gen-tie line. The construction of the solar field and associated facilities is anticipated to employ between approximately 300 workers during peak activity beginning in 2015 for 18 months. Peak construction activities will be from June 2015-May 2016.

Temporary construction jobs will bring employment and income to Clark County. It is expected that the construction workers will primarily be local residents. However, a small amount of workforce is expected to require specialty skills and will either relocate to the region temporarily or permanently, including staying in hotels/motels, apartments, or purchasing a home. Thus, population is expected to grow at least temporarily by up to 100 individuals over the duration of the construction phase, representing a very minor impact on population and temporary housing. The temporary employment will bring income to the region, which will support other businesses in the area. Workers spend their income on food services, transportation services, accommodations, retail stores, medical services, and other services and products. As worker spending rolls over in the local economy, it supports additional jobs and income in the area. Additionally, the state of Nevada as well as Boulder City is expected to gain from sales and property tax receipts from the successful construction and operation of the Project.

The analysis indicates that the Project will be partially located in a Census Tract that has a higher percentage of minorities and low income residents than the population of Boulder City and a higher proportion of low income residents than Clark County. However, no one lives adjacent to or in close proximity to the site (over 10 miles); therefore, no environmental justice populations will be unduly affected. Additionally, construction and operation of the Project will not have long-term or adverse health or environmental impacts, and therefore there will not be disproportionate and adverse effects to these residents.

3.12.3. **Mitigation Measures**

Potential impacts to socioeconomic conditions may be beneficial, and therefore no mitigation is required.

4. List of Preparers and Reviewers

This section provides the name, qualifications, professions, and contact information of each person with primary responsibility for the preparation of the environmental statement and of each person who has provided comments or input in the preparation of the statement.

Name	Title	Project Role
Copper Mountain Solar 4, LLC – c/o Sempra Renewables, LLC - 101 Ash Street, San Diego, California 92101		
Marilyn Burke	Director, Commercial Development	Project Developer
Mike End CSP, CIH	Environmental Permitting and Safety	Project Manager
Travis Jones	Project Engineer	Project Engineer
NewFields Environmental and Engineering, 8250 W. Charleston Blvd., Ste 100, Las Vegas, NV 89117		
Ken MacDonald	Partner	Senior Project Manager
Anne DuBarton	Project Manager, Cultural Resource Specialist	Author of Environmental Statement and Cultural Report
Stephanie Locke	Project Manager, Biologist	Author of Environmental Statement and Biological Resources Report
Justin Romanowitz	Biologist	Author of Permitting Plan

5. List of Acronyms and Abbreviations

AC	alternating current
ASTM	American Society for Testing and Materials
BLM	Bureau of Land Management
BMP	best management practices
CAA	Clean Air Act
CMS4	Copper Mountain Solar 4
CO	carbon monoxide
CO_2-e	CO_2 equivalent
DAQEM	Department of Air Quality and Environmental Management
dB	decibel
dBA	"a-weighted" decibel
DC	direct current
ER	Energy Resource
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GCC	general construction contractor
GHG	greenhouse gas
kV	kilovolt
MSL	mean sea level
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NDWR	Nevada Department of Water Resources
NDOW	Nevada Department of Wildlife
NO_2	nitrogen dioxide
NRCS	Natural Resource Conservation Service

NRHP	National Register of Historic Places
NSO	Nevada Solar One
O_3	ozone
O&M	operations and maintenance
OSHA	Occupational Safety and Health Administration
Pb	lead
$PM_{2.5}$	particles with a diameter less than or equal to a nominal 10 micrometers
PM_{10}	particles with a diameter less than or equal to a nominal 2.5 micrometers
PUCN	Public Utilities Commission of Nevada
PV	photovoltaic
ROW	right-of-way
SCADA	supervisory control and data acquisition
SO_2	sulfur dioxide
SWPPP	Stormwater Pollution Prevention Plan
UEPA	Utility Environmental Protection Act
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Service
VOC	volatile organic compound

6. References

Ahlstrom, Richard V.N.

2003 *Archaeological Investigations in Clark County Wetlands Park: The 170-A Pipeline Project.* HRA Inc. Archaeological Report No. 01-27.

Ahlstrom, Richard V.N. and Heidi Roberts

1999 *Archaeology at the Apex: A Site Location Model in the Las Vegas Valley, Clark County, Nevada.* HRA Inc. Conservation Archaeology, Las Vegas.

2001a *Archaeological Test Excavations at Sites 26CK1282 and 26CK1474, Clark County Wetlands Park, Southern Nevada.* HRA Inc. Archaeological Report No. 00-07, HRA Inc. Conservation Archaeology, Las Vegas.

2001b *Archaeology at the Apex: Excavations in the Apex Project Area, Southern Nevada.* HRA Papers in Archaeology, No. 2. HRA Inc., Conservation Archaeology, Las Vegas.

Anderson, R. Ernest

1999 Fault number 1116, Black Hills fault, in Quaternary fault and fold database of the United States: Accessed online at the U.S. Geological Survey website, http://earthquakes.usgs.gov/hazards/qfaults.

Avian Power Line Interaction Committee

2006 Suggested practices for avian protection on power lines: The state of the art in 2006. Washington, D.C. and Sacramento, CA: Edison Electric Institute, ADLIC, and the California Energy Commission.

Bettinger, R.L., James F. O'Connell, and David Hurst Thomas

1991 Projectile Points as Time Markers in the Great Basin. *American Anthropologist* 93:166–172.

Boulder City

1988 City of Boulder City, Nevada. City Code Title 11 Zoning and Subdivisions, Chapter 16, Section 3. Effective March 23, 1988. Available online at: http://www.sterlingcodifiers.com/codebook/index.php?book_id=417.

1997 City of Boulder City, Nevada. City Code Title 11 Zoning and Subdivisions, Chapter 19, Section 2. Effective July 16, 1997. Available online at: http://www.sterlingcodifiers.com/codebook/index.php?book_id=417.

Buqo, T.S., and M.E. Giampaoli

1988 Hydrologic Study and Water Supply Evaluation, Searchlight, Nevada, Final Report, Las Vegas Valley Water District, Las Vegas, NV.

Bureau of Land Management (BLM)

1986 Bureau of Land Management Manual H-8410-1 - Visual Resource Inventory. Information available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_handbook.Par.31679.File.dat/H-8410.pdf

1992 Draft Stateline Resource Management Plan and Environmental Impact Statement, U.S. Department of Interior, Las Vegas, NV, 1992.

1994 Environmental Assessment for Sale under P.L. 85-339, Eldorado Valley Act. EA Number NV-054-94-111. Las Vegas Office, Stateline Resource Area. August 22, 1994.

2004. Supplemental Programmatic Environmental Impact Statement. Clark County Regional Flood Control Distirct. 2002 Master Plan Update. September.

2011 Mojave Basin and range Rapid Ecoregional Assessment (REA). Accessed online, April 13, 2012. Available: http://www.blm.gov/wo/st/en/prog/more/climatechange/reas/mojave.print.html

Buqo, T.S., and M.E. Giampaoli

1988 Hydrologic Study and Water Supply Evaluation, Searchlight, Nevada, Final Report, Las Vegas Valley Water District, Las Vegas, NV.

City of Las Vegas

2010 The City of Las Vegas Safety and Seismic Safety Element of the Las Vegas 2020 Master Plan. Adopted by City Council on August 4, 2010. Accessed online at: http://www.lasvegasnevada.gov/files/Safety_SeismicSafetyElement.pdf

Clark County Division of Air Quality and Environmental Management (DAQEM)

2010 Dust Control Applications and Forms. Information available at the website: http://www.clarkcountynv.gov/depts/AirQuality/Pages/Compliance_DustPermitting.aspx

Clark County Department of Air Quality and Environmental Management (DAQEM)

2011 Clark County, Nevada – Areas of Nonattainment, Attainment and Maintenance

Ezzo, Joseph A., and Teresita Majewski

1995 Prehistory, Protohistory, and Ethnography. In *A Class I Cultural Resources Survey for the Southern Nevada Water Authority Treatment and Transmission Facility, Clark County, Nevada*, by Joseph A. Ezzo, pp. 35–74. Statistical Research Technical Series No. 55. Statistical Research, Tucson.

Federal Emergency Management Agency (FEMA)
2002 Federal Insurance Rate Map. Map Item ID 32003C3200E. Clark County, Nevada. Available at: http://gis1.msc.fema.gov/Website/newstore/Viewer.htm. Accessed 3/6/2013.

2012. Executive Order 11988: Floodplain Management. Available at: http://www.fema.gov/environmental-planning-and-historic-preservation-program/executive-order-11988-floodplain-management#1. Accessed 3/6/2013.

Fowler, Catherine
1999 Ethnohistory: Isabel Kelly's Data Relevant to the Southern Paiutes. In *Cultural Resource Management Plan for the Las Vegas Springs Preserve, Clark County, Nevada*. Gregory R. Seymour, pp. 111–120. HRC Report 4-9-3, Harry Reid Center for Environmental Studies, University of Nevada, Las Vegas.

Grayson, Donald K.
1993 *The Desert's Past, A Natural Prehistory of the Great Basin*. Smithsonian Institution Press, Washington, D.C.

Harrill, J.R., J.S. Gates, and J.M. Thomas
1988 Major Ground-Water Flow Systems in the Great Basin Region of Nevada, Utah and Adjacent States, Hydrological Investigations Atlas HA-694-C Scale 1:1,000,000, U.S. Geological Survey, Denver, CO.

Hughes, S.D.
2011 City of Boulder City Annual Budget Fiscal Year 2012. Boulder City, Nevada, City Council. Accessed online, September 14, 2012. Available: http://www.bcnv.org/Finance/mediavault/CAFR%202011.pdf

Jennings, Jesse
1957 Danger Cave. University of Utah Anthropological Papers, No. 27. Salt Lake City

Lawrence Berkeley National Laboratory
2007 Demolition of Building 51 and the Bevatron, Final Environmental Impact Report. July 2007.

Longwell, C.R., E.H. Pampeyan, Ben Brower, and RJ. Roberts.
1965 Geology and Mineral Deposits of Clark County, Nevada, Nevada Bureau of Mines and Geology Bulletin 62.

Lyneis, Margaret M.
1982 Prehistory in the Southern Great Basin. In *Man and Environment in the Great Basin*, edited by David B. Madsen and James F. O'Connell, pp. 172–185. SAA Papers No. 2. Society for American Archaeology, Washington.

National Institute on Deafness and Other Communication Disorders (NIDCD).
n.d. Common Sounds. Accessed online at: http://www.nidcd.nih.gov/staticresources/health/education/teachers/CommonSounds.pdf

Nevada Department of Agriculture (NVDA)
2005 Noxious Weed List. Accessed online, September 21, 2012. Available: http://agri.nv.gov/nwac/PLANT_NoxWeedList.htm

Nevada Department of Environmental Protection
2010 Ambient Air Quality Monitoring Standards.

2012 Mesquite Municipal Waste Landfill. Accessed on April 12, 2012 from http://ndep.nv.gov/bwm/landfills_mesquite.htm

2013 Bureau of Safe Drinking Water. About the Safe Drinking Water Act. Available at: http://ndep.nv.gov/bsdw/more.htm. Accessed 3/6/2013.

Nevada Department of Transportation (NDOT)
2013 Annual Traffic Report. Located online at: https://www.nevadadot.com/uploadedFiles/NDOT/About_NDOT/NDOT_Divisions/Planning/Traffic/2013Clark.pdf

Nevada Division of Water Resources (NDWR)
1994. Well Log Database. Available at: http://water.nv.gov/data/welllog/. Accessed 3/6/2013.

Ninyo and Moore
2014 Phase I: Environmental Site Assessment Report – Copper Mountain Solar 4 Project, Boulder City, Nevada

NextLight Renewable Power, LLC (NextLight)
2009 Environmental Statement. Nextlight Boulder City Solar Project. Clark County, Nevada. Exhibit A in: NextLight Renewable Power, LLC. 2010. Application of

Nextlight Renewable Power, LLC for Permit to Construct the Boulder City Solar Facility Pursuant to the Utility Environmental Protection Act. Public Utilities Commission of Nevada. 429 pp.

Rush, F.E., and C.J. Huxel, Jr
1966 Ground-Water Appraisal of the Eldorado – Pahute Valley Area, Nevada and California, Department of Conservation and Natural Resources, Water Resources – Reconnaissance Series Report 36, State of Nevada, Carson City, NV.

Schroedl, Alan R.
1991 Paleo-Indian Occupation in the Great Basin and Northern Colorado Plateau. *Utah Archaeology* 1(1), pp. 1–15.

Scott, B.R., T.J. Smales, F.E. Rush, and A.S. Van Denburgh
1971 Water for Nevada, Water Planning Report 3, Nevada Department of Conservation and Natural Resources, Division of Water Resources, State of Nevada, Carson City, NV.

Seymour, Gregory R.
1997 *A Reevaluation of Lower Colorado Buff Ware Ceramics: Redefining the Patayan in Southern Nevada.* Unpublished Master's thesis, University of Nevada, Las Vegas.

1999 *Cultural Resource Management Plan for the Las Vegas Springs Preserve, Clark County, Nevada.* Harry Reid Center for Environmental Studies, University of Nevada, Las Vegas Report 4-9-3.

State of Nevada, Department of Conservation and Natural Resources
1966 Water Resources Reconnaissance Series Report 36: Ground Water Appraisal of the Eldorado-Piute Valley Area, Nevada and California. Information available at: http://images.water.nv.gov/images/publications/recon%20reports/rpt36-eldorado_piute_valley.pdf

The Weather Channel
n.d. Average Weather for Boulder City, NV – Temperature and Precipitation. Information available at: http://www.weather.com/weather/wxclimatology/monthly/graph/USNV0009

United States Army Corps of Engineers (USACE)
2013 Army Geospatial Center. Summary: Desert Pavement. Accessed online at: http://www.agc.army.mil/research/products/desert_guide/lsmsheet/lspave.htm

United States Census Bureau (Census)

2012a Boulder City (city) QuickFacts from the US Census Bureau. Information available at: http://quickfacts.census.gov/

2012b S2403 Industry by Sex and Median Earnings in the Past 12 Months (in 2010 Inflation-Adjusted Dollars) for the Civilian Employed Population 16 Years and Over. Information available at: http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml

2012c Poverty Thresholds for 2010 by Size of Family and Number of Related Children Under 18 Years. Information available at: http://www.census.gov/hhes/www/poverty/data/threshld/thresh10.xls

2012d Clark County QuickFacts from the US Census Bureau. Information available at: http://quickfacts.census.gov/

2012e Nevada Quickfacts from the US Census Bureau. Information available at: http://quickfacts.census.gov/

United States Department of Agriculture, Natural Resources Conservation Service (NRCS)

2012 Web Soil Survey. Information available at: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

United States Environmental Protection Agency (USEPA)

1974 Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Prepared by U.S. Environmental Protection Agency Office of Noise Abatement and Control. March 1974.

2012a National Ambient Air Quality Standards (NAAQS). Information available at: http://www.epa.gov/air/criteria.html

2012b Region 9 Air Quality Maps. Information available at: http://www.epa.gov/region9/air/maps/index.html

United States Geologic Survey (USGS)

1977 Geologic Map of the Boulder City I5-Minute Quadrangle, Clark County, Nevada, by R. Earnest Andersen, 1977, Map GQ-1395.

2004 Mineral Resource Assessment of Selected Areas in Clark and Nye Counties, Nevada – a progress report. Information available at: http://pubs.usgs.gov/of/2004/1339/of2004-1339.pdf

2013 Nevada Quaternary Faults map. Information available at: http://geohazards.usgs.gov/qfaults/nv/Nevada.php

United States Fish and Wildlife Service (USFWS)

2003 Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.

2011a Revised Recovery Plan for the Mojave Population of the Desert Tortoise (Gopherus agassizii). U.S. Department of the Interior, Fish and Wildlife Service, Region 8, Pacific Southwest Region, Sacramento, California.

2011b Gila Monster. U.S. Department of the Interior, Fish and Wildlife Service, Endangered Species, Mountain-Prairie Region. Information available at: http://www.fws.gov/mountainprairie/species/reptiles/gilamonster/

University of California Santa Barbara (UCSB)

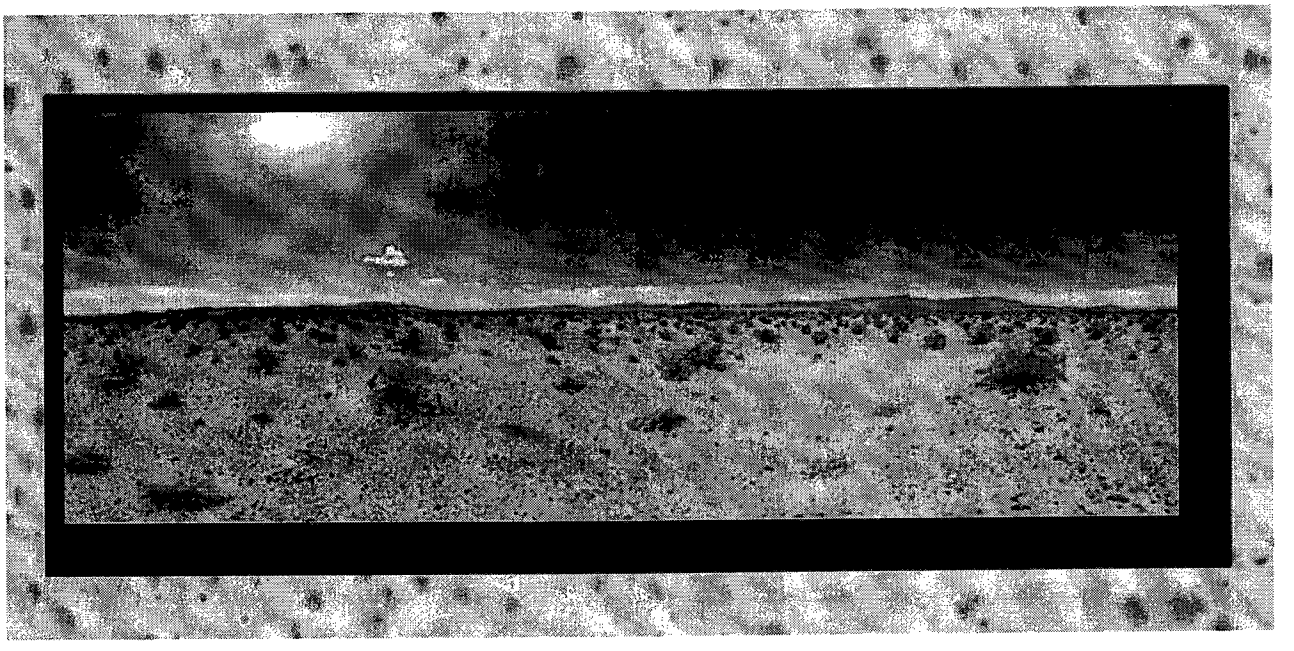
2004 UCSB Biogeography Lab. Information available at: http://www.biogeog.ucsb.edu/Projects/gap/gap_home.html

Exhibit A

Appendix A

Permitting Plan

Environmental Permitting Plan
Copper Mountain Solar 4 Project
Clark County, Nevada



Prepared for:

Copper Mountain Solar 4, LLC

101 Ash Street
San Diego, California 92101

Prepared by:

NewFields

300 South 4th Street
Suite 1500
Las Vegas, Nevada 89101

October 2014

Contents

Tables

1. Executive Summary

This permitting plan was developed to identify federal, state, and local government permits that likely would be required for the construction and operation of the Copper Mountain 4 Solar (CMS4) Project ("Project).

To ensure that a thorough and comprehensive assessment of the environmental permits was completed, potential permits were identified, included, and evaluated in this report. Additionally, the proposed development activities (i.e., project components, construction activities, operation and maintenance activities etc.) were reviewed to determine environmental permits and approvals that may have to be completed prior to project construction, operation, and maintenance.

Agencies were contacted to ascertain or confirm regulatory requirements, submittal conditions, agency review times, and costs. Compliance with federal, state, and local laws, rules, and regulations will require timely coordination to ensure successful acquisition of the required permits, approval, and licenses for this project.

This report contains the conceptual description of the proposed action, followed by a discussion of the above key environmental permits and approvals. This is followed by a summary conclusion, a list of the permits identified, and an Appendix with detailed permit information.

2. Project Description

CMS4, a wholly-owned subsidiary of Sempra Renewables, LLC, is proposing the construction, operation, and maintenance of a solar energy generating facility of 94 megawatts on 682 acres of land owned by the City of Boulder City and leased by CMS4. The Project will share poles with an existing gen-tie to transmit the generated energy to the grid and also will utilize an existing waterline to provide water for construction and maintenance activities. Please refer to the Environmental Statement for a detailed description of the CMS4 Project.

The economics of photovoltaic ("PV") solar energy have improved over the past several years, making solar energy an electricity source of choice. Solar energy offers the opportunity to protect the environment by avoiding the production of greenhouse gases and other air emissions, decreasing our dependence on fossil fuels, and reducing the need for construction of fossil fueled power plants. Solar energy also benefits the economy generating jobs, business income, and tax revenue for Clark County and Nevada. Because solar energy is produced when demand for electricity is at its highest (during bright daylight hours), it helps to meet peak demand.

3. Federal Permits

3.1. Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, provides protection for species of fish, wildlife, and plants that are listed as threatened or endangered with extinction, candidates listing as threatened or endangered, and federally designated critical habitat. Section 10 of the ESA includes provisions to address protected species on private property. One of these provisions allows applicants to prepare a Habitat Conservation Plan so that individual projects do not need to consult with the service. In September 2000, a county-wide Multispecies Habitat Conservation Plan (MSHCP) was completed in compliance with Section 10 Consultation with the U.S. Fish and Wildlife Service (USFWS) and addresses 79 species. The MSHCP is intended under Section 10(a) of the ESA to support the issuance, by the USFWS, of a permit or permits (Section 10(a) Permit) which would (1) allow the "take" of threatened or endangered species resulting from otherwise lawful activities on non-federal properties within the county; and (2) allow the "take" of threatened or endangered species that are currently unlisted but may become listed in the future. The MSHCP does require that applicants pay $550/acre remuneration fee to Clark County, which is submitted with the grading permit fees.

3.2. U.S. Army Corps of Engineers

Two federal statutes mandate the U.S. Army Corps of Engineers (Corps) jurisdiction over navigable waterways and adjacent wetlands. These are Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Clean Water Act. Section 10 of the Rivers and Harbors Act applies to all navigable waters of the United States and Section 404 of the Clean Water Act applies to all waters including wetlands that have sufficient nexus to interstate commerce. Section 404 specifically regulates the placement of dredged or fill material into all waters of the U.S. and adjacent wetlands. Waters of the U.S. includes navigable water and tributaries that often include ephemeral dry desert washes.

Examination of aerial photographs and field reconnaissance indicates that all of the surface water in the project vicinity drains into the Eldorado Dry Lake located northeast of the project area. The dry lake is at the low area within a closed basin and therefore none of the surface flow drains into navigable waters (i.e. Waters of the U.S.). The USACE has not required Section 404 permits for adjacent projects in the Eldorado Valley. A permit is not expected to be required for this project, however, a jurisdictional determination report can be submitted to the U.S. Army Corps of Engineers if an official determination is necessary. In this report, the delineated area per USACE protocol will document that no waters and/or washes meet the criteria for wetlands or Waters of the U.S. Pending approval of this conclusion the Corps, will determine that no jurisdictional waters or wetlands would be affected by the project therefore Corps jurisdiction does not apply and no permits from the Corps would be needed.

4. State Approvals

4.1. Utility Environmental Protection Act (UEPA)

The Nevada Public Utilities Commission (PUCN) has the authority to site most electrical utilities within the state as authorized through the Utilities Environmental Protection Act NRS 704.820 (UEPA). Proponents wishing to construct a utility within the state of Nevada must first obtain a UEPA permit from the PUCN prior to the commencement of construction activities. Permit approval is granted by the Commission, which is comprised of three Commissioners who are each appointed by the Governor to a four-year term

The UEPA requires that the proponent submit an environmental statement which includes:

- A demonstration of the nature of the probable effect on the environment, after mitigation, if the proposed utility facility is constructed (NAC 703.420(4));
- A demonstration that the proposed utility facility represents the minimum adverse effect on the environment considering the state of available technology and the nature and economics of the various alternatives (NAC 703.420(4));
- An evaluation and comparison of all reasonable alternative locations and all reasonable designs for the proposed utility facility that includes:
    - A description of the environmental characteristics of the region in sufficient detail to provide an understanding of the environment existing when the application is made and the impact that each alternative would have on that environment. The data and analyses in the description must be commensurate with the significance of the anticipated impacts (NAC 703.420(4)(a)).
    - An evaluation of the significant effects on the quality of the environment for humans, significant environmental impacts, the means to mitigate adverse environmental impacts and, as appropriate, the requirements for energy and natural or nonrenewable resources (NAC 703.420(4)(b)).
    - A list of the reasons that the primary location and design selected by the applicant are best suited for the proposed utility facility (NAC 703.420(4)(c)).
- A list and summary of all studies that have been made of the environmental impact of the proposed utility facility and its alternatives (NAC 703.420(4)(d)).
- A copy of every study (excluding the Cultural Resources Report as this contains sensitive information) must be included for public inspection (NRS 703.870(1)(c)).

4.2. Nevada Department of Wildlife

NRS 701.600 through 701.640 requires the owners/applicants of all proposed energy projects (of applicable size) to file a notice (application) and provide an initial fee to NDOW for evaluation of the project. Please visit the NDOW webpage for application and instructions

4.3. Nevada Department of Environmental Protection

A Nevada Department of Environmental Protection (NDEP) General Stormwater Permit for construction activities is required for construction activities that disturb more than one acre of land. As the proposed project involves approximately 682 acres, it is anticipated that this permit will be required.

4.4. Nevada Department of Public Safety, State Fire Marshal Division

A Hazardous Material Permit is required for storage of large amounts of flammable liquid or combustible liquid pursuant to Nevada Administrative Code 477.232. It is anticipated that construction activities for the proposed project will require onsite fuel storage and thus require a Hazardous Materials Permit. Additionally, the online Hazardous Materials Reporting System had been developed to allow facilities to submit hazardous material information online. It is recommended that the proposed project use this online reporting system. This system contains a combined agency reporting form that contains EPCRA and SFM hazardous material permitting information. Submittal of this information complies with federal and state reporting requirements.

5. Clark County, Nevada Department of Air Quality

Clark County requires a Dust Control Permit for soil disturbing project greater than or equal to 0.25 acres. Because the proposed project would be grading approximately 665 acres, a dust control permit would be required. A Dust Mitigation Plan is required as part of this permit for all construction projects.

6. City of Boulder City

6.1. Public Works

For all construction projects in the City of Boulder City, the City's Public Works Department may require a review of the plan set, hydrology study, traffic study, and an on-site inspection. The City of Boulder City would issue the building and fencing permits for the project.

6.2. Fire Development

The Fire Development Department issues two types of permits: an annual permit issued for higher than normal fire hazards or hazardous material operations, and a "one-time" installation permit for fire detection and protection systems. In order to issue these permits, the department must conduct either a thorough inspection or plan review. This permitting process helps ensure that quantities of hazardous and/or flammable substances are kept safe and manageable. It is anticipated that for the proposed project a plan review will be required. The plan review will be conducted prior to the issuance of a construction permit. It is anticipated that the proposed project will need an installation permit for hazardous materials that will be stored on site during construction.

6.3. Community Development

The Community Development Department of the City of Boulder City requires a grading permit for all new construction activities. This permit specifies that a Clark County Dust Control permit must be obtained prior to construction.

7. Coordination with Utilities

Coordination may have to occur with several other utilities that have transmission lines, gas lines, telephone lines, or other linear facilities. Southwest Gas, CenturyLink, and NV Energy have been identified as having facilities within/near the proposed project area.

8. Summary

The proposed Copper Mountain 4 Solar Project will have numerous federal, state, county, and city requirements. This report represents a best effort to determine the required permits and the application processes. This evaluation of the proposed project determined that the suite of required environmental and regulatory approvals is typical and well understood for projects of this nature in Southern Nevada. Additional coordination may be required with some utilities that may be near the proposed project area. Table 1 illustrates the permits and approvals that may be required for the proposed project.

Table 1. Permits and Approvals that May be Required.

FEDERAL PERMITS AND APPROVALS REQUIRED	WHEN TO SUBMIT APPLICATION OR PLANS
USFWS - Endangered Species Act Compliance - Endangered Species Act Section 10 Consultation	Prior to construction
STATE PERMITS REQUIRED	
Utilities Environmental Protection Act Application	Immediately
UEPA Permit to Construct	Will be issued as soon as all the Permits and Approvals for the project have been obtained
Nevada Division of Wildlife – Energy Planning and Conservation Fund Payment	At same time as submittal of PUCN Application.
Nevada Division of Environmental Protection - System General Stormwater Permit	Prior to construction activities
Nevada State Hazardous Material Permit Roving Permit	Prior to construction activities
COUNTY PERMITS REQUIRED	
Clark County Department of Air Quality - Dust Control Permit	Prior to construction
CITY OF BOULDER CITY COORDINATION AND PERMITS REQUIRED	
City of Boulder City Public Works - Review and Approval of Plan Set, Hydrology Report, Traffic Study, and an Onsite Inspections,	Upon completion of 100% design
City of Boulder City Public Works – Building Permit	Upon completion of 100% design
City of Boulder City Public Works – Fencing Permit	Upon completion of 100% design

FEDERAL PERMITS AND APPROVALS REQUIRED	WHEN TO SUBMIT APPLICATION OR PLANS
City of Boulder City Fire Development Department – "One time" Permit	Upon completion of 100% design
City of Boulder City Community Development – Grading Permit	Upon completion of 100% design
UTILITY SERVICES COORDINATION REQUIRED	
NV Energy Coordination	After submittal of PUCN application
CenturyLink Coordination	After submittal of PUCN application
Southwest Gas Coordination	After submittal of PUCN application

Appendix A contains detailed information about each permit such as the regulatory context, key contact address and phone number, submittal requirements, typical agency processing times, and application fees.

Appendix A – Permit Details

FEDERAL PERMITS

U.S. FISH AND WILDLIFE SERVICE ENDANGERED SPECIES ACT SECTION 10 CONSULTATION

Need

A county-wide Multispecies Habitat Conservation Plan (MSHCP) was completed under Section 10 of the Endangered Species Act in consultation the U.S. Fish and Wildlife Service (USFWS) and addresses 79 species located on private property in Clark County. Under this MSHCP, the applicants pay a remuneration fee to mitigate for impacts to threatened and endangered wildlife habitat.

Agency Name and Address

U.S. Fish and Wildlife Service
4701 Torrey Pines Dr.
Las Vegas, NV 89130-2301
Contact: Michael Burroughs
Phone: 702-515-5230, Fax: 702-515-5231

Forms and Submittals

See scheduling and fees, below.

Scheduling

Permit pulled by Contractor just prior to beginning construction.

Fees

Construction contractor to pay desert tortoise fees of $550/acre on private land in desert tortoise habitat.

Additional Information

Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Act also are under the jurisdiction of USFWS and the MSHCP does not automatically ensure compliance. For example, Burrowing Owls or other migratory birds may occur at the site and the MBTA protects the birds, their nests, and prohibits activities that cause birds to leave nests. It does not protect habitat. As discussed in the Biological Evaluation, clearing owl burrows in the non-breeding season ensures compliance with the MTBA and does not specifically require consultation with USFWS. USFWS also has issued construction guidance to reduce impacts to burrowing owls, and these guidelines and other common standards are easily incorporated into the Best Management Practices for the project.

STATE PERMITS

NEVADA UTILITY ENVIRONMENTAL PROTECTION ACT

Need

1. The Nevada Legislature has declared that:

(a) There is at present and will continue to be a growing need for electric, gas and water services which will require the construction of new facilities. It is recognized that such facilities cannot be built without in some way affecting the physical environment where such facilities are located.

(b) It is essential in the public interest to minimize any adverse effect upon the environment and upon the quality of life of the people of the State which such new facilities might cause.

(c) Present laws and practices relating to the location of such utility facilities should be strengthened to protect environmental values and to take into account the total cost to society of such facilities.

(d) Existing provisions of law may not provide adequate opportunity for natural persons, groups interested in conservation and the protection of the environment, state and regional agencies, local governments and other public bodies to participate in proceedings regarding the location and construction of major facilities.

2. The Legislature, therefore, hereby declares that it is the purpose of NRS 704.820 to 704.900, inclusive, to provide a forum for the expeditious resolution of all matters concerning the location and construction of electric, gas and water transmission lines and associated facilities.

(Added to NRS by 1971, 554; A 1985, 2051; 1997, 489, 1914)

Agency Name and Address

Public Utilities Commission Of Nevada
Las Vegas Office
9075 West Diablo Drive, Suite 250
Las Vegas, NV 89148
Phone: (702) 486-7210, Fax: (702) 486-7206

Direct Contact: Mark Harris 775-684-6165

http://pucweb1.state.nv.us/PUCN/PUCHome.aspx

Forms and Submittals

A person or company who wishes to obtain a permit for a utility facility must file with the Commission an application, in such form as the Commission prescribes, containing:

(a) A description of the location and of the utility facility to be built thereon;

(b) A summary of any studies which have been made of the environmental impact of the facility; and

(c) A description of any reasonable alternate location or locations for the proposed facility, a description of the comparative merits or detriments of each location submitted, and a statement of the reasons why the primary proposed location is best suited for the facility.

☐ A copy or copies of the studies referred to in paragraph (b) must be filed with the Commission and be available for public inspection.

Scheduling

The Public Utilities Commission could take between 30 to 90 days to issue a UEPA permit after the application packet is received.

Fees

$200 filing fee.

Additional Information

All other State and Federal Permits must be submitted prior to the final issuance of the UEPA permit. All federal, state, county, and local permits must be obtained before the PUCN will issue a Notice to Construct

STATE PERMITS (CONTINUED)

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION NATIONAL POLLUTANT DISCHARGE AND ELIMINATION SYSTEM GENERAL STORMWATER PERMIT FOR CONSTRUCTION ACTIVITIES

Need

A General Stormwater Permit for Construction Activities is required for construction activities that will disturb one acre or greater and will discharge storm water runoff from the construction site into a municipal separate storm water sewer system or into waters of the United States as defined by Section 404 of the Clean Water Act. As no waters of the United States are expected to occur in the project area, this permit may not be required.

Agency Name and Address

Stormwater Coordinator
Bureau of Water Pollution Control
Nevada Division of Environmental Protection
901 S. Stewart Street, Suite 4001
Carson City, NV 89701
Phone: 775-687-9429

Clark County Contact: David Lloyd 702-486-2850 ext 250

http://ndep.nv.gov/bwpc/forms.htm

Forms and Submittals

Submit the following materials prior to construction:

- Notice of Intent, which provides general information
- General Stormwater Permit NVR100000 application

Upon project completion, contractor will submit a Notice of Termination.

Scheduling

Permit is valid upon electronic submission of permit application and receipt of confirmation letter, usually within 2 days. Permit issuance is required prior to construction/discharge activities. Preparation of a Stormwater Pollution Prevention Plan is required.

Fees

$200.00 application fee and a $200.00 annual fee.

Additional Information

Permit duration is one year. To renew permit, an additional $200 application fee is required (no need to resubmit Notice of Intent). A Stormwater Pollution Prevention Plan, that describes how the applicant intends to control runoff from the construction site must be completed and kept on site, but does not need to be submitted.

STATE PERMITS (CONTINUED)

NEVADA DIVISION OF WILDLIFE ENERGY PLANNING AND CONSERVATION FUND

Need

The 2011 Nevada State Legislature passed AB307 (NRS 701.600 through 701.640) which created the Energy Planning and Conservation Fund and the Fund for the Recovery of Costs.. These two funds will be administered by the Nevada Department of Wildlife (NDOW). The Director of NDOW approved the regulations (January 25, 2012) and was subsequently approved on March 8, 2012 by the Legislative Commission's Subcommittee to Review Regulations the set of regulations to implement the Statute and to provide further direction in the application of those statutes. In short, the statutes require the owners/applicants of all proposed energy projects (of applicable size) to file a notice (application) and provide an initial fee to NDOW for evaluation of the project. Additional fees may be required depending upon the scope of the project. The application and initial fee is to be submitted to NDOW concurrently with application submittal to any other (local, State or Federal) government agency in the State of Nevada. Project which are already in progress but still have documents pending for review by NDOW will also need to apply and provide funding. All unused fees will be returned upon completion of project review or if the application is withdrawn in advance of completion.

Agency Name and Address

Nevada Department of Wildlife
1100 Valley Road
Attn:John Toll
Habitat Division
Reno, NV 89512
Contact: John Toll
Phone: 775-688-1561

http://www.ndow.org/Our_Agency/Special_Projects/

Forms and Submittals

An online application form must be submitted with a location map and schedule for the project.

Scheduling

NDOW is allowed a 30 days to review.

Fees

An initial deposit toward reimbursement costs in the amount of $10,000; unused funds will be refunded.

Additional Information

N/A

STATE PERMITS (CONTINUED)

NEVADA STATE HAZARDOUS MATERIAL PERMIT

Need

Required for storage of flammable liquid of 5 or more gallons inside or 10 or more gallons outside and for combustible liquid of 10 or more gallons inside or 25 or more gallons outside for over 30 days. A Roving Permit from highway patrol is needed if the tanks would be moved. The Hazardous Material Permit is required for onsite fuel storage during construction activities. The Roving Permit is required if storage tanks are moved to different staging areas as construction progresses.

Agency Name and Address

Nevada Department Public Safety
Nevada State Fire Marshall Division
107 Jacobsen Way
Carson, City, NV 89711
Contact: Ginny Capucci
Phone: 775-684-7524 Fax: 775-684-7507

http://fire.nv.gov/bureaus/FPL/Hazmat/

Forms and Submittals

Project proponent will submit notification during construction phase to

Scheduling

Upon completion of online application

Fees

$150.00 annual report fee per facility up to 1 ton of hazardous material and $100.00 per additional ton of hazardous material

Additional Information

N/A

CLARK COUNTY PERMITS

DUST CONTROL PERMIT

Need

In accordance with Clark County Department of Air Quality Management regulations, a Dust Control Permit is required for any grading or land-disturbance activities within Clark County, Nevada.

Agency Name and Address

Clark County Department of Air Quality
4701 W. Russell Rd Suite 200
Las Vegas, Nevada 89118
Phone: 702-455-5942 Fax: 702-383-9994

http://www.clarkcountynv.gov/Depts/AirQuality/Documents/DustControl/DustForms/Application.pdf

Forms and Submittals

Submit the following materials prior to construction:

- Application for Dust Control Permit
- Location map
- Dust Mitigation Plan

This permit is required for construction activities in Clark County, Nevada impacting greater than 0.5 acre or 100 feet of trench. A sign must be displayed prior to construction per 17.5.1.6 Clark County Department of Air Quality Management regulations.

Scheduling

The Department of Air Quality Management may take up to 7 days to issue a permit.

Fees

$144.00 per disturbed acre

Additional Information

Permits are issued for up to one year from date received. If project continues over one year, applicant must reapply for a new permit before the existing permit expires for disturbance on the remaining acreage.

UTILITY COORDINATION

NEVADA ENERGY COORDINATION

Need

Construction activity requires review of project location by utilities to avoid construction conflicts. Must prepare preliminary project design drawing.

Agency Name and Address

NV Energy Land Services
Attn: ROW Management Department
6226 W. Sahara Ave., MS #9, Las Vegas, NV 89146

Phone: 702-402-5555

https://www.nvenergy.com/brochures_arch/new_construction/ApplicationforSubmittal.pdf

Forms and Submittals

Design engineer will submit Preliminary design drawing with project location during design phase.

Scheduling

21 days

Fees

None

Additional Information

N/A

UTILITY COORDINATION (CONTINUED)

CENTURYLINK COORDINATION

Need

Construction activity requires review of project location by utilities to avoid construction conflicts. Prepare preliminary project design drawing. For telephone service, prepare 60 percent design drawings. CenturyLink will design the telephone facilities.

Agency Name and Address

CenturyLink

Forms and Submittals

Design engineer will submit a preliminary design drawing or 60 percent design drawing if telephone service is required during design phase.

Scheduling

21 days

Fees

None

Additional Information

N/A

UTILITY COORDINATION (CONTINUED)

SOUTHWEST GAS COORDINATION

Need

Construction activity requires review of project location by utilities to avoid construction conflicts. Must prepare preliminary project design drawing.

Agency Name and Address

Southwest Gas
4300 W. Tropicana Ave.
Las Vegas, NV 89193
Phone: 702-365-2056

Forms and Submittals

Design engineer will submit Preliminary design drawing with project location during design phase.

Scheduling

21 days

Fees

None

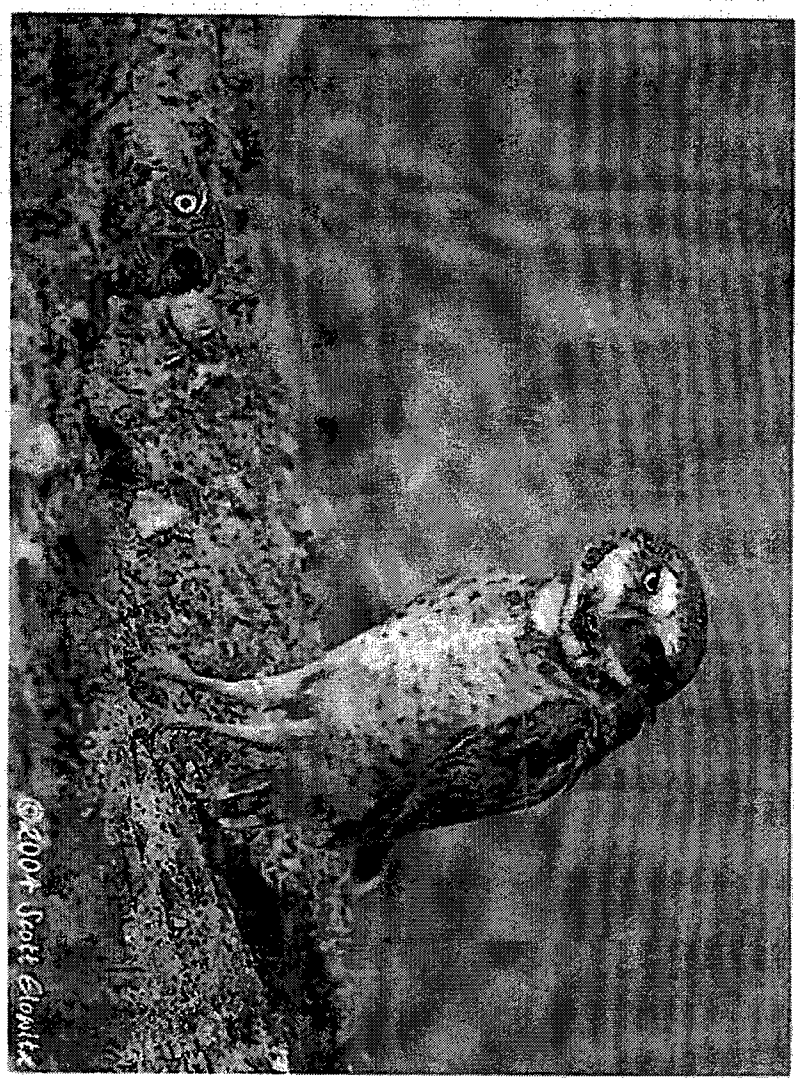
Additional Information

N/A

Exhibit A

Appendix B

USFWS's pamphlet, Protecting Burrowing Owls at Construction Sites in Nevada's Mojave Desert Region



U.S. Fish and Wildlife Servi
Nevada Fish and Wildlife Off
4701 N. Torrey Pines Drive
Las Vegas, NV 89130
Phone: 702-515-5230
Fax: 702-515-5231

http://www.fws.gov/nevada

U. S. Fish and Wildlife Service

Nevada Fish and Wildlife Office

Conserving the Biological Diversity of Great Basin, Eastern Sierra & Mojave Desert

PROTECTING BURROWING OWLS AT CONSTRUCTION SITES IN NEVADA'S MOJAVE DESERT REGION

Burrowing owl numbers are declining despite protection under the Migratory Bird Treaty Act. Killing or possessing these birds or destruction of their eggs or nest is prohibited.

Be part of the solution; help these owls!

Though burrowing owls are capable of digging their own burrows, they often will use burrows of other animals for shelter and nesting. They will even adopt pipes or culverts 6" to 8" in diameter.

Tips for Protecting Burrowing Owls, Their Eggs and Young at Construction Sites:

Even though burrowing owls are often active during the day, always check burrows, cracks, and crevices for owls before beginning construction. Use of a fiber-optic scope or remote mini-camera to look into a burrow can help determine the presence of owls or nests. Ensure owls and eggs are not present in burrows when grading begins, to avoid burying them.

In southern Nevada, owls breed from about mid-March through August. If a burrow has an active nest, the site must be avoided until the chicks have fledged. To ensure that birds will not abandon the nest, a buffer of at least a 250-foot radius should be placed around the burrow, within which no construction should occur. It takes a minimum of 74 days from when eggs are laid until chicks are able to fly (fledge). After the young have fledged, check the nest burrow for any owlets before resuming construction.

<u>The following owl behaviors may help determine breeding or the presence of an active nest:</u>

- A pair of owls is initially observed at a site, then only one owl is observed. This may indicate that the pair has chosen a nest burrow, and the female has gone down into the burrow to lay and incubate eggs. Once incubation begins the female rarely leaves the burrow.
- An owl is frequently observed carrying food to the burrow. The male provides food for the female while she is incubating eggs. The best time of day to observe owls is dawn and dusk, but they may be active throughout the day. The male will most likely leave the food in front of the burrow and the female will come to the entrance to take the food. This is probably the best indication that the owls have an active nest.
- Only one owl has been seen for a period of time; then, two owls are observed. This may indicate that either the nest has failed, or the eggs have hatched, and the female has emerged from the burrow to assist the male in hunting for food to feed the chicks. The chicks will appear at the burrow entrance when they are about 10 days old.

If you are unsure of breeding status, seek the assistance of a professional biologist or other knowledgeable person. Should breeding behavior be observed, presence of an active nest should be assumed and the area avoided until the chicks have fledged or the nest is no longer occupied.

IMPORTANT! In the Mojave Desert portions of Clark, southern Lincoln and Nye counties, owls may use desert tortoise burrows for nesting and shelter. Desert tortoises are protected under the Endangered Species Act. Killing, harming, or harassing desert tortoises, including destruction of their nests with eggs, without prior authorization is prohibited by Federal law.*

* IF YOUR PROJECT IS IN CLARK COUNTY, PLEASE READ ON:

Clark County holds a permit from the U.S. Fish & Wildlife Service authorizing "take" of desert tortoises during the course of otherwise legal activities on non-federal lands. In Clark County only, discouraging burrowing owls from breeding in the construction site on private property is allowed by collapsing tortoise burrow's during the owl's non-breeding season (September through February). This may help avoid construction delays. Prior to collapsing a burrow, always check for owls or other protected wildlife occupying the burrow for the winter. Call the Nevada Department of Wildlife at 702-486-5127 if a Gila monster is found as this is a State protected species.

Thank you for your assistance in protecting migratory birds and Nevada's endangered and threatened species!

Exhibit A

Appendix C

Nevada Department of Wildlife (NDOW) Gila-monster
Protocols issued September 7, 2012

NEVADA DEPARTMENT OF WILDLIFE
Southern Region
4747 W. Vegas Drive, Las Vegas, Nevada 89108
Phone: 702-486-5127, Fax: 702-486-5133

7 September 2012

GILA MONSTER STATUS, IDENTIFICATION AND REPORTING PROTOCOL FOR OBSERVATIONS

Gila Monster Status

- Per Nevada Administrative Code 503.080, the Gila monster (*Heloderma suspectum*) is classified as a Protected reptile.

- Per Nevada Administrative Codes 503.090, and 503.093, no person shall capture, kill, or possess any part thereof of Protected wildlife without the prior written permission by the Nevada Department of Wildlife (NDOW).

This species is rarely observed relative to other species which is the primary reason for its Protected classification by the State of Nevada. The USDI Bureau of Land Management has recognized this lizard as a sensitive species since 1978. Most recently, the Gila monster was designated as an *Evaluation* species under Clark County's Multiple Species Habitat Conservation Plan (MSHCP). The evaluation designation was warranted because inadequate information exists to determine if mitigation facilitated by the MSHCP would demonstrably cover conservation actions necessary to insure the species' persistence without protective intervention as provided under the federal Endangered Species Act.

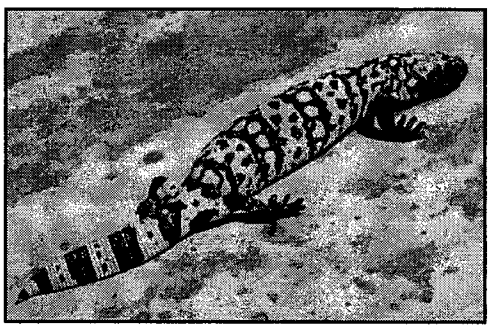
The banded Gila monster (*H.s. cinctum*) is the subspecies that occurs in Clark, Lincoln, and Nye counties of Nevada. Found mainly below 5,000 feet elevation, its geographic range approximates that of the desert tortoise (*Gopherus agasizii*) and is coincident to the Colorado River drainage. Gila monster habitat requirements center on desert wash, spring and riparian habitats that inter-digitate primarily with complex rocky landscapes of upland desert scrub. They will use and are occasionally encountered out in gentler terrain of alluvial fans (bajadas). Hence, Gila monster habitat bridges and overlaps that of both the desert tortoise and chuckwalla (*Sauromalus ater*). Gila monsters are secretive and difficult to locate, spending >95% of their lives underground.

The Gila monster is the only venomous lizard endemic to the United States. Its behavioral disposition is somewhat docile and avoids confrontation. But it will readily defend itself if threatened. Most bites are considered illegitimate and consequential to harassment or careless handling. These lizards are not dangerous unless molested or handled and should not be killed.

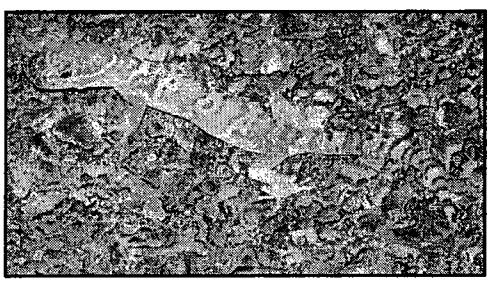
Scant information exists on detailed distribution and relative abundance in Nevada. The Nevada Department of Wildlife (NDOW) has ongoing management investigations addressing the Gila monster's status and distribution, hence additional distribution, habitat, and biological

information is of utmost interest. In assistance to gathering additional information about Gila monsters in Nevada, NDOW will be notified whenever a Gila monster is encountered or observed, and under what circumstances (see Reporting Protocol below).

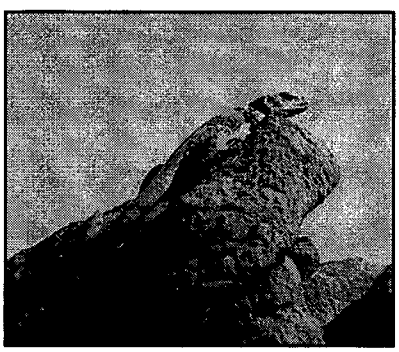
Identification



The Gila monster is recognizable by its striking black and orange-pink coloration and bumpy, or beaded, skin. In keeping with its namesake, the banded Gila monster retains a black chain-link, banded appearance into adulthood. Other lizard species are often mistaken for the Gila monster. Of these, the non-venomous western banded gecko (*Coleonyx variegatus*) and non-venomous chuckwalla are most frequently confused with the Gila monster. All three species share the same habitats.



The western banded gecko is often mistakenly identified as a baby or juvenile Gila monster. Western banded geckos do have a finely granular skin and pattern that can be suggestive of the Gila monster to the untrained eye. However, western banded gecko heads are somewhat pointed at the snout and the relatively large eyes have vertical pupils. Snouts of Gila monsters are bluntly rounded and the smallish eyes have round pupils. Newly hatched Gila monsters are about 5-6 inches long with a vivid orange and black, banded pattern. Adult western banded geckos are at best cream to yellow and brown in pattern and do not exceed 5 inches.



Both juvenile and adult chuckwallas are commonly confused with the Gila monster. Juvenile chuckwallas have an orange and black, banded tail. Although banding of the tail fades as chuckwallas mature, their large adult size (up to 17 inches) rivals that of the Gila monster. Adult chuckwallas have a body shape somewhat suggestive of the Gila monster, but they lack the coarsely beaded skin and black and orange body pattern of the Gila monster.

Reporting Protocol for Gila Monster Observations

Field workers and personnel in southern Nevada should at least know how to: (1) identify Gila monsters and be able to distinguish it from other lizards such as chuckwallas and western banded geckos (see Identification section above); (2) report any observations of Gila monsters to the Nevada Department of Wildlife (NDOW); (3) be alerted to the consequences of a Gila monster bite resulting from carelessness or unnecessary harassment; and (4) be aware of protective measures provided under state law.

1) Live Gila monsters found in harms way on the construction site will be captured and then

detained in a cool, shaded environment (≤85°F) by the project biologist or equivalent personnel until a NDOW biologist can arrive for documentation, marking and obtaining biological measurements and samples prior to releasing. Despite that a Gila monster is venomous and can deliver a serious bite, its relatively slow gate allows for it to be easily coaxed or lifted into an open bucket or box carefully using a long handled instrument such as a shovel or snake hook (*Note: it is not the intent of NDOW to request unreasonable action to facilitate captures; additional coordination with NDOW will clarify logistical points*). A clean 5-gallon plastic bucket with a secure, vented lid; an 18"x 18"x 4" plastic sweater box with a secure, vented lid; or, a tape-sealed cardboard box of similar dimension may be used for safe containment. Additionally, written information identifying the mapped capture location, Global Positioning System (GPS) coordinates in Universal Transverse Mercator (UTM) using the North American Datum (NAD) 83 zone 11. Date, time, and circumstances (e.g. biological survey or construction) and habitat description (vegetation, slope, aspect, substrate) will also be provided to NDOW.

2) Injuries to Gila monsters may occur during excavation, blasting, road grading, or other construction activities. In the event a Gila monster is injured, it should be transferred to a veterinarian proficient in reptile medicine for evaluation of appropriate treatment. Rehabilitation or euthanasia expenses will not be covered by NDOW. However, NDOW will be immediately notified of any injury to a Gila monster and which veterinarian is providing care for the animal. If an animal is killed or found dead, the carcass will be immediately frozen and transferred to NDOW with a complete written description of the discovery and circumstances, date, time, habitat, and mapped location (GPS coordinates in UTM using NAD 83 Z 11).

3) Should NDOW's assistance be delayed, biological or equivalent acting personnel on site should detain the Gila monster out of harms way until NDOW personnel can respond. **The Gila monster should be detained until NDOW biologists have responded.** Should NDOW not be immediately available to respond for photo-documentation, a digital (5 mega-pixle or higher) or 35mm camera will be used to take good quality images of the Gila monster in situ at the location of live encounter or dead salvage. The pictures will be provided to NDOW at the address above or the email address below along with specific location information including GPS coordinates in UTM using NAD 83 Z 11, date, time and habitat description. Pictures will show the following information: (1) Encounter location (landscape with Gila monster in clear view); (2) a clear overhead shot of the entire body with a ruler next to it for scale (Gila monster should fill camera's field of view and be in sharp focus); (3) a clear, overhead close-up of the head (head should fill camera's field of view and be in sharp focus).

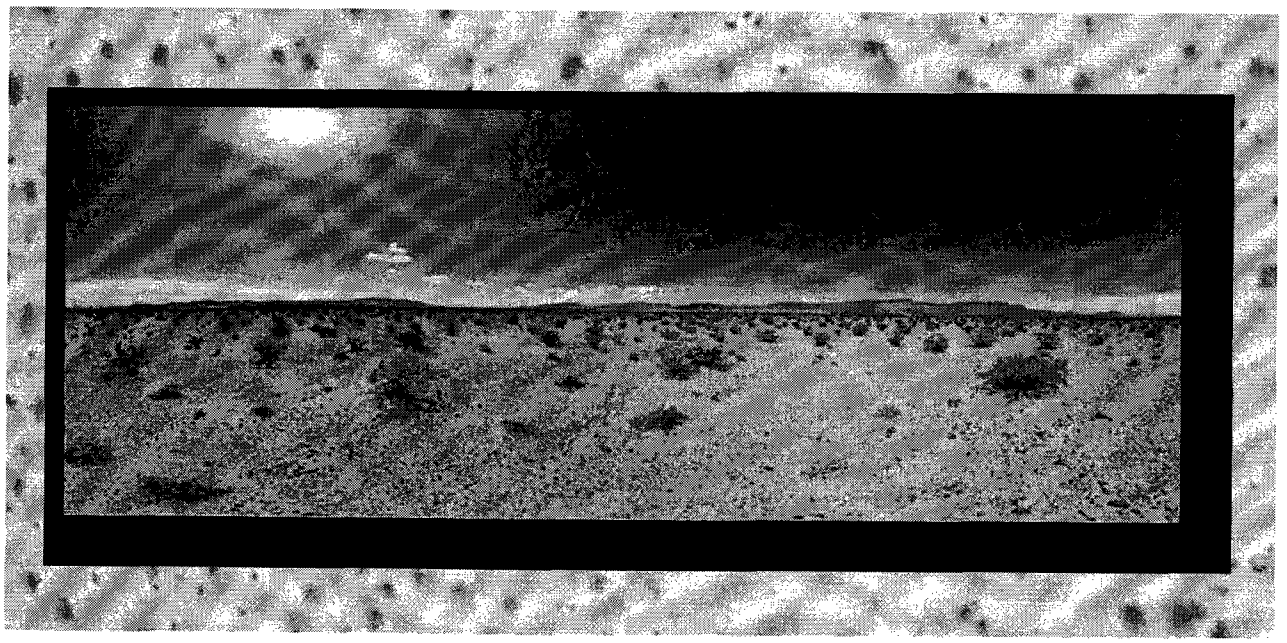
Please contact NDOW Biologist Jason L. Jones at 702-486-5127 x3718
or by e-mail at jljones@ndow.org for additional information regarding these protocols.

Exhibit A

Appendix D

Biological Report

Biological Report
Copper Mountain Solar 4 Project
Clark County, Nevada



Prepared for:

Copper Mountain Solar 4, LLC

101 Ash Street
San Diego, California 92101

Prepared by:

NewFields

8250 West Charleston Boulevard, Suite 100
Las Vegas, Nevada 89117

October 2014

Contents

Figures

Tables

1. Introduction

The purpose of this Biological Report is to evaluate the potential effects of the proposed Copper Mountain Solar 4 (CMS4) Project ("Project") on federally-protected and state-protected species. It is also intended to document compliance with Section 10 of the Endangered Species Act (Act) of 1973, specifically the Clark County Multiple Species Habitat Conservation Plan (MSHCP). The desert tortoise (*Gopherus agassizii*) is the single federally protected species known to inhabit the Project area and has been classified as being threatened with extinction.

2. Project Description

CMS4, a wholly-owned subsidiary of Sempra Renewables, LLC, is proposing the construction, operation, and maintenance of a solar energy generating facility of 94 megawatts on 682 acres of land owned by the City of Boulder City and leased by CMS4. The Project will share poles with an existing gen-tie to transmit the generated energy to the grid and also will utilize an existing waterline to provide water for construction and maintenance activities. Please refer to the Environmental Statement for a detailed description of the CMS4 Project.

3. Project Location

The Project area is located within Sections 6, 7 and 8 of Township 25 South, Range 63 East, M.D. B. & M. on the Boulder City SW U.S. Geological Survey 7.5 minute quadrangle map. The proposed Project is located within Boulder City's Eldorado Valley Energy Zone.

Main access to the Project will be via Eldorado Valley Drive, which connects the Project Area with U.S. Highway 95.

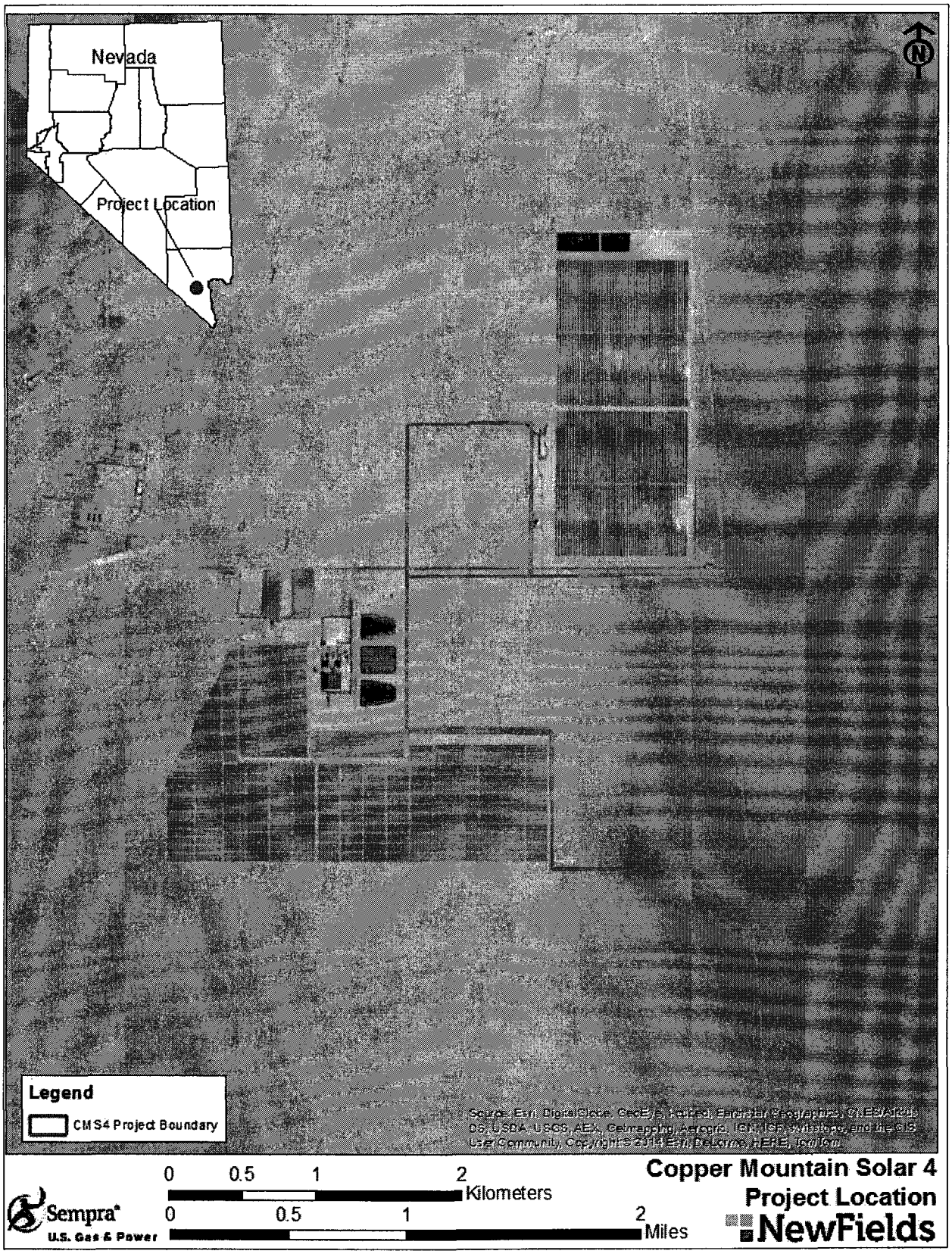


Figure 1. Project Location

4. Existing Conditions

This section documents the potential biological resources in the Project area including Vegetation, Wildlife, and Special Status Species (i.e. species protected under federal or state laws).

4.1. Vegetation Community

Boulder City lies in the Mojave Basin and Range ecoregion. This is an arid desert environment, receiving approximately 2-8 inches of rain annually. Mojave Creosote Bush Scrub is the major vegetation type in the Project area. This vegetation type consists mostly of creosote shrub (*Larrea tridentate*), white bursage (*Ambrosia dumosa*), and burro-weed (*Ambrosia dumosa*) in a sparse, widely-spaced pattern of growth that appears on slopes, fans, and valleys (UCSB 2004, BLM 2012). Additional species that were documented during field visits in May 2014 are presented in Table 2.

Table 1. Plants Observed in the Project Area

Common Name	Scientific Name
beavertail cactus	*Opuntia basilaris*
buck horn cholla	*Cylindropuntia acanthocarpa*
Devil's spineflower	*chorizanthe rigida*
Mediterranean grass	*schismus barbatus*
desert marigold	*Baileya multiradiata*
wingnut cryptantha	*Cryptantha pterocarya*
cotton top cactus	*Echinocactus polycephalus*
Freemont's pincushion	*Chaenactis fremontii*
cheesebush	*Ambrosia salsola*
soft prairie clover	*Dalea mollisima*
six-weeks grama	*Bouteloua barbata*
Parry's sandmat	*Chamaesyce parryi*

Non-Native Invasive Plant Species

Four non-native invasive plant species are known to have colonized within or near the Project area: Sahara mustard (*Brassica tournefortii*), Mediterranean grass (*Schismus* spp.), red brome (*Bromus madritensis*), and Russian thistle/tumbleweed (*Salsola iberica*; NextLight 2009). These invasive plants occupy the Project area in low numbers, and none of them are particularly abundant (NextLight 2009). Sahara mustard is the only one designated as a noxious weed by the Nevada Department of Agriculture. It is classified as a Category B weed species. Category B species are defined as "weeds established in scattered populations in some counties of the state; actively excluded where possible, and actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur" (NVDA 2005).

Cactus and Yucca

Cactus and Yucca are protected under NRS 527.060-527.120, Nevada State Protection of Christmas Trees, Cacti, and Yucca and addressed in this section. During field surveys, cactus plants were observed in the proposed Project area including cotton top cactus (*Echinocactus polycephalus*) and beavertail cactus (*Opuntia basilaris*). No yucca was observed within the proposed Project area.

4.2. Wildlife

Species known to inhabit the area include species typical of the Mojave Desert. Wildlife and wildlife sign observed during field surveys (May 2014) are presented in Table 2.

Table 2. Wildlife and Wildlife Sign Observed in the Project Area.

Common Name	Scientific Name
Reptiles	
western whip-tail lizard	*Cnemidophorous* spp
common zebra-tailed lizard	*Callisaurus draconoides*
desert horned lizard	*Phrynosoma platyrhinos*
Western shovel-nosed snake	*Chionactis occipitalis*
Desert tortoise (sign only)	*Gopherus agassizii*
Birds	
common nighthawk	*Chordeiles minor*
raven	*Corvus corax*
red-tailed hawk	*Buteo jamaicensis*
Mammals	
black-tailed jack rabbit	*Lepus californicu*
kit fox	*Vulpes macrotis*
coyote	*Canis latrans*
ground squirrel	*Spermophilus* sp.

Other common wildlife in this area may include turkey vultures (*Cathartes aura*), cactus mice (*Peromyscus* spp.) and kangaroo rats (*Dipodomys* spp.) as well as several bat and migratory bird species.

4.3. Special Status Species

The only federally-protected special-status species that may occur in the Project area was the desert tortoise (*Gopherus agassizii*), which is classified as Threatened under the Endangered Species Act (ESA) and migratory birds, which are protected under the Migratory Bird Treaty Act (MBTA). State-protected special-status species that have the potential to occur in the Project area include the western burrowing owl and Gila monster (*Heloderma suspectum*; BLM 2012).

4.3.1. Desert Tortoise

Desert tortoises are known to occur within the Project vicinity and area. Throughout most of the Mojave region, the desert tortoise occurs primarily on flats and bajadas (compound alluvial fans

along slopes) with soils ranging from sand to sandy-gravel and characterized by scattered shrubs and abundant inter-shrub space for herbaceous plant growth. They are also found on rocky terrain and slopes.

In May 2014, regionally experienced biologists conducted pre-project tortoise surveys within the entire action area in accordance with 2010 USFWS protocols (USFWS 2010). According to the USFWS, the objective of the field surveys is to determine presence or absence of desert tortoise, estimate the number of tortoises (abundance), and assess the distribution of tortoises within the action area (USFWS 2010). The survey area included the entire proposed Project site (682 acres) and was located using topographical maps, aerial photographs, and global positioning system (GPS) coordinates. Physical landmarks such as roads, surveyor markers, existing transmission lines, solar power plants and substations were also used for orientation. According to the USFWS, the objective of the field surveys is to determine presence or absence of desert tortoise, estimate the number of tortoises (abundance), and assess the distribution of tortoises within the Project area (USFWS 2010). Biologists also recorded observations of special status species. Biologists covered the entire Project area using 10-meter (33-foot) wide parallel pedestrian transects.This method is standard and referred to by USFWS as "100 percent coverage".

Observations of tortoise sign (live tortoises, carcasses, shell, bones, scute, scat, burrows, pallets, tracks, egg shell fragments, etc.) were recorded using fulcrum electronic data collection application. A Garmin GPSmap 60CSx GPS was used for orienteering during surveys.

No live tortoises were observed within the Project site; therefore, the estimated number of tortoise could not be calculated using the current USFWS tortoise estimation equation. The Project area contains what is subjectively considered very low tortoise population density habitat. However, desert tortoise sign was observed as shown in Figure 2, provided in Appendix A, and summarized in Table 3:

Table 3. Tortoise Sign Observed during Field Surveys.

Sign	Number Observed
Tortoise Burrows	29
Scat	2
Carcasses	2
Egg Shell Fragments	1

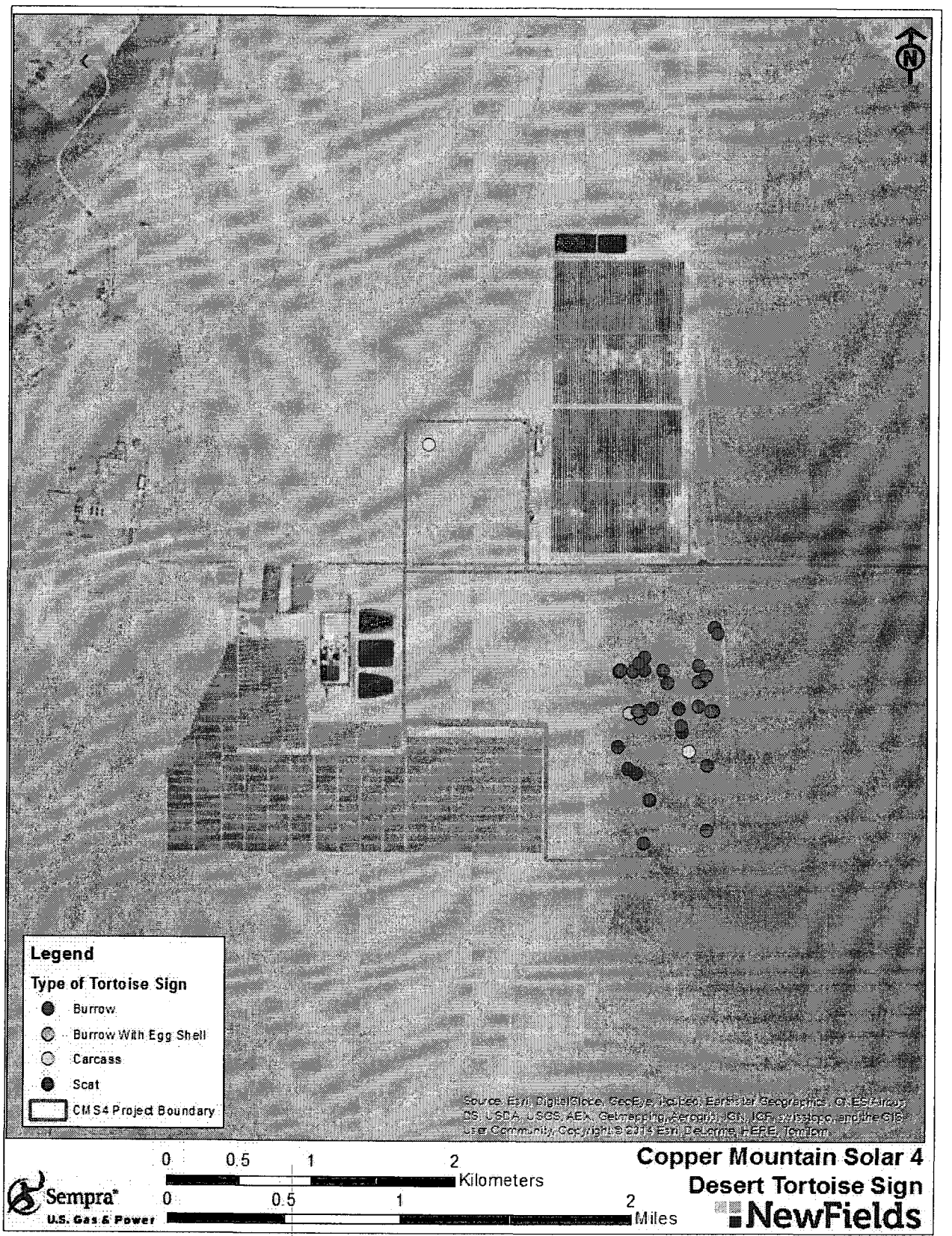


Figure 2. Desert Tortoise Sign Observed during Field Surveys

4.4. Migratory Birds and the Western Burrowing Owl

Executive Order (January 11, 2001) defines the MBTA of 1918 and subsequent amendments (16 U.S.C. 703–711) state that it is unlawful to take, kill, or possess migratory birds. Numerous bird species travel through Nevada during spring and fall migrations. A complete list is published at the USFWS web site (USFWS 2006). A list of those that are protected birds is in 50 CFR 10.13. The list of birds protected under this regulation is extensive and the project area has potential to support many of these species. Typically, the breeding season is when these species are most sensitive to disturbance, which generally occurs from March 1 through August 31.

Migratory birds that were observed during desert tortoise surveys include the common raven, common nighthawk, and red-tailed hawk. It is assumed that the Project area contains potential nesting and foraging habitat for a wide range of migratory birds including the burrowing owl.

Burrowing owl habitat typically consists of open, dry, treeless areas on plains, prairies, and desert floors (Haug et al. 1993). Burrowing owls most frequently use mammal burrows created by other animals such as kit fox, coyotes or desert tortoises. Burrow presence is the limiting factor to burrowing owl distribution and abundance (Coulumbe 1971; Martin 1973; Green and Anthony 1989; Haug et al. 1993). The burrows are used for nesting, roosting, cover, and caching prey (Coulumbe 1971; Martin 1973; Green and Anthony 1989; Haug et al. 1993).

Western burrowing owls are protected by the Migratory Bird Treaty Act (MBTA) and are a state-protected species in Nevada (NRS 503.620). Threats to burrowing owl populations throughout their range include alteration of breeding and wintering habitat, illegal hunting, predation, disease, inadequacy of existing regulatory mechanisms, pesticides, and various other natural or manmade factors (such as collisions with stationary/moving structures, or disease; USFWS 2003).

No western burrowing owls or owl burrows were observed in during field visits and desert tortoise surveys. However, the Project area does have the potential for burrowing owl use, as it contains potential nesting and foraging habitat (BLM 2012).

4.5. Gila Monster

The Gila monster (Heolderma suspectum) is classified as a State sensitive reptile (NAC 503.080) in Nevada and was not observed during the biological surveys but has the potential to occur in the Project area. Gila monsters are carnivorous/insectivorous lizards in the genus Heloderma (USFWS 2011b) whose range is centered in western and southern Arizona, and extends south through Sonora, Mexico (USGS 2006). They inhabit rocky slopes, washes, and sandy valleys in the desert environment, and can spend more than 95 percent of their time in underground shelters (USFWS 2011b). At the time of this writing, Gila monsters are not a federally-protected species. They are, however, classified as State Sensitive Reptiles in Nevada (NAC 503.080) and are protected under Nevada state laws NAC 503.090 and NAC 503.093

The Gila monster is a large, heavy-bodied lizard with a massive head, a short thick tail, and short limbs with strong claws. It has flamboyant dorsal coloration of black and pink, orange, or yellow

and occasionally exceeds 50 centimeters (19.7 inches) in total length (Campbell and Lamar 1989). Threats to this reptile include illegal collection, traffic fatalities, and most severely; habitat destruction from urban and agricultural development (Campbell and Lamar 2004).

No Gila monsters were observed during the 2014 surveys for this Project. Data compiled by Nevada Natural Heritage Program (NNHP) from previous surveys reported the Gila monster occurs near the proposed Project.

5. Environmental Consequences and Mitigation

This section discusses the potential impacts to biological resources resulting from construction, operation, and maintenence of the proposed Project and the mitigation measures/best management practices (BMPs) that would reduce and/or minimize these potential effects.

5.1. Vegetation

About 665 acres within the proposed site will be graded causing direct removal of vegetation and wildlife habitat. Additionally, construction activities could facilitate the introduction or spread of noxious or invasive weed species that can displace native vegetation, increase fire frequency, and reduce the quality of wildlife habitat.

During field surveys, only a few cactus plants were observed in the Project site, which are protected for commercial sale and transport under NRS 527.060-527.120, Nevada State Protection of Christmas Trees, Cacti, and Yucca. Few cacti were observed in the proposed Project site: however, it is probable that a cactus could be crushed or removed during grading activities.

The following BMPs/mitigation measures will be implemented to reduce construction impacts on vegetation and wildlife habitat:

- All construction vehicle movement will be restricted to the Project area, predesignated access roads, and public roads; and
- The Project proponent will avoid creating soil conditions that promote weed germination and establishment.

5.2. Wildlife

During construction of the Project, ground-disturbing activities could directly result in mortality to various wildlife species as about 665 acres will be graded. Fencing will be installed to help exclude wildlife after construction. Some species that are particularly mobile might be able to avoid injury or mortality by leaving the area. However, some wildlife, such as nocturnal species or species that use burrows, might be more susceptible to injury or mortality. Although temporary in nature, noise and activity associated with construction could cause animals to avoid the area, thus altering their normal behavior patterns.

Increased traffic on established roads could result in more vehicle/wildlife collisions, thereby resulting in injury or death to wildlife. This might be of particular concern for reptiles and species that utilize roads for heat sources or for other less mobile wildlife.

These general conservation measures are adapted from the Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement (Clark County 2002). The following BMPs/mitigation measures will aid in preserving the quality of adjacent desert tortoise habitat and will benefit other species:

- Store, use, and dispose chemicals, fuels, and other toxic materials in an appropriate manner;
- Keep equipment in good condition with no significant leaks of fuel or other substances that could be toxic to animals and fish. Equipment should be washed prior to first site use to prevent the spread of invasive species;
- Keep materials to absorb small spills of toxic materials available onsite;
- Ensure that roads are engineered to adequately spread runoff to minimize erosion; and
- Minimize soil compaction, erosion, and vegetation loss to preserve habitat by limiting construction activities to the Project site.

5.3. Special Status Wildlife Species

This section includes the impacts and mitigation measures for federally- or state-protected special status species including the desert tortoise, migratory birds, Western burrowing owl, and Gila monster.

5.3.1. Desert Tortoise

The entire 682 acre proposed site is within desert tortoise habitat. However, during surveys conducted in May 2014, no live tortoise sign was found in the Project site. Development of the solar facility is on private lands (i.e. those owned by Boulder City) and therefore will utilize the existing Clark County MSHCP Section 10 permit which allows take of desert tortoise.

Tortoises may be injured or killed during construction activities. Although not required under the Clark County MSHCP prior to construction, a Project clearance survey will be conducted. If a tortoise is found during the pre-construction survey, it will be removed and appropriately relocated by an authorized biologist.

Increased human activity and construction vehicle traffic may also result in tortoise/vehicle collisions that result in tortoise injury or death. Tortoise may take shelter under parked vehicles and be killed, injured, or harassed. Minimization measures such as a Worker Environmental Action Plan (WEAP), and speed limits on roads, will reduce or eliminate these effects.

Indirect effects could be caused by newly constructed fencing and the new gen-tie circuit which may facilitate increased predation. Predators such as ravens, coyotes, or other raptors may be attracted to the construction site due to an increase in food opportunities including construction site litter and voluntary feeding from construction staff;; or increased water sources due to dust control protocols. An increased presence of predators could lead to a predation increase on smaller, more vulnerable tortoises.

Ground disturbing activities during construction may result in an increase of noxious and invasive plant species in the area. Construction machinery may facilitate the spread of existing noxious or invasive species throughout the site, or may facilitate the introduction of new noxious weeds or invasive species. Noxious and invasive plants may displace native species that provide forage for tortoises.

Effects to desert tortoises due to gen-tie line construction will be the same as those described for construction of the Project Site, except the impacted area has previously been disturbed. In addition, the gen-tie line right-of-way will not be fenced so desert tortoises will be able to access the area.

The following BMPs/mitigation measures will be implemented to reduce effects on the desert tortoise and other species during construction:

- **Pre-Construction Clearance Survey:** Field biologists would conduct a single-pass clearance survey immediately prior to any construction activities. Tortoises found during this survey would either be collected and/or relocated by Clark County Desert Tortoise Pick-Up Program.
    - Burrows with the potential to be occupied by tortoises within the construction area would be searched for tortoise presence. In some cases, a fiber optic scope would be used to determine presence or absence within a deep burrow. If a tortoise-occupied burrow is located, the tortoise would be excavated using hand tools by a qualified biologist in accordance with standard USFWS protocols.
- **Worker Environmental Awareness Program (WEAP):** A WEAP would be presented to all personnel onsite during construction. This program would contain information concerning the biology and distribution of the desert tortoise, desert tortoise activity patterns, and its legal status and occurrence in the proposed Project area. The program would also discuss the definition of "take" and its associated penalties, measures designed to minimize the effects of construction activities, the means by which employees limit impacts, and reporting requirements and procedures to be implemented if tortoises are encountered. Personnel would be instructed to check under vehicles before moving them as tortoises often seek shelter under parked vehicles.
- **Trash and Litter Control:** Trash and food items would be disposed properly in predator proof containers with resealing lids. Trash would be emptied and removed from the Project site on a weekly basis. Trash removal reduces the attractiveness of the area to opportunistic predators such as ravens, coyotes and fox.
- **Habitat Compensation:** Prior to surface disturbance activities, the Project proponent would pay a one-time remuneration fee (per acre of proposed disturbance). The compensation rate for habitat loss under Section 10 through the MSHCP is $550/acre for development on private lands.

5.3.2. *Migratory Birds Including the Western Burrowing Owl*

Migratory birds could be injured or killed during construction activities such as vegetation removal and grading activities. Adult birds may be able to flee the area; however, during migratory bird nesting season, eggs and juvenile birds that are confined to nests may be injured or destroyed. During operation of the facility birds may be injured, electrocuted, or killed from collisions with power lines or construction vehicles. During decommissioning, impacts to birds would be similar as those described for construction. Birds may be injured or killed during gen-tie line pole removal.

Approximately 665 acres of native plant communities that provide potential habitat to nesting migratory birds would be removed as a result of the proposed Project.

The following BMP and mitigation measures will be implemented to reduce effects on the migratory birds and Western burrowing owls during construction:

- In compliance with the Migratory Bird Act of 1918, habitat-altering portions of the Project would be scheduled outside bird breeding season (generally March 1st to August 31st) whenever possible. For work occurring during the nesting period, a qualified biologist would survey the area for nests within 5 days prior to initial grading and vegetation removal. If any active nests (containing eggs or young) are found, a 100-foot diameter no-construction buffer area for small passerine (perching birds) and a 500-foot diameter no-construction buffer for western burrowing owls) would be established and maintained until the young birds fledge and have left the nest.

- To reduce impacts to burrowing owls, CMS4 would implement the protocols in the USFWS's pamphlet: *Protecting Burrowing Owls at Construction Sites in Nevada's Mojave Desert Region* (Appendix B).

5.3.3. *Gila Monster*

Gila monsters may be injured or killed during construction activities. The entire 682 acre proposed site is within Gila monster habitat. Therefore, the grading, construction, and fencing associated with Project will result in a loss of 682 acres of potential Gila monster habitat.

Increased human activity and construction vehicle traffic may also result in Gila monster/vehicle collisions that result in Gila monster injury or death. Minimization measures such as a WEAP, and speed limits on roads, will reduce or eliminate these effects.

Indirect effects could be caused by fencing and gen-tie lines include increased predation. Predators such as ravens, coyotes, or other raptors may be attracted to the construction site due to an increase in food opportunities including construction site litter and voluntary feeding from construction staff; an increased number of perching opportunities due to the new gen-tie circuit, fences, or other opportunities; or increased water sources due to dust control protocols. An

increased presence of predators could lead to a predation increase on smaller, more vulnerable Gila monsters.

Ground disturbing activities during construction may result in an increase of noxious and invasive plant species in the area. Construction machinery may facilitate the spread of existing noxious or invasive species throughout the site, or may facilitate the introduction of new noxious weeds or invasive species. Noxious and invasive plants may displace native species that provide forage for the prey of Gila monsters.

The following BMP and mitigation measures will be implemented to reduce effects on the Gila monster (Note: these measures are in accordance with Nevada Department of Wildlife (NDOW) protocols issued September 7, 2012 [Appendix C])

- Gila monsters found during the desert tortoise clearance survey would be relocated offsite.
- In the event a Gila monster is injured, it would be transferred to a veterinarian proficient in reptile medicine for evaluation of appropriate treatment. Rehabilitation or euthanasia expenses will not be covered by the Nevada Department of Wildlife (NDOW).
- NDOW will be immediately notified of any injury to a Gila monster and which veterinarian is providing care for the animal.
- If an animal is killed or found dead, the carcass will be immediately frozen and transferred to NDOW with a complete written description of the discovery and circumstances, date, time, habitat, and mapped location. .

6. REFERENCES

Bureau of Land Management (BLM) 2012. Programmatic Environmental Assessment for the Eldorado Valley Transmission and Utility Corridor. Las Vegas Field Office, Las Vegas, Nevada. November 2012.

Coulombe, H.N. 1971. Behavior and population ecology of the burrowing owl, SPEOTYTO CUNICULARIA, in the Imperial Valley of California. Condor 73:162-176.

Clark County. 2002. *Clark County Multiple Species Habitat Conservation Plan and Environmental Impact Statement* for issuance of a permit to allow incidental take of 79 species in Clark County, Nevada. Department of Comprehensive Planning. Las Vegas, NV.

Green, G. A., and R. G. Anthony. 1989. Nesting success and habitat relationships of burrowing owls in the Columbia Basin, Oregon. Condor 91:347-354.

Haug, E. A., B. A. Millsap, and M. S. Martell. 1993. Burrowing Owl (*Athene cunicularia*), *The Birds of North America*, (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. Available online at: http://bna.birds.cornell.edu/bna/species/061

Martin, D.J. 1973. Selected aspects of burrowing owl ecology and behavior. The Condor 75:446 -456.

The Weather Channel n.d. Average Weather for Boulder City, NV – Temperature and Precipitation. Information available at: http://www.weather.com/weather/wxclimatology/monthly/graph/USNV0009

United States Fish and Wildlife Service (USFWS). 2009. Desert Tortoise Field Manual. Chapter 7: Guidelines For Handling Desert Tortoises- Mojave Population And Their Eggs. Available online at: http://www.fws.gov/ventura/species_information/protocols_guidelines/docs/dt/dt_fieldmanual/CHAPTER%207.pdf

United States Fish and Wildlife Service(USFWS). 2006. Birds Protected by the Migratory Bird Treaty Act. List of Migratory Birds. Available online at: http://www.fws.gov/migratorybirds/intrnltr/mbta/mbtandx.htm

____. 2003. Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.

____. 2011a Revised Recovery Plan for the Mojave Population of the Desert Tortoise (Gopherus agassizii). U.S. Department of the Interior, Fish and Wildlife Service, Region 8, Pacific Southwest Region, Sacramento, California.

____. 2011b Gila Monster. U.S. Department of the Interior, Fish and Wildlife Service, Endangered Species, Mountain-Prairie Region. Information available at: http://www.fws.gov/mountainprairie/species/reptiles/gilamonster/

Appendix AA – Desert Tortoise Sign

Date/Time	Project	Latitude	Longitude	Sign	Sign Class	Description
5/24/2014 6:35	CMS4	35.78992063	-114.9703418	Burrow	Class 2	
5/24/2014 6:36	CMS4	35.78958559	-114.9700954	Burrow	Class 3	
5/24/2014 6:47	CMS4	35.7857582	-114.9705495	Scat	Class 2	class 2 scat
5/24/2014 6:57	CMS4	35.78301621	-114.9707639	Burrow	Class 3	
5/24/2014 7:03	CMS4	35.7797797	-114.9707798	Burrow	Class 2	
5/24/2014 7:16	CMS4	35.7857285	-114.9704382	Burrow	Class 3	
5/24/2014 7:27	CMS4	35.78598733	-114.9713664	Burrow	Class 2	Class 3 scat inside
5/24/2014 7:31	CMS4	35.78720887	-114.9710851	Burrow	Class 3	
5/24/2014 7:32	CMS4	35.78718504	-114.9713534	Burrow	Class 5	
5/24/2014 7:32	CMS4	35.78746037	-114.9708659	Burrow	Class 3	
5/24/2014 8:25	CMS4	35.78797413	-114.9713138	Burrow	Class 2	
5/24/2014 8:26	CMS4	35.7836902	-114.9719079	Carcass	Class 3	
5/24/2014 8:49	CMS4	35.78466064	-114.9723397	Burrow	Class 2	
5/24/2014 8:50	CMS4	35.78499952	-114.9724137	Burrow	Class 3	
5/24/2014 9:19	CMS4	35.78585754	-114.9725402	Scat	Class 4	
5/24/2014 9:52	CMS4	35.7871291	-114.9732271	Burrow	Class 2	
5/24/2014 10:13	CMS4	35.78774975	-114.97356	Burrow	Class 2	
5/24/2014 10:33	CMS4	35.77910985	-114.9746658	Burrow	Class 3	
5/24/2014 10:38	CMS4	35.7812999	-114.9743064	Burrow	Class 2	
5/24/2014 10:48	CMS4	35.78583264	-114.974216	Burrow	Class 2	
5/24/2014 12:24	CMS4	35.78838736	-114.9747026	Burrow	Class 2	
5/24/2014 12:26	CMS4	35.788101	-114.9750443	Burrow	Class 3	
5/24/2014 12:27	CMS4	35.78775717	-114.9746789	Burrow	Class 2	
5/24/2014 12:32	CMS4	35.785715	-114.9750986	Burrow	Class 3	
5/24/2014 12:33	CMS4	35.78572426	-114.9749888	Burrow	Class 2	
5/24/2014 12:34	CMS4	35.78540596	-114.974882	Burrow	Class 3	
5/24/2014 12:59	CMS4	35.78280757	-114.9756589	Burrow	Class 2	
5/24/2014 12:59	CMS4	35.7826044	-114.9751754	Burrow	Class 3	
5/24/2014 13:06	CMS4	35.78558848	-114.9756016	Burrow	Class 1	Egg shells
5/24/2014 13:13	CMS4	35.78768425	-114.9754204	Burrow	Class 3	
5/25/2014 6:04	CMS4	35.78770841	-114.9762259	Burrow	Class 2	
5/25/2014 6:05	CMS4	35.7877638	-114.9762158	Burrow	Class 2	
5/25/2014 6:16	CMS4	35.7839464	-114.9763615	Burrow	Class 3	
5/27/2014 7:48	CMS4	35.79898283	-114.9883438	Carcass	Class 5	

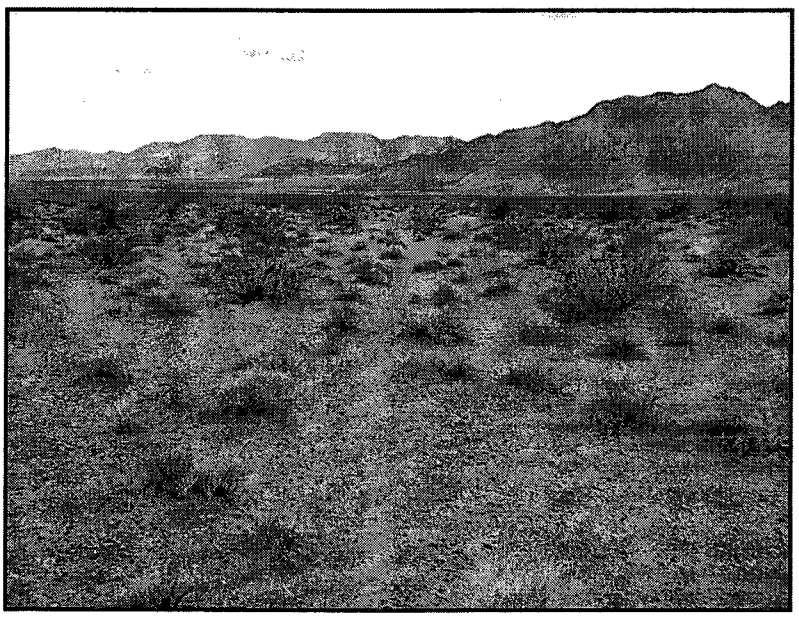
Exhibit A

Appendix E

Cultural Resources Overview and Archaeological Investigations

CULTURAL RESOURCES OVERVIEW AND ARCHAEOLOGICAL INVESTIGATIONS FOR THE COPPER MOUNTAIN SOLAR 4 PROJECT

Clark County, Nevada



Prepared for:

Copper Mountain Solar 4, LLC
101 Ash Street
San Diego, CA 92101-3017

Prepared by:
Anne DuBarton

NewFields
8250 West Charleston Boulevard, Suite 100
Las Vegas, Nevada 89117

October 2014

TABLE OF CONTENTS

Section **Page**

LIST OF FIGURES

LIST OF TABLES

MANAGEMENT SUMMARY

Pursuant to the Utilities Environmental Policy Act (UEPA), and Section 106 of the National Historic Preservation Act, in June and July of 2014, NewFields archaeologists performed archaeological investigations located on approximately 682 acres within the proposed Copper Mountain Solar 4 (CMS4) Project ("Project"), Clark County, Nevada (Figure 1). The Public Utility Commission of Nevada (PUCN) requires that proposed utility facilities apply for a UEPA permit in order to construct a utility such as the proposed solar facility. The Project is located within the Boulder City Energy Zone and can be accessed from State Highway 95.

Cultural resource investigations included a Class I Literature Review and a Class III pedestrian reconnaissance for the entire project area. The Class I Literature Review showed that 44 sites had been previously recorded in the vicinity of the Project site. Portions of two transmission line sites have been recommended eligible for listing on the National Register of Historic Places (NRHP). In addition, portions of historic Highway 5 have also been found eligible for NRHP listing.

During Class III reconnaissance of the Project site the crew documented 1 new historic site, and 6 isolates. None of these sites are recommended as eligible for listing in the NRHP.

Area of Potential Effect (APE)

NewFields defined the Area of Potential Effect (APE) to be coterminous with the power generation facility project area (Figure 1). Because existing gen-tie poles and water lines installed for adjacent projects will be used for the CMS4 project, no new rights-of-way footprint will be required. Visual effects resulting from the proposed project would be similar or in-kind with the existing effects that transmission lines, power plants and solar facilities have already produced.

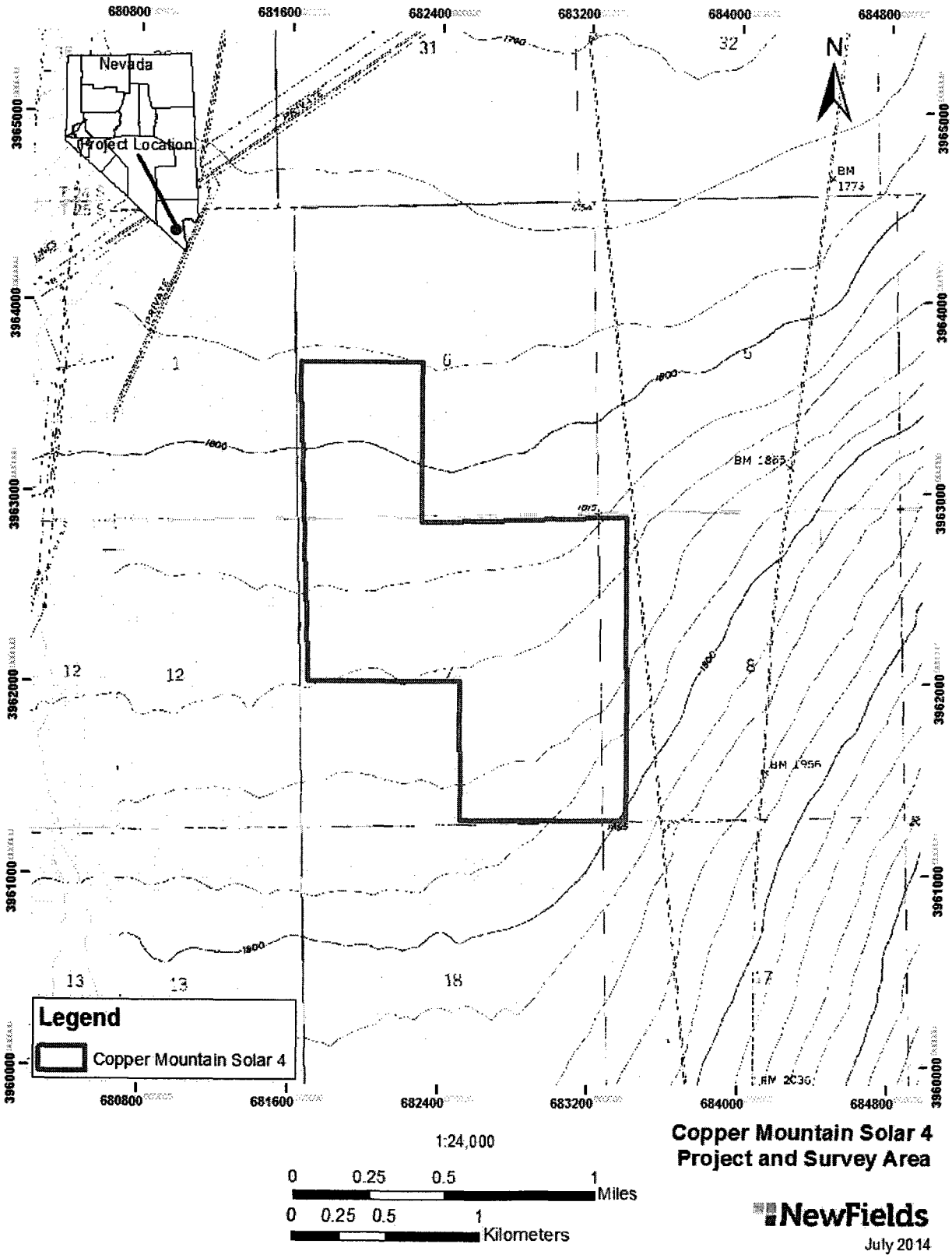


Figure 1. The Copper Mountain Solar 4 Project Area.

INTRODUCTION

The proposed facility is located in the Eldorado Valley area of Boulder City, Nevada (Figure 1). Copper Mountain Solar 4 (CMS4), a wholly-owned subsidiary of Sempra Renewables, LLC, is proposing the construction, operation, and maintenance of a solar energy generating facility of 94 megawatts on 682 acres of land owned by the City of Boulder City and leased by CMS4. The CMS4 Project ("Project") will share some poles with an existing gen-tie to transmit the generated energy to the grid and also will utilize an existing waterline to provide water for construction and maintenance activities. Please refer to the Environmental Statement for a detailed description of the Project.

The project area is shown on the U.S. Geological Survey Boulder City SW 7.5 minute quadrangle map in Sections 6, 7 and 8 of Township 25 South, Range 63 East, M.D. B.& M., Clark County, Nevada (Figure 1).

Because the proposed project is not located on federal lands, compliance with federal laws such as the National Environmental Policy Act (NEPA) and the National Historic Preservation Act (NHPA) is not required. However, the UEPA requires a demonstration of the nature of the probable effect on the environment, after mitigation, if the proposed utility facility is constructed (NAC 703.420(4)) and a description of the environmental characteristics of the region in sufficient detail to provide an understanding of the environment existing when the application is made and the impact that each alternative would have on that environment (NAC 703.420(4)(a)). Therefore, this report describes the cultural resources found in the project area and utilizes eligibility for listing on the NRHP to gauge the significance of sites located during the field reconnaissance.

The NRHP criteria stipulate that sites must be assessed for integrity of location, design, setting, materials, workmanship, feeling, and association. A site may be considered eligible for the NRHP if it retains sufficient integrity of the elements above and if it:

a. Is associated with events that have made a significant contribution to the broad patterns of our history, or

b. Is associated with the lives of persons significant in our past, or

c. Embodies the distinction characteristics of a type, period, or method of construction, or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction, or

d. Yields, or may be likely to yield, information important in prehistory or history.

In addition to the above criteria, the development of contexts is necessary to place the sites within a framework wherein evaluation criteria can be appropriately structured. A context is a body of information about historic properties organized by basic elements—theme, place, and time (NPS 1997). Together, the historic contexts comprise the history or prehistory of the area broken down into a series of historically meaningful segments, each segment being a single historic context. Grouped together the various historic contexts of an area form a comprehensive summary of all aspects of the area's history and prehistory. With this information, specific research goals may be developed. In the following sections the project area is placed within a

natural and cultural context and research goals considered important to understanding the Eldorado Valley are presented.

NATURAL CONTEXT

The project area is located within the floristic province known as the Mojave Desert. This Desert encompasses some 32 million acres. The dominant vegetation type in the project area is Creosote Bush Scrub which is widespread and covers approximately two-thirds of the Mojave Desert below about 5,000 feet in elevation (Figure 2). Creosote bush is a dominant or codominant member of most plant communities in the Mojave, and also in the Sonoran, and Chihuahuan deserts.

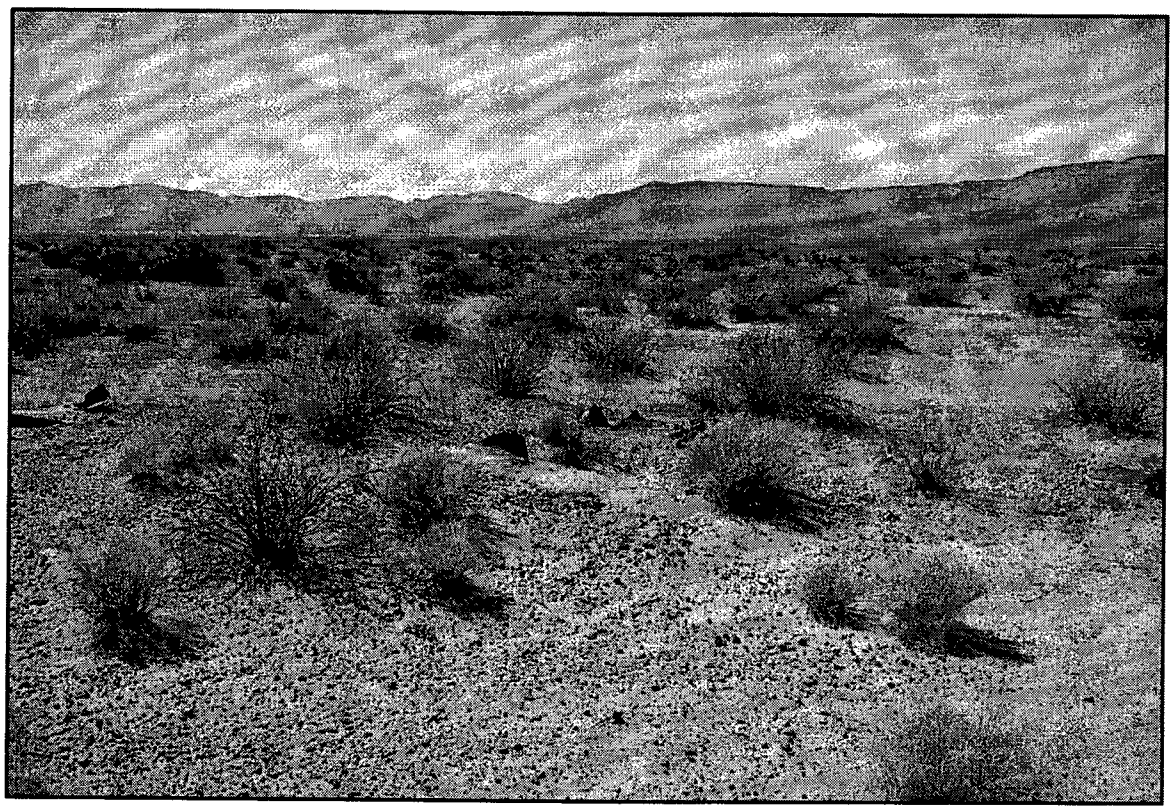


Figure 2. Mojave Desert Scrub Found in the Project Area (McCullough Range in background).

Other vegetation typical of this community and common within the project area include: creosote bush, white bursage, broom snakeweed, desert trumpet, and desert globemallow. The project area also contains some Desert Wash Scrub habitat community that occurs on several of the sandy, shallow washes and secondary drainages within the project area. Vegetation typical within this community included cheesebush, shadscale, acacia, and mesquite. Cacti, yucca, and mesquite were observed to have a scattered and scarce distribution in the project area.

The proposed project area supports wildlife characteristic of the Mojave Desert. Species observed or identified indirectly by sign (tracks, scat or droppings, burrows, feathers, bones, etc.) included reptiles, birds, and mammals common to the region. Reptiles identified included western whip-tail lizard, desert iguana, side-blotched lizard, zebra-tail lizard, desert tortoise, coachwhip snake, and Mojave rattlesnake. Avian species identified included turkey vulture, common raven, and red-tailed hawk. These species are raptors or predatory birds that commonly hunt from the wing. Mammals occurring at the site likely include coyote, kit fox, kangaroo rats, pocket mice, California jackrabbits and desert cottontails. Several of these were important to the diet of prehistoric people including chuckwallas, rabbits, and desert tortoises.

The project area is primarily disturbed desert; transmission lines and roads bisect the region and evidence of off road vehicle activity is widespread. The soil is gravelly to rocky and consists of eroded volcanic rocks that are Tertiary (65 million to 1.6 million years ago) in age. These deposits range in composition from andesite to basalt (Longwell et al. 1965:99).

DEPOSITIONAL CONTEXT

The Eldorado Valley, with an average elevation of 1700 feet, is at the terminus of a large alluvial fan which drains eastward out of the McCullough Range. The deepest portion of the Eldorado Valley is the dry lake or playa, in which water accumulates from time to time, depending on the precipitation. The northern division of the McCullough Range to the northwest of Eldorado Valley consists chiefly of Tertiary volcanic rocks. The eastern edge of this division is a steep escarpment 2,000 to 3,000 feet high exposing the volcanic section. An elongate body of quartz monzonite extends four miles southwest from Railroad Pass and cuts the lower member of volcanic rocks. The volcanic rocks are composed of two members: the lower member, about 2,000 feet thick, consists largely of reddish-brown andesite breccia; and the upper member, 1,200 feet thick, is a series of black basalt flows alternating with zones of reddish-brown breccia. Flows of dark-brown latite are exposed in the lower member but are lacking in the upper member (Longwell et al 1965).

PREHISTORIC – HISTORIC OVERVIEW

Little is known about the Eldorado Valley and its relationship to regional archaeological cultures. While the region is generally assigned to the Southern Paiute culture area, a realistic view of the region is that both prehistorically and historically it functioned as a major travel corridor between the Colorado River and the Las Vegas Valley. Particularly in the period post-dating 1500 years before present, several varieties of cultural influences are manifest in the region. These include Anasazi, Patayan, and Numic traditions. Because the area is at the crossroads of these distinct cultural traditions, it is difficult to assign a comprehensive sequence of phases for the entire area. A chronology presented in Ezzo's (1995) publication works well for the early periods, but a chronology developed by HRA Inc. (Ahlstrom 2003; Ahlstrom and Roberts 1999, 2001a, 2001b;

Roberts and Ahlstrom 2000; Roberts et al. 2003a, 2003b) better characterizes the complexity of later occupations.

A chronological framework, presented in Table 1, includes four major periods: Paleo-Archaic (10,000–5500 BC), Archaic (5500 BC–AD 500), Ceramic (AD 500–1800) and Historical (AD 1500–1950). The first three periods are defined (10,000 BC–AD 1800) with reference to archaeological data, whereas the fourth period (AD 1800–1950) is based on historical and ethnohistorical data.

Table 1. Chronological Sequence of the Las Vegas Valley.

Period	Subperiod	Date Range
Paleo-Archaic	Fluted Point Tradition	10,000–9200 BC
	Stemmed Point Tradition	9200–5500 BC
Archaic	Middle	5500–3000 BC
	Late	3000 BC–AD 500
Ceramic	Early	AD 500–1000
	Middle	AD 1000–1500
	Late	AD1500–1800
Historical Paiute, Chemehuevi, and Mohave		AD 1600–1905
Historical Euro-American	Exploration/Pioneering	AD 1800–1855
	Transportation	AD 1856–Modern
	Mining	AD 1863–1941
	Power Generation and Transmission	AD 1931–1950

Paleo-Archaic Period (10,000–5,500 BC)

The Paleo-Archaic period includes the end of the Pleistocene epoch and the first several millennia of the Holocene epoch, and it combines what have generally been termed the Paleo-Indian and Early Archaic periods. Today, Great Basin archaeologists (Grayson 1993; Schroedl 1991) generally distinguish two artifact traditions within the Paleo-Archaic period: the Fluted Point (Paleo-Indian) and the Stemmed Point (Lake Mojave) traditions. Little evidence of either the Fluted or Stemmed Point traditions has been found in southern Nevada, although projectile points associated with these traditions have been found in surrounding areas.

Fluted Point Tradition

The Fluted Point Tradition's most characteristic artifact is the large, distinctive Clovis point. These points may have had a variety of uses, but in southern Arizona apparently some were hafted to thrusting spears. These weapons were used to kill mammoths and other large mammals, or megafauna, that became extinct as the Pleistocene epoch ended and the Holocene epoch began. Although fluted points have been recorded throughout the Great Basin, most have been found as isolates. None of the Great Basin examples have occurred in association with evidence of extinct megafauna. The fluted points from this region are extremely variable in form (Grayson 1993), and only some of them fit the "classic" definition of the Clovis point.

HRA recorded a Clovis point base (Site 26CK6000) in the eastern half of Clark County Wetlands Park (Roberts 2000; Roberts and Ahlstrom 2000). This point is the first reliable evidence of the Clovis Tradition from Clark County. Clovis and Clovis-like points have, however, been found elsewhere in Southern Nevada as well as in the surrounding region of

southwestern Utah, southeastern California, and northwestern Arizona (Haynes 2001; Roberts and Ahlstrom 2000). Most of these points have been isolates.

Stemmed Point Tradition

The Great Basin Stemmed Point Tradition was first recognized in the 1930s at sites located on the shores of Pleistocene Lake Mojave, California (Grayson 1993:239). The sites possessed Lake Mojave and Silver Lake projectile points as well as other distinctive artifacts called crescents (Warren and Crabtree 1986). Based on 60 years of research at these sites and at others throughout the Great Basin, the Lake Mojave Culture can be dated between 11,200 and 7500 years ago, or roughly to 9200–5500 BC (Grayson 1993:240–241; Warren and Crabtree 1986:184). This interval overlaps the traditional dating of both the "Paleo-Indian" and Early Archaic periods—which is the reason why archaeologists working in the Great Basin have identified a combined "Paleo-Archaic" period. As of the 1970s, Stemmed Point sites were known primarily from settings along lake margins. This led some archaeologists to associate them with a marsh- or lake-environment subsistence focus, referred to as the Western Pluvial Lakes Tradition (Grayson 1993:242). With the more recent discovery of Stemmed Point sites in numerous other environmental settings, this term has largely been abandoned (Grayson 1993). Today we know that the makers of stemmed points exploited a diverse array of plant and animal resources at locations throughout the Great Basin and Mojave Desert.

While no convincing Stemmed Point/Lake Mojave assemblages have been found in southern Nevada (HRA 2004), there have been some isolated finds of stemmed points. Graf and DuBarton (2001) recorded a stemmed point along the upper Las Vegas Wash during survey for the North Valley Lateral Water Pipeline, and two stemmed points were collected from the surface at the Twin Dunes site, located on the Eglington Escarpment. The site also produced surface evidence for use in the Middle Archaic, Late Archaic, and Ceramic periods, and it is not possible to relate the stemmed points to a contemporaneous artifact assemblage. Two Lake Mojave points were also recently reported from the Flaherty Rockshelter, located in the Apex Area on the northeastern edge of the Las Vegas Valley. Based on radiocarbon dates, the occupation of this site appears to have begun in the Middle Archaic, with most of the occupation dating to the Late Archaic through the Ceramic periods (Ahlstrom and Roberts 2001b:202; Blair and Wedding 2001). Whether it also had a "stemmed point component" is impossible to say.

Elsewhere in Southern Nevada, stemmed points have been recovered from sites located in the Yucca Mountain Area, Nye County (Buck et al. 1998) (see Intermountain Antiquities Computer System site forms for 26NY3191 and 26NY8062, on file at the Desert Research Institute). Unfortunately, these artifacts were not found in association with materials suitable for radiocarbon dating. In addition, at least one Stemmed Point/Lake Mojave assemblage has been recorded near Jean Lake, which is south of Las Vegas Valley, and another from a site along California Wash near the Moapa River Indian Reservation (Claude Warren, personal communication 2001 in HRA 2004).

Middle Archaic (5500–3000 BC) and Late Archaic (3000 BC–AD 500) Periods

The Archaic Tradition is characterized by a broad-spectrum adaptation to the animal and plant resources of a Holocene environment with conditions resembling those of the historic and

modern-day environment. Jesse Jennings (1957) coined the concept of the Desert Archaic to refer to the Western expression of the American Archaic. His view emphasized the continuity of this hunting-and-gathering adaptation from the Early Archaic period until the adoption of agriculture. In southern Nevada, the earliest clear evidence of this generalized hunting and gathering lifeway does not appear until around 5500 BC, that is, in the Middle Archaic period.

Characteristic artifacts of the Middle and Late Archaic periods include large projectile points that would have been hafted to darts that were propelled with atlatls. Grinding tools appear to be an important part of tool assemblages dating to the Middle Archaic, and they are common in Late Archaic assemblages. The Middle Archaic has also been called the Pinto period, in reference to the Pinto point, and the Late Archaic the Gypsum period, in reference to the Gypsum point (Ezzo and Majewski 1995; Warren and Crabtree 1986). This usage reflects the fact that both Pinto and Gypsum points have been considered useful Archaic temporal markers (Bettinger et al. 1991).

Middle Archaic Sites

Several surface assemblages have been reported from Southern Nevada that date to the Middle Archaic period. Margaret Susia (Lyneis) investigated a Middle Archaic Pinto component as part of the Tule Springs project during the 1960s (Susia 1964). Prior to this, Mark Harrington collected Pinto points from Tule Springs (Ezzo and Majewski 1995:41). Several other sites with Pinto points have been recorded along Duck Creek (Ezzo and Majewski 1995:41; Rafferty 1984:133–137); although no radiocarbon dates were obtained from these sites, they appear to date at least in part to the Middle Archaic. One of the best known Middle-to-Late Archaic period sites in Southern Nevada is the Corn Creek Dunes site (26CK2605), where HRA conducted an archaeological survey and other related studies (Roberts et al. 2003b).

HRA has recently reported on investigations at two Southern Nevada sites with radiocarbon-dated Middle Archaic components. One of these sites, the Flaherty Rockshelter (26CK415), is located several miles north of the Las Vegas Valley, near Apex. A radiocarbon date from the deposits (4220–3800 BC) suggests that the shelter was first utilized during the Middle Archaic period (Ahlstrom and Roberts 2001b:203). A second Middle Archaic site investigated by the Harry Reid Center (HRC) for Environmental Studies, University of Nevada, was 26CK3799. This site was investigated as part of the Northern Beltway Data Recovery Program. It was located on the Eglington Escarpment in scattered dune hummocks and mesquite bosques and included a large scatter of artifacts and fire affected rock clusters that were eroding from the sand dunes. Most of the features were completely eroded, but there were a few that contained ash, charcoal, and evidence of shallow, basin-type hearths (Features 5, 8, 22, 27, and 31) (Blair et al. 2000:Map 4). Radiocarbon samples obtained from three of the features produced dates that fall in the Middle Archaic to early Late Archaic periods. The three features included a hearth (Feature 8, 2620–2025 BC), a rock-lined hearth (Feature 5, 3335–2925 BC), and a discrete area of stained sediment without a distinguishable pit outline (Feature 20, 5340–4800 BC).

Late Archaic Sites

Late Archaic sites are more common than Middle Archaic sites in Southern Nevada. The most famous site of this period is Gypsum Cave, the type-site for the Gypsum point. The site is located several miles east of the Las Vegas Valley's northeastern edge. Although Harrington (1933), the site's excavator, thought that its Gypsum Cave points were 8,000 years old, wood samples recovered in association with the points have produced Late Archaic period radiocarbon

dates of 1371–897 and 762–387 BC (Ezzo and Majewski 1995:43). Gypsum points were also recovered at the Basic site (26CK1098) during excavations conducted by the Navajo-McCullough transmission line project (Brooks et al. 1975). This site occupies a rockshelter in the River Mountains, in the southeastern corner of the Las Vegas Valley. Finally, two Gypsum points (one per site), were found at two sites on Duck Creek (Rafferty 1984:136).

A radiocarbon date from CL-243 at the Corn Creek Dunes site falls within the Late Archaic period (2876–2302 BC). HRA recently obtained a second Late Archaic period date (1000–820 BC) from the Corn Creek site's Locus 1 (Roberts et al. 2003b). The dated sample came from a small roasting pit discovered 53 centimeters below the ground surface.

Flaherty Rockshelter, previously mentioned in the context of the Middle Archaic, produced evidence of an important Late Archaic component (Blair and Wedding 2001; also Ahlstrom and Roberts 2001b:200–203). Ten of the site's 18 radiocarbon dates fall in the Middle Archaic period. Four of the 10 dates cluster in the interval from 1650 to 1105 BC. The site also yielded a number of dart points of types that are consistent with a Late Archaic date, including Gatecliff, Humboldt, and Elko points.

Late Archaic period radiocarbon dates are available from three sites on the Eglington Escarpment. One of the dates (3335–2305 BC) was from a hearth "in a dune area" that was sampled by the Tule Springs Project. The site containing the dated feature was not assigned an official number, though the area containing the feature was identified as the Tule Spring Project's Locus 65 (Haynes 1967:Table 6). The second site with Late Archaic dates was the Burnt Rock Mound site (26CK3601), located on and around an ancient spring mound. The three dates in question (80 BC–AD155; 50 BC–AD 230; AD 330–625) were produced from samples of charred material recovered from what the excavator's interpreted as archaeological (as opposed to geological) contexts (Rager 2001; Seymour and Rager 2001, 2002). The third location on the Eglington Escarpment with a Late Archaic radiocarbon date (AD 92–539) was a large prehistoric campsite known as the Pardee site (26CK3766). The dated sample was from a hearth that was buried 40 to 50 centimeters below the ground surface (White et al. 1989:48–53).

Terminal Late Archaic (AD 1–500)

The end of the Archaic period was a time of change in Native American lifeways throughout the American Southwest. In southern Nevada, this change can be discussed with reference to four categories of archaeological evidence, involving the introduction of ceramic technology, the shift from the atlatl-and-dart to the bow-and-arrow, increased investment in habitation structures, and the introduction of agriculture. In HRA's chronology (Table 1), the Archaic period ends and the Ceramic period begins with the introduction of ceramic technology. Researchers suggest a date of around AD 500 for the introduction of Puebloan ceramics and a date of AD 900 for the beginning of the Patayan ceramic sequence (Seymour 1997). These dates provide an end point for what HRA refers to as the Terminal Late Archaic period. They place the beginning of this period at AD 1, because the 500-year interval defined in this way takes in all of the evidence that is relevant to the four kinds of change considered important to this period (HRA 2004).

Most evidence for the introduction of pottery and the adoption of agriculture comes from the region east of Las Vegas along the Virgin and Muddy Rivers. It appears that pottery making had appeared among Virgin Branch puebloan groups living in the Moapa Valley of extreme southeastern Nevada and in southwestern Utah by AD 500 (Ezzo 1995; Walling et al. 1986). Farming and, probably, the bow-and-arrow arrived in this region at an earlier date. Evidence for

farming comes in particular from radiocarbon dates run directly on samples of maize. A handful of dates from three Virgin Branch sites located northeast of the Las Vegas Valley on the Muddy River—Black Dog Cave, Yamashita Site 2, and Yamashita Site 3—suggest that farming was being practiced in this area by AD 300–400 (HRA 2004).

Some of the most recent evidence relating to the end of the Terminal Late Archaic period in the Las Vegas Valley comes from a pithouse that HRA excavated in Clark County Wetlands Park at Site 26CK1282 (Ahlstrom et al. 2005). The remains of this structure were buried more than 2 meters beneath the historic, though now abandoned, floodplain of Las Vegas Wash. Two samples consisting of charred seeds from the structure's hearth and from a floor or near-floor context produced statistically indistinguishable radiocarbon dates that, together, yielded a mean date of AD 430–600. No pottery was recovered from floor or lower-fill contexts, suggesting that the structure is pre-ceramic in age. The excavated artifact assemblage included two projectile points that were probably, though not certainly associated with the structure's use. Both are Rose Springs style arrow points. While the HRA archaeologists strove to identify evidence of farming through pollen and flotation analysis, no such evidence was recovered. Instead, the samples indicated an emphasis by the pithouse inhabitants on the exploitation of a creosote bush-dominated community with numerous mesquite and acacia plants (Ahlstrom et al. 2005:94). The evidence from this structure is consistent with that from the Muddy River and lower Colorado River in indicating the construction of pithouses and the use of the bow-and-arrow in the period before the advent of ceramic technology.

The Ceramic Period (AD 500–1800)

The introduction of pottery for cooking and storage marks the beginning of the Ceramic period. As previously noted, the bow-and-arrow was apparently introduced to the Southern Nevada region before ceramic technology. The replacement of lightweight basketry with heavier ceramic containers is usually associated with a farming economy and greater sedentism. Because pottery types vary from region to region, and because they correlate with other traits such as architecture and settlement patterns, pottery often forms the basis for defining prehistoric cultures. In the past, the Ceramic period in southern Nevada was defined and subdivided into subperiods and phases with specific reference to the Virgin Branch (Anasazi) cultural sequence, specifically the sequence developed for the Moapa and Virgin river valleys (Ezzo and Majewski 1995; Lyneis 1982a). This temporal and cultural framework does not take into account the strong Patayan presence in Southern Nevada from around AD 1000 to AD 1500 (Seymour 1997, 1999).

Ceramic data suggest that, during the Early Ceramic period, outside contacts were with the Virgin Branch culture area, located to the east. Later, during the Middle and Late Ceramic periods, these contacts shifted to the Patayan area, located to the south. Also during the Middle Ceramic period, Paiute ceramics first appeared in the Las Vegas Valley.

LAS VEGAS VALLEY, EARLY CERAMIC PERIOD (AD 500–1000)

The Early Ceramic period corresponds roughly in time with the Patayan I period in the Patayan cultural sequence, the Basketmaker III and Pueblo I periods in the generalized puebloan (Anasazi) cultural sequence, and the Muddy River and early Lost City phases in the Moapa-Virgin Valley, Virgin Branch cultural sequence. The earliest ceramics identified in the Las Vegas Valley are a handful of Virgin Branch potsherds that predate AD 1000. As reported by Seymour (1997), these sherds came from the Duck Creek area (Seymour 1997:Figures 11 and

15), from the Burnt Rock Mound Site (26CK3601) in North Las Vegas, and from the Big Springs sites (Seymour 1999:192; Roberts et al. 2003b).

A radiocarbon sample recovered from the floor of a structure excavated at the Big Springs site provided a radiocarbon date of AD 530–710 (Seymour 1999:192). At Burnt Rock Mound (26CK3601), located on the Eglington Escarpment, three radiocarbon dates fall within the range of the Early Ceramic period (650–885, 670–870, and 680–1020) (Rager 2001; Seymour and Rager 2001, 2002). Other sites with radiocarbon dates placing them within the Early Ceramic period include locations at the northeastern edge of the Las Vegas Valley near Apex, and in the Upper California Wash area. A date of AD 540–690 was obtained from a hearth at site 26CK4440 (York et al., 1992), and four sites in the California Wash date at least partially to the Early Ceramic period, with dates ranging from AD 260–1260 (Brooks et al. 1975; Blair 1986).

LAS VEGAS VALLEY, MIDDLE CERAMIC PERIOD (AD 1000–1500)

According to HRA, the Middle Ceramic period is the best represented subdivision of the Ceramic period in southern Nevada. It corresponds roughly in time with the Patayan II period in the Patayan cultural sequence, the late Pueblo II and Pueblo III periods in the Puebloan/Virgin Branch cultural sequence, and the late Lost City and Mesa House phases in the Moapa–Virgin Valley, Virgin Branch cultural sequence. Typically, Patayan and Anasazi ceramic types dating to this interval are equally represented in artifact assemblages, which may reflect interactions between these groups (HRA 2004). During the later part of the period, however, Virgin Branch ceramics decrease in number as Patayan and Paiute varieties increase. This shift is undoubtedly related to the 13th century abandonment of the Moapa and Virgin River valleys by Virgin Branch people. Many archaeologists believe that the Southern Paiute arrived in the region during or soon after this event. Most of the sites in southern Nevada that date to the Middle Ceramic period are located near springs and other well-watered locales.

Williams and Orlins (1963:Appendix A, Table 3) described a wide variety of Virgin Branch ceramics that were collected from the vicinity of the Corn Creek Dunes Field Station (CL-242) including Aquarius Brown, Boulder Gray, Lino Gray, Medicine Black-on-Red, Moapa Gray, North Creek Black-on-Gray, North Creek Corrugated, North Creek Gray, Pyramid Gray, Shinarump Brown, Southern Paiute Brown, St. George Black-on-Gray, Tusayan Black-on-Red, Washington Corrugated, and Washington Gray. These ceramic types span the Early and Middle Ceramic periods. During HRA's recent survey of the Corn Creek Dunes site (Roberts et al. 2003b), potsherds dating to the Middle Ceramic period were identified at one locus (Locus 26), and other sherds that may date to this period were found at another locus (Locus 1, Middens 3 and 5).

Additional Middle Ceramic period radiocarbon dates are available from the Eglington Escarpment. Archaeological deposits at Burnt Rock Mound (26CK3601) yielded six dates with ranges falling entirely or predominantly in this period (AD 980–1195, 1250–1420, 1300–1430, 1300–1430, 1310–1440, and 1310–1638; Rager 2001:Table 4). As part of the Tule Springs project, three additional dates were obtained from hearths in the area. Two of the dates apply to features buried near the base of Haynes' depositional Unit G (AD 1071–1409 and 1280–1466). A third date of AD 1020–1278 was obtained from "aboriginal hearths on spring mound" (Haynes 1967:74).

Other dates came from 26CK3799, a campsite previously discussed in the context of the Paleo-Archaic and Middle Archaic/early Late Archaic periods. Three hearths or small roasting pits at

this site produced Late Ceramic period radiocarbon dates. Features 40A and 40B were located just 3.5 meters apart and produced statistically indistinguishable dates (AD 1235–1390 and 1275–1400), suggesting that they were used as part of the same encampment. A third hearth (discovered 1 meter from Feature 40A), may also have been contemporaneous with the other two features. A flotation sample from either Feature 40A or 40B contained abundant *Prosopis* (mesquite) charcoal as well as a small amount of *Acacia* charcoal. Both categories represent the remains of fuel that was used in the feature. Feature 27 (AD 1290–1425) was located in a different area of the site. A flotation sample from this hearth or small roasting pit contained a charred *Yucca schidigera*-type seed fragment, suggesting that a fleshy yucca fruit may have been processed in the feature. Also present was fuel-wood charcoal, primarily *Prosopis*, but with some *Acacia* and *Atriplex* (saltbush) also present (Blair et al. 2000).

Big Springs, a well-watered site toward the center of the Las Vegas Valley, contained habitation features. Seymour (1999:172) reports that, in 1920, a local physician, Dr. William S. Park, excavated a five-room, multi-occupation pueblo in this locality. A prehistoric adobe feature located near a spring mound at Big Springs and associated with Virgin Branch ceramics may be the remnant of a second pueblo. Finally, there may have been a third pueblo located near the intersection of Interstate Highways 15 and 95 (Gregory Seymour, personal communication 2000 in HRA 2004).

The Duck Creek drainage contains many sites dating to the Middle Ceramic period. The Berger site (26CK501/1528), for example, yielded five calibrated radiocarbon dates that fall entirely or predominantly within this period (AD 1188–1385, 1245–1410, 1294–1432, 1296–1435, 1279–1472) (Seymour 1997:Table 10). Some of the sites investigated on Duck Creek have produced evidence of habitation structures and cultivated plants. At Site 26CK1445, Rafferty (1984:76) reported a depression that resembled a semi-subterranean habitation structure. Seymour identified Patayan II (the most abundant category) and Patayan III types as well as Pueblo I and Pueblo II types in the ceramic collections from this site (Seymour 1997: Tables 13 and 14). The Patayan sherds slightly outnumbered Virgin Branch sherds (Seymour 1997: Table 12). Evidence of cultigens consists of pumpkin/gourd seeds, a corncob, and a corn kernel that were recovered from the Berger site. Abundant burned tortoise bones were also found there.

Numerous other Late Ceramic period sites are known for the southern Nevada region. These include sites near Apex, in the California Wash, and at Clark County Wetlands Park. For more information on these sites see HRA (2004).

LAS VEGAS VALLEY, LATE CERAMIC PERIOD (AD 1500–1800)

The Late Ceramic period corresponds to the Patayan III period in the Patayan cultural sequence. Evidence of Patayan influence, in the form of Patayan ceramics, continues into the Late Ceramic period. The frequency of Patayan ceramic types decreases; however, in favor of Southern Paiute Brown Ware, which first appeared sometime during the Middle Ceramic period. The use of ceramics, both Paiute and Patayan varieties, suggests the practice of horticulture around springs and well-watered locales.

During HRA's recent survey of the Corn Creek Dunes site (Roberts et al. 2003b), the survey crew recorded Southern Paiute Brown Ware throughout the project area, suggesting fairly extensive use of the site by Southern Paiute people. A scraper made of glass hints that this use continued into the early Historical period. Paiute Elders tell stories of relatives who lived in the Corn Creek area in the early 19th century.

Site 26CK415 in the Apex Area, 26CK3601 (Burnt Rock Mound) on the Eglington Escarpment, and the Berger site on Duck Creek have yielded Late Ceramic period radiocarbon dates. There are three of these dates from the Flaherty site (1425–1635, 1440–1640, and 1440–1650); seven from Burnt Rock Mound (AD 1400–1620, 1430–1645, 1440–1650, 1450–1660, 1455–1665, 1520–1950, and 1715–1885); and one from the Berger site (26CK501/1528) on Duck Creek (1421–1632) (Ahlstrom and Roberts 2001b:200–203; Blair and Wedding 2001; Seymour 1997:Table 10; Rager 2001:Table 4).

Late prehistoric presence is documented at numerous other sites within and surrounding the Las Vegas Valley. A complete summary can be found in HRA (2004).

Historical Paiute, Chemehuevi, and Mohave (1600–1905)

Paiute

Elizabeth von Till Warren describes the subsistence practices of the historical Paiute in HRA's report in support of the Las Vegas Disposal Boundary EIS (2004). She indicates that the Southern Paiute people inhabited the Las Vegas Valley and surrounding areas throughout the Historical period, and until around 1850 they were the valley's primary inhabitants. The following is excerpted from her work in that document.

> The subsistence pattern reflected in the incomplete record of the late prehistoric and protohistoric Southern Paiute people suggests that the Las Vegas Paiutes adopted a different strategy than the commonly pictured, exclusively nomadic lifeway. Las Vegas Valley Southern Paiutes lived in an unusually productive eco-zone, with ample water resources that supported a wide variety of edible native plants and, most importantly, numerous and in places extensive mesquite forests. Within the short distance of 20 miles from the valley floor, in the foothills of the Spring Mountains and other nearby ranges, grew substantial numbers of pinyon pines (*Pinus monophylla*), agaves (notably *Agave utahensis*), and Joshua tree (*Yucca brevifolia*) forests, interspersed with Mojave yuccas (*Yucca schidigera*) and other higher elevation plant resources, along with their associated fauna. The soil adjacent to the creeks and springs of the valley was suitable for horticulture, and the mesquite groves nearby produced a never-failing supply of edible, storable beans. The combination of rich resources located on the valley floor, which stimulated the growth of horticulture, and the collectible wild flora and fauna of the mountains close at hand made it possible to diverge from the seasonally based collecting rounds anthropologists usually portray for this area. The seasonal round of the Las Vegas Paiutes had two fulcrums, one based in the valley, the other in the mountains. The loop based in the valley was dictated by the need to prepare and plant gardens, tend them, and harvest the produce, all augmented by the seasonal ripening of mesquite beans. Las Vegas Paiutes would camp at their spring sites during planting season, visiting their gardens to irrigate and control predation by animals and others. The second loop describes the period of movement to the foothills and higher mountain elevations in the warmer months and early fall, to gather, process, and store wild foods, including agave and pine nut "crops." The excursions to the mountains headed to particular groves of trees or clusters of agaves or yuccas, entailing seasonal use of the same camps

over many years. At the same time, the tie to the valley camps would also be maintained, and there, too, the campsites previously used would be revisited. Archaeologist Claude Warren termed this a "double loop" subsistence strategy (C. Warren 1981) (E.V.T. Warren in HRA 2004).

Chemehuevi

The Chemehuevi are usually described as an off-shoot of the Las Vegas Paiute. They occupied the region between the Las Vegas Paiute and the Mojave. Strongly influenced by the Mojave, they took on traits such as vocabulary, floodplain farming, earth-covered houses, songs, emphasis on dreams, and a complex of elements related to warfare (Laird 1976). They also adopted the squared metate, balsa rafts, ferrying pots, ceramic forms and ornaments, paddle-and-anvil pottery techniques and hair dye. Kelly and Fowler (1986) (recount that some sources indicate that generations ago, before the Chemehuevi and Las Vegas separated and Chemehuevi acquired separate identity, they exterminated the Desert Mojave and moved into their territory (Kroeber 1959; Roth 1976).

Yumans (Mohave)

The ancestors of the Mohave (known archaeologically as the Lowland Patayan), have lived along the Colorado River since about AD 500. When Europeans first came up the river in 1604, they encountered many Mohave. These groups practiced a form of floodwater farming, growing crops such as pumpkins, squash, corn, beans, sunflower, and amaranth. After contact, they also grew introduced crops such as wheat and watermelon (Fowler 1999). There is growing evidence that the Mohave utilized portions of the Las Vegas Valley along the Las Vegas Wash. Evidence for horticulture there has not been forthcoming and Seymour (1999) believes that the collection of wild foods was probably the primary strategy. A series of reports by HRA provide increasing data indicating a substantial Mohave presence along the lower Las Vegas Wash (Ahlstrom and Roberts 2001a; Roberts and Ahlstrom 2000; Woodman, Roberts, and Ahlstrom 2001; Woodman, Ahlstrom, and Roberts 2003).

Historical Euro-American (1600–1950)

While exploration of the Lower Colorado River region began as early as 1540, the Spanish explorers found the river inhospitable and did not attempt any permanent settlement along its banks until the early 1800s (Weber 1944).

Exploration (1604–1855)

While the Spanish had explored the Colorado River in 1604, it was not until 1829 that the first Euro-Americans came into Las Vegas Valley. In 1829, Antonio Armijo and a caravan of 60 men leading 100 mules laden with woolen goods, pioneered the route that came to be known as the Old Spanish Trail. The trail was a pack mule route that linked Santa Fe, New Mexico with Los Angeles, California. The immediate stimulus for the trail was the expansion of trade between Santa Fe and St. Louis via the Santa Fe Trail, which created demand for robust animals to pull wagons and provide human transportation between the American west and midwest. Later, the trail and its many variants sustained the period of American expansion westward, the Gold Rush, and Mormon settlement in the region. When the Gold Rush began in 1849, maps showing the route were tucked into many a wagon box for later reference as the American pioneers trekked to

California. The mules and horses gave way to freight wagons and light carriages and the old trail became a road for Mormon pioneers between Utah and California. The Mormons built a small fort in Las Vegas in 1855 to support the faithful in their travels (Roske 1986).

Prospecting and Mining

According to local lore, Spaniards, Mexicans and Native Americans prospected the Eldorado Range for 150 years before Euro-Americans discovered the area. Steam driven stern-wheel paddle boats came up the Colorado beginning in 1852 making the region more accessible to those seeking to get rich quick. However, few roads crossed the miles of desert and the mule was the prospector's main mode of transportation.

Eldorado Valley Mining (1863 to 1941)

Located about 39 miles southeast of Las Vegas in Eldorado Canyon is one of the earliest mining districts in southern Nevada. According to local legend, Indians and Spanish explorers exploited the mine for years before Mormon miners made discoveries in the canyon and commenced mining. By 1863, prospectors and promoters had laid out four townsites in the canyon and excitement was high despite the remote location of the mines. It took six months for supplies to come from San Francisco; flatbottom steamers carried the cargo the last leg of the journey from Yuma, Arizona and often more than a month passed between steamer visits. The remote camps were part of Arizona territory until 1867, a ten-stamp mill started running near the mouth of Eldorado Canyon in 1864 which reduced the amount of overland ore shipments by way of Los Angeles to San Francisco smelters. The mill was constructed of old machinery and the mill lost values in tailings, so another of similar size was built in the spring of the next year. In 1865 a post office was established and during 1867-1869 the army maintained a military post near the mill to aid in steamboat promotion and to watch over neighboring Indians. During its early years, Eldorado was a very rough and lawless camp. The sheriff was nearly 300 miles away through inhospitable desert, so the locals typically formed posses and vigilante groups to capture and punish wrongdoers (Paher 1970:280). During the Civil War, deserters from both the Union and Confederate armies would wander there, hoping that such an isolated location would be the last place military authorities would look for them (Paher 1970:280).

After 1905 the district underwent a revival and the townsite of Nelson was platted seven miles west at the head of Eldorado Canyon, and old Eldorado was abandoned in favor of the new site. The town was named for a man named Nelson who was killed by an Indian in 1898 (Las Vegas Age 1910). A fifty-ton smelter was constructed a half-mile below Nelson but produced only limited amounts of lead before blowing up in 1909. Production lagged for the next twenty years but Nelson fought its way back in the mid-1930s when operations resumed. A paved highway was extended to the town and trucks transported their loads to rail shipping points. By 1941 the population had reached a stable 600 and three cyanide mills treated 230 tons of ore daily. Labor costs finally forced closure of the mines in 1941. Production is estimated to be as high as ten million dollars (Paher 1970: 280).

Today, the site of old Eldorado is submerged under Lake Mohave. Ruins of the Techatticup mine, several other old mines and other buildings remain at Nelson. Nelson's Landing, about five miles west in Eldorado Canyon, is noted for washing into Lake Mohave in 1974 after a strong downpour in the regional mountains sent the runoff down the channels and produced a flash flood. There are five wide channels that run from the local mountains toward the river. The

problem is that they all converge into a small outlet where Nelson's Landing was. The entire landing and village was destroyed and nine people died when the flood came through the wash. The wall of water and debris was reported as about 40 feet (12 meters) high as it reached the river (Thompson and Haley 1974).

The Alunite Mining District is located northwest of the project area near Railroad Pass. During the first decades of the twentieth century, as Las Vegans attempted to expand the economic base of their small railroad town, they explored the regions near Las Vegas where gold, silver, and tungsten is found in the fractured Tertiary volcanic rocks. These explorations are evidenced by a series of adits, shafts, and mine dumps scattered through the hills. While gold samples from the district assayed high and several mines were developed, the district was only active from about 1906 to 1913 and failed to yield significant amounts of ore or wealth (Valentine 2008).

The Development of Searchlight (1897 to Present)

Given the early development in Eldorado Canyon, prospectors abounded in the region. About 55 miles south of Las Vegas, veteran prospector G. F. Colton discovered an exposed gold vein in May of 1897 near ground which had been initially located in the early 1890s. The gold assayed as high as $2900.00 per ton and additional prospectors flooded the region. In July 1898, a district was organized and by October a camp with a post office was established three-quarters of a mile west of the present townsite. The district became populated after a rush in the following winter. The next year Boston interests acquired important properties with "picture rock" and incorporated the Quartette Mining Company. Other mining companies also formed; the Duplex mine was organized around the Searchlight claim.

At first, ore had to be shipped by wagon to Manvel, California for rail delivery to a smelter at Needles. Costs were reduced when the Quartette company built a twenty-stamp mill on the Colorado River in 1900 and further savings were realized when a narrow gauge railway began shuttling between mines and mill in May 1902. The next month a weekly newspaper began beaconing the news of the burgeoning camp and several tent saloons sprang up. Despite strikes by mine workers, development continued through 1903. A second twenty-stamp mill was built in Searchlight when a water supply was discovered, and the mill on the river was moved to Searchlight in 1906. The boom peaked in 1907 when the camp featured two competing newspapers, well-furnished stores, over a dozen saloons, a telephone exchange, 44 working mines, several mills, an active chamber of commerce, and a population of up to 5000 (Paher 1970: 280-284). The panic of 1907 hit the district severely because rich ore bodies had been worked out and low-grade ores required additional capital for continued development. Production dropped drastically after 1910 and leasers replaced the large mining operations. Many families moved to Las Vegas although a small population stayed in town and reworked the tailings. Today, early twentieth-century buildings mix with modern structures in the town of Searchlight. The town exists mainly as a stop along the highway where travelers can buy gasoline and get a bite to eat as they head to Laughlin or southern California.

Dam Building and Power Plants (1878–Present)

Settlement in most of the arid west required a steady and dependable water supply for irrigation and for domestic use in cities. In 1878, John Wesley Powell sent a report to the Department of Interior delineating settlement plans based on topography and river basins rather than the traditional grid. Powell envisioned small, private, independent irrigation cooperatives working

together to ensure an adequate water supply (ACRE and HRA 2004). However, there were problems with irrigation projects developed by small companies. By 1900, many private irrigation firms faced bankruptcy and there was an increasing belief that the federal government should take a hand in western irrigation projects. During the Progressive Era (1896 to 1919) political and social reform curbed the power of big business and placed the government in control of many natural resources, including water. President Roosevelt signed the National Reclamation Act in 1902, authorizing the Secretary of the Interior to construct irrigation projects in 16 states and territories. Subsequent to the Reclamation Act came the concept of multiple-purpose planning. Planners realized that irrigation projects could be combined with riverine navigational improvements, flood control, and the generation of electricity. While power plants had not been part of the original scheme, Reclamation recognized the potential and passed the Town Sites Act of 1906, authorizing the sale of excess power generated at Reclamation dam sites to companies and towns (Western Area Power Administration 2002:6). By 1914, 11 power plants were in operation on Reclamation projects and the sale of electricity had become a factor in repaying the cost of constructions of Reclamation projects. In further action to restrict monopolies, Congress passed the Federal Water Power Act in 1920 authorizing the Federal Power Commission to withdraw and regulate potential hydroelectric power sites on navigable waterways.

The Boulder Canyon Project authorized construction of Hoover Dam in 1928. It was the first large multipurpose dam and reservoir on the Colorado River. Despite the impact of Hoover Dam upon Southern Nevada, its origins had little to do with the state. Designed to control the Colorado River and to allow for vast irrigation schemes downstream, Hoover Dam was envisioned as a way to develop the agricultural potential of the Imperial Valley (Ezzo 1995). Planning began as early as 1919 when seven states within the Colorado River basin met to discuss water use and form the "League of the Southwest" (Belshaw and Peplow 1980). These states formed an agreement calling for construction of the Colorado River high dam and a new All-American Imperial Valley canal (Jones and Cahlan 1975). The Swing-Johnson bill brought the terms of the agreement before Congress in 1923, but approval did not occur until 1928. Even before the bill was passed, utility companies began lining up for the benefits that would accrue from the massive project. Southern California water and electric companies had plans and funding in place in advance of dam construction to divert water and power to the growing region. All of the water and electricity were allocated before any construction began.

In June 1929, six months after the Boulder Canyon Project Act was signed into law, the first federal money was spent as Reclamation set up offices in Las Vegas and began putting together estimates for bids that would be sent out in 1930. In June 1930, work began on support facilities such as a rail connection, a highway from Las Vegas, a cable system over the canyon, and an 88,000-volt transmission line from San Bernardino to supply power (Ezzo 1995). Las Vegas boomed despite the economic depression that was deepening across the rest of the nation, and soon plans to build a community to house workers were on the drawing board. As people flocked to the area a series of camps sprang up close to the dam site in the areas known today as Hemenway Wash and Railroad Pass (Furnis 2003). In 1931, the bids were all in and the low bidder was found to be Six Companies, Inc. Despite severe weather and labor difficulties, work on the townsite for workers (Boulder City) and diversion tunnels were complete by fall of 1932 (Dunbar and McBride 1993). The tunnels allowed water to be diverted and coffer dams constructed to keep the construction area free of water. Preparation of the dam bed began in June of 1932 and was complete by spring of 1933 and cement pouring commenced in June 1933.

Round-the-clock pouring continued until May 1935. Every stage of dam construction progressed swiftly, and the dam was completed 2 years ahead of schedule.

Infrastructure (1935–Present)

Once the dam was complete, electrical work had to be finished before the power plant generators could go on line. By 1935, the "Boulder Power Transmission System" was almost complete with lines stretching between Hoover Dam and Los Angeles. The system was activated in October 1936. The first dam generator was activated at that time and more and more generators came on line during the late 1930s. Lines were extended to the Las Vegas Valley during this time, although there is little information available regarding the timing and exact routes.

During the Great Depression, the Southwest grew slowly as people who had lost everything in the "dust bowl" region headed west looking for jobs and a brighter future. In 1931, a small company began selling gas in the southern California towns of Barstow and Victorville. Southwest Gas grew steadily over the next 20 years. When Pacific Gas and Electric Company built a high pressure natural gas transmission line from San Francisco to the Arizona border, Southwest Gas recognized the growth potential offered by this delivery method, and tapped into the line, converting its system to the more marketable fuel system in 1951. Three years later, the company expanded its system bringing natural gas to central Arizona and to Las Vegas (http://www.southwestgas.com/about/aboutus/history.php).

The first transmission lines in the Eldorado Valley extended from Hoover Dam to provide power to southern California. Later, other lines were installed across the valley to provide power to local and regional markets. The first of these lines was installed in the mid 1970s. The Navajo-McCullough 500 kV (kilovolt) line extends from the McCullough switching station in Eldorado Valley to the Navajo transmission line right-of-way northeast of the Las Vegas Valley in Lincoln County. The Eldorado-Kaiparowits line was built in the late 1970s, and the Intermountain Power Project line was constructed in the mid 1980s. Power generation continues to be a key theme in use of the Eldorado Valley today as development of solar sites is ongoing.

Transportation Routes

The Mojave Desert was an extreme impediment to early travelers in the area. For a long time, the best way to access the area was to travel up the Colorado River. Steam driven stern-wheel paddle boats came up the river beginning in 1852 making the region more accessible to those seeking to get rich quick. However, the only route crossing the desert was the Old Spanish Trail/Mormon Road, which followed the limited water sources across the desert from Las Vegas to Los Angeles.

Historic maps indicate that the first roads in Eldorado Valley probably developed as part of the mining boom in Eldorado Canyon. Wheelers 1872 survey map shows a road extending from Las Vegas to the mines in Eldorado canyon at that time.

By 1907, the Las Vegas to Eldorado Canyon road had been extended to Searchlight as reported in a newspaper article. At that time, individuals were driving existing roads to document them for automobile clubs (Las Vegas Age, December 14, 1907). During this period, the automobile was beginning to become a popular mode of transportation and various vehicle "trails" crisscrossed the landscape, even the remote reaches of southern Nevada. These trails were a product of the pioneer days of auto travel when government provided little assistance for roads,

and many people still made longer trips by train. Some of these trails were named on maps in the late 1800s, and by the early 1910s automobile promoters assembled associations to name transcontinental routes such as "The National Old Trails Road" (Baltimore to Los Angeles), and the "Lincoln Highway" (New York to San Francisco). Boosters often selected routes over existing roads, gave the road a colorful name, formed an association to promote the trail, and collected dues from businesses and towns along the way. The associations published trail guides and newsletters to promote their route, and promoted local-government bond sales to improve the primitive roads section by section. A segment of the Arrowhead Trail was one of these routes. The trail was advertised as an all weather route from Salt Lake City to Los Angeles (Motor West 1917). The route parallels the modern Interstate 15 with the exception of the portion extending from Las Vegas to Needles, California. The Arrowhead Trail initially took a longer route via present US 95 and former US 66 between Las Vegas and Needles, as the more direct Old Spanish Trail was in very poor condition. The "Silver Lake cutoff", which would save about 90 miles (145 km), was proposed by 1920, and completed in 1925 as an oiled road by San Bernardino County (Nystrom 2003).

The number of American automobiles skyrocketed during the period from 1910 to 1920. In 1910, fewer than 50,000 vehicles were registered in the U.S., but by 1920 nearly 10 million were on the nation's record books. By 1918 all 48 states had created highway departments to channel federal grants and promulgate standards for highway construction, linked by the American Association of State Highway Officials (AASHO). In the early 1920s, highway signs were standardized according to shape, and the red/yellow/green sequence for illuminated lights was adopted. The old trail associations had named over 250 routes, but in November 1926 AASHO members adopted the new U.S. numbered highway system, effectively ending the influence of the trail associations but largely accomplishing their missions (Weingroff 1997:2-5).

By 1926, the Searchlight Road had assumed close to its present course through Eldorado Valley and had been designated Highway 5 according to a Rand McNally and Company California – Nevada Pocket Map dated that year. The road has become part of the modern highway system.

PREHISTORIC CONTEXT

The research goals presented here reflect issues critical to understanding the prehistory and history of the Eldorado Valley. These themes are not exhaustive, but are designed to address issues defined for the project area. Prehistoric research contexts particularly applicable to southern Nevada include themes developed in Lyneis (1982b), and in Ezzo's (1995) Class I study for the Southern Nevada Water Authority. Recent research has identified additional topics important to understanding Southern Nevada prehistory. Some of these are described in Ahlstrom and Roberts (1999); Gilreath 2003; D. Seymour et al. (1996); G. Seymour et al. (1998); and King, Young, and Ruby (2003), and most recently in *A Prehistoric Context for Southern Nevada* (Roberts and Ahlstrom 2012). Prehistoric research goals include: Settlement Pattern Studies, Subsistence Systems, Environmental Change and Geochronology, Trade and Exchange, Ritual and Ceremonial Systems, and Chronology and Cultural Boundaries.

Settlement Pattern Studies

Settlement patterns define the way people lived on and used the landscape, and settlement pattern studies are a primary consideration for understanding past lifeways. Great Basin and Nevada settlement studies have been highly influenced by Steward's 1938 work among ethnographic populations. More recently, research has focused on Binford's 1980 model of the forager-collector continuum. This model distinguishes between "foragers" who employ a number of residential base camps while also moving as a community to resource areas daily and who employ little storage (Binford 1980:5) and "collectors" who utilize a more stable residential base camp but send out specialized groups to procure specific resources in bulk and return. These latter groups also employ storage as a strategy (Binford 1980:10). A major application of Binford's model to the archaeological record is in the identification of site types (residential base, location, field camp, station, cache, etc.) based on the type and number of activities at the site (Binford 1980). Other Nevada researchers have noted the importance of settlement studies, particularly in determining site types and functions. Specific questions that have been developed for Southern Nevada include whether ground stone correlates with fire-cracked rock in a way that can be used to infer site function (Dames and Moore 1997:15), whether site locations vary in relation to environmental factors or are related to raw material sources (Ezzo 1995:135–137), and whether rockshelter and lithic procurement sites were used at the same time (Ahlstrom and Roberts 1999:119–120).

Data Requirements—Settlement Patterning

In order to answer questions about settlement patterning, a site must contain data that can indicate both the time and nature of occupation. Diagnostic artifacts and/or materials that can be radiocarbon or otherwise dated are necessary to provide a temporal framework, while various data classes are required to answer specific questions. To test correlations between groundstone and fire-cracked rock both artifacts should be present; to understand the relationship between site locations and environmental factors or resource availability, both site location information and data on the past environment and available resources around a site must be available. To test whether rockshelter and open lithic scatters were occupied at the same time, chronological information needs to be associated with both occupation types.

Subsistence Systems

Subsistence strategies and settlement patterning are closely related, although the bodies of data needed to answer questions about them should be examined separately. Until recently, there has been little direct evidence of the nature of subsistence practices in southern Nevada. Subsistence practices during the Archaic period are virtually unknown, and many questions relating to later periods remain unanswered. The degree that certain resources (e.g., pinyon, mesquite, and yucca) were utilized during the various periods is unknown (Lyneis 1982b), and whether exploitation of resources was embedded in other practices remains to be understood (D. Seymour et al. 1996). The timing and cause of the exploitation of domestic cultigens (Ezzo 1995:133–135), the role of mesquite exploitation, whether there was a focus on the exploitation of certain mammals (desert tortoise, mountain sheep) are questions that remain poorly understood.

Data Requirements—Subsistence Systems

As can be expected, data for addressing the subsistence systems context is primarily subsistence data. These data include faunal remains, botanical remains, palynological remains, and coprolites. Such remains would need to be present at a site to address this context.

Environmental Change and Geochronology

Because the environment forms the background, and in many cases, the underlying conditions for human cultural behavior, an understanding of past environments is crucial for interpretation of past behaviors and activities in the Mojave desert. Several lacks are identified in the Nevada statewide context. A large-scale paleoenvironmental record for Nevada is lacking as well as local records for the late Quaternary. The statewide context recommends placing priority on obtaining faunal, floral, sedimentological, geomorphological, and geochronological information to enhance our understanding of paleoenvironmental sequences in the area (Lyneis 1982b:17). Previous research has identified the need to further our understanding of past climatic change. In particular, studies focusing on the establishment of desert scrub vegetation at lower elevations as well as the lower limit of pinyon-juniper growth during the past are particularly relevant as these zones provide a number of resources to humans occupying them (Lyneis 1982b:168–169). Additional pollen studies are also recommended for Southern Nevada (Kelly et al. 1990:91; Lyneis 1982b:169).

Data Requirements—Past Environments and Geochronology

Evidence of past environments can be derived from floral and faunal species, sedimentological evidence and geomorphological evidence. Floral and faunal remains can include bone assemblages, botanical assemblages, and pollen assemblages. Useful paleoenvironmental reconstructions require assemblages that are derived from sources that are not biased by human selection, i.e., packrat (*Neotoma* sp.) nest rather than a bison kill site. Fine-grained organic sediments in sequence, (such as lake and relict lake sediments or stratified fluvial sedimentary records) and packrat middens are also useful for addressing the paleoenvironmental context.

Trade and Exchange

Trade and exchange of a wide variety of raw materials and finished goods occurred over a large portion of the prehistoric period and involved, in some cases, contacts between distant groups.

Trade and exchange relate to a variety of cultural factors including economic activity, ethnicity, and political structures. The form and nature of trade and exchange can vary according to a variety of factors, and can therefore reveal many aspects of past economies, cultures and politics. Trade and exchange as a major research topic. Methodological questions such as determining the means of identifying trade goods and the means of distinguishing trade from direct acquisition in the archaeological record are important. Processual topics such as the structure of trade (down-the-line, hierarchical, etc.), identifying changes in the size of exchange networks and the traded goods, determining whether different goods circulate in different exchange networks, determining the factors that condition the value of trade goods, and the identifying role of ethnolinguistic boundaries in structuring trade are also important issues (Lyneis 1982b:25–26). In Southern Nevada, the presence of obsidian, ceramics, and shell beads from distant sources has been used to establish the presence of trading networks in the area (Lyneis 1982b:172). The quantities of these materials vary over time, suggesting changes in the nature and extent of exchange networks. Specific questions include whether obsidian was exchanged (Kelly et al. 1990), whether imported plainware ceramics affect local plainware manufacture (Ezzo 1995:140–142), and whether export good procurement patterns can be identified (Ezzo 1995:140–142).

Data Requirements—Trade and Exchange

In order to understand the processes of trade and exchange, potential trade goods must be identified. In southern Nevada trade items include non-local lithics such as obsidian, non-local ceramics, beads, pendants, shell, turquoise, and other rare goods with limited distributions. Obsidian is particularly valuable because through X-ray spectrometry the source location of different types can be determined. The source location of ceramics can similarly be identified through analysis of distinctive tempers. However, the mere presence of trade goods is not enough to understand exchange processes. Because change over time is a major issue, and because potential trading partners must be contemporaneous, it is important to be able to associate trade goods with specific chronological information. It is also important to have information on the context of trade goods, such as features, houses, trash pits, etc., in order to investigate the social contexts in which these goods circulate.

Ritual and Ceremonial Systems

While ideological systems pervade all aspects of cultural behavior, the material record of such systems is often difficult to recover and interpret. This is particularly the case with highly mobile hunters and gatherers such as the groups who occupied Southern Nevada through much of prehistory. Nonetheless, because of the crucial role of these systems in structuring cultural behavior, it is important to attempt to compile as much information as possible about the role of belief in the structuring of human life in the region. Artifacts and features considered relatively direct evident of ritual and ceremonial systems include split-twig figurines, rock art such as pictographs and petroglyphs, portable art such as carved stones (see Thomas 1983) and carved bones (see Stettler 1998), design elements on ceramics (see Crown 1994), and rock alignments and intaglios.

Data Requirements—Ideology and Belief Systems

Although to a certain degree, no cultural artifact is ideology free (Asad 1979; Hodder 1986; Joyce and Winter 1996; Miller and Tilley 1984), direct links between artifacts and ideology are most easily observed through artifacts and features that have little or no economic function. Thus, sites with rock art, split-twig or other figurines, carved stone or bone artifacts, fetishes and miniatures, or large assemblages of decorated pottery have the most potential to address these issues. Rock alignments and trails may also provide information relating to ideology and belief systems, although how these features functioned within prehistoric ideology and belief systems is not well understood. If such artifacts or features can be associated with other classes of data and therefore have the potential to address in a holistic manner the relationships between ideology, economy, and other aspects of past societies, the value of the data increases greatly.

Chronology

Good chronological control is necessary to address many research questions. Many researchers have identified a need to refine the cultural chronology for the Great Basin region in general, and southern Nevada in particular (Ahlstrom and Roberts 1999:115; Ezzo 1995; Kelly et al. 1990; Lyneis 1982b; D. Seymour et al. 1996; G. Seymour et al. 1996). Chronological studies include projectile point chronology, obsidian hydration dating, dendrochronology and ceramic chronology.

While the projectile point sequence developed for the Great Basin as a whole (see Hester 1973; Hester and Heizer 1973; Holmer 1978) functions fairly well at a broad scale (see Paleo-Indian, Archaic, Post-Archaic), more work is necessary to refine this chronology. In particular, the chronological development of Elko series projectile points as well as the stemmed point and Pinto point sequences require further investigation (Kelly et al. 1990; Schroedl 1995). Attempts to systematize classification of projectile points have met with success in other areas of Nevada (Schroedl 1995; Thomas 1981). Similar studies have not been carried out in the project area, and regional studies are necessary because of variation in the form and timing of projectile points across the area.

Obsidian hydration dating, which relies on the systematic uptake of environmental humidity by volcanic glass, has the potential to increase our ability to assign dates to sites lacking other chronological information (Michels 1986; Stevenson et al. 1989). However, care must be used in applying obsidian hydration rims to absolute dates because of the ways in which the chemical composition of different obsidian types and regional environments can affect uptake of water (see Ridings 1996). To date, the most successful applications of obsidian hydration dating in the Great Basin region have relied on relative dating, correlated with time periods, rather than determination of absolute dates (Jones and Beck 1990; Schroedl 1995). Several researchers stress the need to develop a relative obsidian hydration chronology for the Southern Nevada region (Ezzo 1995:132; Kelly et al. 1990:90).

Stylistic and manufacturing-related changes in ceramics have long been used as chronological markers for archaeological research. Ceramic chronologies developed for the Virgin/Muddy River region and the Las Vegas Valley are based on cross-dating with Kayenta Branch pottery. To develop useful chronologies for these regions further refining of the local ceramic sequence and understanding of local pottery is needed. Such refinement will provide greater understanding of the timing of occupations in the area (Ezzo 1995).

Data Requirements—Chronology

Data to assist in refining the local chronology includes projectile points, obsidian, materials suitable for radiocarbon dating (carbonized wood, botanical materials, and other organic materials with high carbon content), materials suitable for dendrochronology (preserved wood in archaeological contexts), and ceramics. To address the chronology question directly, these materials must be present in ways that could be used to refine the chronology. In other words, while a diagnostic projectile point on a site might assist in dating that individual site (and might in fact lead to an eligibility determination for that site under other contexts), unless the point is associated with other information that can be used for dating and for refining the chronology, the single point cannot be used to address the chronology research question. Thus, in general, combinations of chronological markers must be present at a given site in order to provide information that could refine the projectile point, obsidian hydration, and ceramic chronology, or contribute towards subdividing existing chronological periods. An exception would be sites with large assemblages of projectile points or ceramics where detailed studies of projectile point morphology or ceramic decoration could lead to refining these chronologies.

Cultural Boundaries

The issue of past ethnic group distribution and interaction is a significant one for southern Nevada. A number of archaeologically defined ethnic groups (or groups that can be identified by commonalities in material culture) inhabited Southern Nevada in the prehistoric, protohistoric, and historic periods. Archaeological manifestations of Virgin Anasazi and Patayan groups are known in the Las Vegas Valley, and Numic occupations appear late in the prehistory of the area. These appear to represent ancestors of the Southern Paiute inhabiting the area at the time of Euro-American contact. The relationship between these groups during various times in prehistory needs to be more clearly defined. Thus, information is needed regarding the spatial distribution of past ethnic groups in the area, particularly along frontier zones such as the Las Vegas Valley. We also need information regarding the nature of interactions between these groups.

The means of identifying ethnic groups with archaeological data has been identified as a research goal (Ezzo 1995; D. Seymour et al. 1996; G. Seymour et al. 1998), and, in particular, whether ethic groups can be identified via rock art is a significant question (Ezzo 1995). The spatial distribution of the Virgin Anasazi and relationships between these groups and others in the region is not currently understood, and further research at either Virgin Anasazi sites or sites with Virgin Anasazi material culture such as ceramics could clarify this issue (Lyneis 1982b:182–183).

Recently, archaeologists have asked questions relating to understanding Patayan occupation or exploitation of southern Nevada. These questions are important to understanding the late prehistory of the valley and how different ethnic groups interacted during this time (Ahlstrom and Roberts 2001a, 2001b). In much of the Southwest, evidence of archaeological cultures comes from broken pieces of pottery. For the Las Vegas Valley, evidence of Patayan occupation or utilization has been found in the Duck Creek area and in the Las Vegas Wash. This evidence has until recently consisted almost entirely of pottery.

Finally, the timing, nature, and causes of the expansion of Numic speakers into the overall region (or the development of Numic populations from an indigenous population base) is currently

poorly understood (Aikens and Witherspoon 1986; Bettinger and Baumhoff 1982; Lyneis 1982b; Rhode and Madsen 1994). An influential model of this process describes the Numic expansion in terms of differing resource exploitation strategies between pre-Numic and Numic populations, with Numic exploitation strategies supporting higher population levels and leading to replacement of pre-Numic groups (Bettinger and Baumhoff 1982). However, problems with this model have been noted (Grayson 1993:269), and further research is required to test the models that have been developed to date to describe this process.

Data Requirements—Cultural Boundaries

To address the questions incorporated by this context, a variety of lines of interrelated data are required. To some degree, the archaeological identification of past ethnicity is a question in and of itself; therefore, the identification of ethnicity in the record is difficult at best. However, material culture that has been used to identify these different groups such as ceramics, diagnostic projectile points, and basketry provides a good starting place for addressing these questions. If these artifacts are in association with other aspects of material culture that can denote cultural lifeways of ethnic groups (e.g., subsistence, settlement, etc.), then it may be possible to begin to address this question. If sites with such material culture are in association with rock art, it may be possible to identify and associate this art with particular ethnic groups. Of particular value would be sites possessing diagnostic artifacts from different groups where it might be possible to assess whether trade or some other interaction structured the relationship between the different groups.

Also important are sites where evidence of subsistence practices can be associated with diagnostic artifacts. Via such associations, it may be possible to address the nature of the Patayan occupation of the Las Vegas Valley and surrounding regions, and whether Numic populations employed a different subsistence strategy from pre-Numic groups.

HISTORIC CONTEXT

Historic contexts developed for Nevada are quite broad in scope and reflect current preservation planning interests outlined in the Nevada Comprehensive Preservation Plan (White et al. 1991). For southern Nevada, productive research areas include the development of transportation corridors, mining practices and technology, and the role that the development of hydroelectric power had in regional urban growth. Specific research questions that may be answered with data recovered in the Eldorado Valley include:

Pioneering

Research questions relating to pioneering overlap many of the historic research domains described herein. The impact of Euro-American settlers was profound both in terms of changing the landscape of the Colorado Valley and in terms of contacts with Native Americans.

How did Euro-American utilization of the valley affect Native Americans already present?

How did the construction of Hoover Dam affect transportation routes into the Las Vegas and Eldorado Valleys?

Were there economic relationships between Native Americans and Euro-American explorers and prospectors? If so, what was the nature of this relationship, and how did it evolve or change over time?

Data Requirements—Pioneering

Data requirements for investigating Euro-American settlement include the range of material culture and site types used by early explorers and settlers. Data requirements for investigating the effects pioneers had on native people include location and recording of Native American sites, and comparison of material culture characteristic of late prehistoric and protohistoric periods. It is also necessary to investigate sites where Native Americans and Euro-Americans may have coexisted and to examine the range of material culture at these sites. This kind of investigation may provide information on economic or other relationships between the two groups. Documentary and archival information include records of relationships between the Native Americans and Euro-Americans. Other archival information may come from records that outline the influences of transportation routes and water availability on Euro-American settlement and growth in the region.

Transportation

The main transportation route in the Eldorado Valley connects Searchlight with Las Vegas. This route probably began as a trail, then wagon/stagecoach roads crossed the region, and finally a parallel route became part of Highway 95. Archaeological evidence of these routes has been located in various portions of the Eldorado Valley. This evidence includes the traces of trails, roads, railroads, artifacts discarded within "pitch zones" flanking the roads (Myhrer 1993), construction camps associated with railroad construction (Blair et al. 1999a, 1999b), the remains of railroad sidings, campsites of travelers along the trails and roads, and "transitional trails" between the main routes. Research questions relating to the development of transportation routes in the Eldorado Valley include:

What mode of transportation is represented by the particular site? What is the sites orientation, where does it "lead"? How was the site established or constructed?

Are artifacts or "constructions" such as culverts, abutments, and so on present that indicate the sites date of origin or period of use?

Can the site be associated with one of the region's named transportation routes, or with a named siding or other way point?

In the case of a railroad construction camp, or other kind of habitation site, what can we learn about the lives of the people who lived and worked there? Is there evidence of their gender, social class, or ethnic identity?

Data Requirements—Transportation

Data requirements required to answer questions relating to the transportation theme include features and artifacts that allow the mode of transportation to be identified, that reveal the ways the route was improved or constructed, or that provide evidence relating to when the route was established and used. Documentary evidence and previous research may provide information relating to some of these requirements.

Mining

Mining has had an important role in the economic development of the state of Nevada, and to a lesser extent the Eldorado Valley. In addition to mines themselves, properties that may be associated with mining include camps, general stores, milling and metal extraction features (such as stamp mills and smelters), and drainage features. While mining is a specific activity, it is also a unique way of life or system of adaptation that changed and evolved in response to economic demands, labor requirements, and technological innovations (Hardesty 1988). Research questions relating to mining in the Eldorado Valley and surrounding region include:

What types of mines are present in the project area and what was the range of metal-extraction techniques that were employed?

How were materials extracted from mines processed? Were processing facilities available locally or did the ore need to be sent elsewhere?

How were mining camps located spatially in relationship to mines, water sources, and other critical resources?

How did mining and/or processing affect community growth?

Data Requirements—Mining

Data requirements to answer questions about mining include location of sites, structures, facilities, or artifacts directly related to the technology of mining or that existed because of the presence of the industry (e.g., general stores). Associated material culture of mine sites, such as domestic lodging, recreational facilities, etc., are important to determine how the mine operated. Archival data are also important to understanding lifestyles of miners. Mining claims and deeds, historical-period maps showing locations of mines and information about their owners, and other documentary evidence pertaining to business transactions carried out between miners, or between miners and other businesspersons.

Power Generation and Transmission

While water was a critical resource in the arid southern Nevada region during historic periods, electrical power was equally important to the developing community. Without power to light and cool buildings community growth and expansion would be limited. Once the Hoover Dam was completed, Southern Nevada residents had access to the hydroelectric power generated by the dam. Research questions relating to the development of power generation and transmission systems in the Las Vegas Valley include:

Do any of the original transmission lines built to bring power from Hoover Dam to Las Vegas still exist?

Who were the people that worked on construction of transmission lines? Were these groups associated with dam and road construction that was part of the infrastructure of Hoover Dam?

Are any construction camps associated with transmission line construction still in existence? What was the nature of these camps when compared to those utilized during construction of Hoover Dam?

Data Requirements—Power Generation and Transmission

Data requirements to answer questions about power generation and transmission include the location and recording of transmission lines and associated features such as construction camps. Documentary evidence may include photographs, maps, construction reports, and letters indicating when and how the features were installed and maintained.

EXPECTATIONS

The primary objectives of the Copper Mountain Solar 4 Project Cultural Resources Investigation are to collect archaeological data to ensure compliance with the UEPA and Section 106 of the National Historic Preservation Act. NewFields conducted a Class I Literature Review at the Southern Nevada Archaeological Archives located at the Desert Research Institute (DRI). The following section summarizes previous archaeological research in the solar generation site and associated gen-tie power line vicinity. This work spans approximately the last 30 years and focuses upon the development of infrastructure. The research conducted by previous scientists provides us with data to discern the kinds of sites that are likely to be found in the project area and the kinds of research questions that may be answered. The following sections present the results of the Literature Review conducted for the solar generation site and gen-tie power line.

Class I Literature Review Results

Table 2 summarizes the archaeological reconnaissance surveys conducted within approximately 1 mile of the proposed solar generation project. Most of the work that has been completed within the region relates to the development of transmission lines and associated substations/switching stations. The earliest transmission lines in the area extend from Hoover Dam to southern California. These were constructed in the 1930s, before the NHPA, and so no cultural resources compliance studies were completed. These include the Southern Sierras/Nevada-California Power Company transmission line (26CK4956) and the Los Angeles Department of Water and Power (LADWP) Boulder transmission line (26CK4957). 26CK4956 was recorded by William Zukosky, Dames & Moore in 1993, and later updated in by Kurt Schweigert and Teela Labrum, (ACRE 2001). The IMACS site record and updated Nevada State Historic Preservation office Historic Resources Inventory forms completed for the site provide the following description of the historic transmission line:

> The site consists of the 225-mile Southern Sierras/Nevada-California Power Company 132kV overhead transmission line. The standard tower used consists of a 52-foot, H-frame structure consisting of two lattice masts, each 2 feet square in section, spaced 17 feet apart to support a horizontal trussed-channel cross-arm 34 feet long. With an average spacing of 750 feet, the towers carried a single circuit consisting of three 4/O aluminum steel reinforced (ASCR) conductors. The line was designed to carry power from Hoover Dam to San Bernardino when the Boulder Canyon Project was completed. It remains in use with minor modifications, delivering energy at 138kV from the dam to San Bernardino and intermediate points. A telephone line for transmission-line communications was constructed at the same time, but with the exception of a few standing poles located in Peanut Butter Pass in the McCullough Range, is no longer extant. The line and companion telephone line were completed on June 13, 1931, tested, and began to deliver 60-cycle power to the dam-site at 88kV on June 25, one day before the contract deadline. At present, the line is designated the "138 Line", the only transmission line operating at 138kV in the region [26CK4956 Site Record prepared by William Zukosky 1993].

The site record also contains an extensive physical description of the transmission line and detailed historical data for the property, which was evaluated in 2001 by ACRE for the NRHP.

That evaluation determined that with the exception of the portions near Hoover Dam, which are considered contributing elements of the Hoover Dam Historic District, the remaining portion of the line (specifically that portion which adjoins the project area) was found to lack integrity of materials, design, and association, a result of upgrading and rebuilding of the transmission line through the years and therefore determined not eligible for listing on the National Register.

The LADWP Boulder transmission line (26CK4957) is described by William Zukosky as follows:

> Boulder Transmission Lines 1, 2, and 3 were built by the Los Angeles Department of Water and Power (LADWP), Bureau of Power and Light, between 1933 and 1940. The lines were built to transmit three-phase, 60-cycle electrical power from Hoover Dam on the Colorado River between Arizona and Nevada, completed in 1936, to receiving stations in Los Angeles, about 270 miles distant. At the dam, power was generated at an electrical pressure of 16,320 volts and then transformed by means of step-up transformers located in the powerhouse to a pressure of 287,500 volts (287.5kV). Leads took the power form the powerhouse roof to LADWP's switchyard nearby on the Nevada side of the canyon rim.
>
> Two basic tower designs were used for the Boulder transmission lines: a single-circuit type carrying three conductors and two overhead ground-wires, and a double-circuit type carrying six conductors and two overhead ground-wires [26CK4957 Site Record prepared by William Zukosky 1993].

The record continues with a detailed physical description and extensive historical data for the property. Although the 1993 record notes that the site had not been fully evaluated, Blair (1994) evaluated the line in *An Evaluation of Eighteen Historic Transmission Line System That Originate from Hoover Dam, Clark County, Nevada*, and found that only the portion of the line near Hoover Dam was significant and considered a contributing element of the Hoover Dam Historic District. Additionally, the line was reevaluated by Chambers Group in 2009 and portions of the LADWP line (26CK4957) was identified as a contributing element to the Historic District under criterion a and d. These include the Hoover Dam to Boulder City Tap and the McCullough Substation to the California border portion. Thus, the portions in the vicinity of the proposed solar project are not considered eligible for NRHP listing.

The first project to conduct cultural resources studies was the Navajo-McCullough line, which located several sites along the shore of Eldorado Dry Lake. Additional transmission line surveys followed. Five sites were located during survey for the Marketplace Substation. All of these sites were found ineligible for listing on the NRHP (Table 3)

.

Table 2. Archaeological Investigations in the Vicinity of the Proposed Copper Mountain Solar 4 Project.

Project #	Title	Author	Year	Acres
5-209	Nevada State Highway Department Railroad Pass Material Sites	NAS	n.d.	2.560
5-209	Nevada State Highway Department Railroad Pass Material Sites	NAS	n.d.	640
5-166	Prehistoric and Historic Research Along the Navajo-McCullough Transmission Line Right-of-way for the Los Angeles Water and Power Company in Clark and Lincoln Counties, Nevada	Brooks et al.	1975	5000+
5-400	Class II Cultural Resources Field Sampling Inventory Along Proposed IPP Transmission Line Corridors, Utah-Nevada-California	Fowler et al.	1978	Unknown
5-514	Class III Cultural Resource Survey, Victorville-McCullough Transmission Lines 1 and 2	Greenwood and McIntyre	1979	10,407
5-1042	From 16.3 Miles North of Searchlight, EA 71100	Moore et al.	1982	484
5-1030 NDOT 067-82R	US 95, CL-13.0-13.5 (South Side)	Leavitt	1982	12.1
5-1082	US 95 North of Searchlight, EA 71100	Metranga et al.	1983	360
5-1366	Material Source Access Road From SR165 to Pit CL11-3 in Eldorado Valley, Clark County, Nevada, EA 71120	Leavitt	1984	7.53
5-1325	Archaeological Survey of the Mead to Phoenix 500kv Direct Current Transmission Line Preferred Alternative	Keller et al.	1986	5890
5-1955(P)	Cultural Resources Technical Report for the AT&T Communications Fiber Optic Project Between Flagstaff, Arizona and Las Vegas, Nevada	Davis et al.	1989	666
5-2248	Cultural Resources Report on the Proposed Valley Electric Association Powerline from Boulder City to Pahrump, Clark and Nye Counties, Nevada	Peterson	1994	102
Misc 130	The Alunite Mining District, Southern Nevada	Myhrer	1995	
5-2266	An Evaluation of Eighteen Historic Transmission Line Systems That Originate from Hoover Dam, Clark County, Nevada	Blair	1994	Unknown
5-177-1 5-2400	Results of a Cultural Resource Inventory of 14 Mines In the Alunite Mining District for the Nevada Mining Association Abandoned Mines Permanent Securing Project, Clark County, Nevada	Wedding	2000	114
No #	Cultural Resources Overview and Archaeological Investigations for the Nextlight Boulder City Solar Project, Clark County, Nevada	DuBarton	2010	1130
5-2686	Cultural Resources Overview and Archaeological Investigations for the Techren Boulder Solar Project, Clark County, Nevada	DuBarton	2013	2,200
5-2690	Cultural Resources Overview and Archaeological Investigations for the Komipo Boulder Solar Project, Clark County, Nevada	DuBarton	2013	1,550

Prior to field investigations we had to decide what the research that we were conducting could tell us that we did not already know about use of the project area. The data that has been collected so far relates mainly to historic period use of the project area during construction and use of transmission lines and roads.

Table 3. Archaeological Sites Recorded in the Vicinity of the Proposed Copper Mountain Solar 4 Project.

26CK1157	Rock Circles (site record missing)	1972	Unevaluated
26CK3648	Site Record Missing		Unevaluated
26CK4712	Isolate Mano Frag	1991	Not Eligible
26CK4713	Isolate Utilized Flake	1991	Not Eligible
26CK4714	Isolate Flake	1991	Not Eligible
26CK4715	Isolate Scraper	1991	Not Eligible
26CK4716	Isolate Flake	1991	Not Eligible
26CK4717	Isolate Flake	1991	Not Eligible
26CK4718	Isolate Flake	1991	Not Eligible
26CK4719	Isolate Scraper	1991	Not Eligible
26CK4720	Isolate Flake	1991	Not Eligible
26CK4721	Isolate Flake	1991	Not Eligible
26CK4722	Isolate Flake	1991	Not Eligible
26CK4723	Isolate Can	1991	Not Eligible
26CK4724	Isolate Flake	1991	Not Eligible
26CK4725	Isolate Hammerstone	1991	Not Eligible
26CK4726	Isolate Flake	1991	Not Eligible
26CK4727	Isolate Grinding Stone Fragment	1991	Not Eligible
26CK4728	Isolate Grinding Stone	1991	Not Eligible
26CK4729	2 Hearth Features	1991	Unevaluated
26CK4730	Isolate Grinding Stone Fragment	1991	Not Eligible
26CK4956	Historic Transmission Line	1994	Portions Eligible
26CK4957	Historic Transmission Line	1994	Portions Eligible
26CK5090	Large Lithic Scatter w/Historic Component	1994	Not Eligible
26CK5091	Lithic Scatter	1994	Not Eligible
26CK5092	Lithic and Ground Stone Scatter	1994	Not Eligible
26CK5093	Lithic, Ground Stone, and Ceramic Scatter	1994	Not Eligible
26CK5094	Lithic and Ground Stone Scatter	1994	Not Eligible
26CK5095	Lithic and Ground Stone Scatter	1994	Not Eligible
26CK5096	Lithic and Ground Stone Scatter	1994	Not Eligible
26CK5097	Lithic and Ground Stone Scatter	1994	Not Eligible
26CK5098	Lithic Scatter	1994	Not Eligible
26CK5099	Lithic Scatter	1994	Not Eligible
26CK5100	Lithic Scatter	1994	Not Eligible
26CK5101	Lithic Scatter	1994	Not Eligible
26CK5102	Lithic Scatter	1994	Not Eligible
26CK5103	Lithic and Ground Stone Scatter	1994	Not Eligible
26CK5104	Prehistoric Lithic Scatter	1994	Not Eligible
26CK5106	Prehistoric Lithic Scatter	1994	Not Eligible
26CK5110	Prehistoric Lithic Scatter	1994	Not Eligible
26CK5111	Lithic and Ground Stone Scatter	1994	Not Eligible
26CK5112	Lithic and Ground Stone Scatter with Recent Rock Ring	1994	Not Eligible

26CK5180	Historic Transmission Line	1994	Not Eligible
26CK8757	Historic Road	2010	Eligible

Many sites have been recorded along the shores of Eldorado dry lake to the north. Numerous lithic tools and grinding stones are found around the lake but the sites are limited to the surface and none of them have been found eligible for listing on the NRHP.

Based on the kinds of sites recorded at the dry lake we felt that archaeological research within the project area had the potential to address some of the research goals outlined above. Diagnostic projectile points might be found that could expand our chronological information. We were also hoping to find pottery in the project area that could provide information about different cultural groups that might have used the Eldorado Valley as a travel route.

The remains of historic Highway 5 were located nearby to the current project area. The road included numerous "pitch zone" artifacts including car parts, bottles and cans that were discarded as travelers drove from Las Vegas to Searchlight. Highway 5 was mitigated prior to construction of the Copper Mountain 2 Solar Facility through intensive recording and limited collection (DuBarton 2012). Several isolate artifacts were also found in this survey area, most dating from World War I to the mid-1950s. Only one prehistoric artifact was found.

While mining development has taken place in the surrounding hills and mountains it was not clear if mining activities have taken place in the valley proper, so evidence of such activities was sought. Finally, the numerous transmission lines that cross the valley document the development of regional power at Hoover Dam and the ways that power was delivered to the public. These lines have been continually upgraded, so it was not clear if they could provide additional information that has not already been obtained. However, they may retain integrity of setting in relation to the historic Hoover Dam District.

METHODOLOGY

Site File Search

NewFields sought documentation describing previous work conducted within 1 mile of the proposed Project site at the Desert Research Institute (DRI). The DRI serves as the regional repository for records of this kind. Table 2 lists the reports pertinent to the Project area. An important goal of this data compilation was to identify any previously surveyed areas that might need reexamination as part of this project. Table 3 documents the sites recorded within 1 mile of the proposed Project.

Field Methods

The Secretary of the Interior has issued standards and guidelines for the identification and evaluation of historic properties (Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation [48 FR 44720–44726]), which are used to ensure that the procedures utilized are adequate and appropriate. The identification and evaluation of historic properties are dependent upon the relationship of individual properties to other similar properties (NPS and ACHP 1998:18-20). Information about properties regarding their prehistory, history, architecture, and other aspects of culture must be collected and organized to define these relationships (NPS 2009), which was the intent of the current Class III cultural resources inventory.

General guidelines for complying with the National Historic Preservation Act are found in the Nevada State Protocol Agreement (BLM 2012), in the BLM Manual, Section 8100, Subsection .01 (BLM 2004), and in the Nevada BLM Guidelines (BLM 2012). Survey techniques are loosely grouped into two categories, reconnaissance and intensive (BLM 2004; NPS 2009). The choice of survey category depends on the level of effort required for a particular project, which can vary depending on the nature of the properties or property types, the possible adverse effects on such properties, and agency requirements (NPS and ACHP 1998:18). The selection of field survey techniques and level of effort must be responsive to the management needs and preservation goals that direct the survey effort. For any survey, it is important to consider the full range of historic properties that may be affected, either directly or indirectly, and consider strategies that will minimize any adverse effects and maximize beneficial effects on those properties (BLM 2004; NPS 2009; NPS and ACHP 1998).

NewFields conducted the archaeological survey in accordance with Nevada BLM *Guidelines and Standards for Archaeological Inventory* (BLM 2012). The survey area was located "on the ground" using U.S. Geological Survey topographic maps and physical landmarks such as roads. Transects were oriented to primary compass directions when possible, but other transect would be used depending on terrain. The project limits would be defined in the field using a shapefile loaded to a Trimble GPS unit (see Figure 1). This GPS unit was used by the field crew to accurately locate and survey the sample units, relocate any previously recorded sites, and map newly discovered cultural resources. After the fieldwork, this information was downloaded and converted to GIS shape files. A GIS specialist created the digital maps presented in this report.

The archaeologists would record artifacts in the field using appropriate descriptions, drawings, and photos to facilitate interpretations of site character. All new prehistoric and historic sites would be recorded, and records for previously recorded sites within the sample survey units

would be updated (if needed), confirming or correcting information on their locations, spatial extent, general characteristics, and likely eligibility status using Intermountain Antiquities Computer System (IMACS) forms, to BLM and Nevada Office of Historic Preservation standards. Sites would be defined as any concentration of two or more artifacts within a 25-m^2 area. Site boundaries would be defined when over 30-m of open space separated cultural materials. All sites encountered during the survey would be recorded in this manner.

Isolated artifacts would be recorded and numbered separately from sites. The field personnel would assign temporary site numbers to all cultural resources that meet the definition of an archaeological site. Site recording would include definition of site boundaries, features, and formed artifacts. Detailed sketch maps demonstrating the relationship of the location of each site to topographic features and other landmarks would be prepared. Digital photographs would document the environmental associations and the specific features of all sites, as well as the general character of the survey area. If a site extended beyond the project APE, the whole site would be documented until it was terminated by the end of the cultural deposit or by a natural feature, such as a drainage.

On July 9-10, 2014, a crew of archaeologists composed of one Crew Chief and three Archaeological Technicians completed the inventory by walking parallel transects spaced no more than 30 meters apart.

.

SITE SURVEY RESULTS

The following section documents the results of field reconnaissance. The CMS4 Project Site has not been previously surveyed so all cultural resources are newly recorded. NewFields recorded one new historic site and six isolates during survey of the Project site.

Newly Recorded Cultural Resources

Most of the cultural resources recorded during field reconnaissance were from the historic era. This includes a small historic site consisting of five food can lids and two can bodies given site number 26CK9993 (53-9147) (Appendix A). Items and their measurements are shown in Table 4 below.

Table 4. Artifacts Found at 26CK9993 (53-9147).

Count	Density/m^2	Material/Code	Artifact/Code	Comments
3	$1/m^2$	Tin	Food tin/TD	2 15/16 in diameter, turn-key opened; key still attached with score strip wound around key
2	$1/m^2$	Tin	Food tin/TD	4 9/16 in diameter, turn-key opened; key still attached with score strip wound around key
1	$1/m^2$	Tin	Food tin/TD	2 15/16 in diameter
1	$1/m^2$	Tin	Food tin/TD	4 9/16 in diameter

The site is a very sparse a very sparse historic artifact scatter consisting of cylindrical food tins in an area 10 (N-S) × 5 m (E-W) just east of an ephemeral rill (Figure 3). The site consists of seven artifacts representing five vessels/cans. All of the cans were opened with turn keys suggesting a time range from 1900 to 1920. However, turn keys are still used on some modern cans so they are potentially historic but in fact may be modern.

Figure 3. An Overview of 26CK9993 (53-91470 Looking West).

Five historic isolates and one prehistoric isolate were also located (see Table 5). The historic isolates were mainly early to mid-20th Century cans and the prehistoric isolate consists of a basalt biface fragment (Figure 4).

Table 5. Isolates Found during Survey of the Project Area.

IO #	Easting	Northing	Description	Date
1	682230	3963235	Two crushed metal cans (possible meat tins) in a 4 × 2-meter area centered in an ephemeral rill	Late Historic (1900-early 1960s)
2	682122	3962115	Crumpled motor oil can, church-key opened	1940s-1960s
3	682092	3962447	Type 19 (after Simonis 1997) hole-in-top evaporated milk can	1930-1975
4	682021	3962778	Type 15 (after Simonis 1997) hole-in-top evaporated milk can	1920-1931
5	682903	3962001	Fine-grained black basalt biface fragment measuring 3 × 2.5 × 0.5 cm	Unknown Prehistoric
6	683286	3962088	GLO section survey marker	1941

Figure 4. An Isolate Biface Found During Field Reconnaissance

CONCLUSIONS and NRHP ELIGIBILITY RECOMMENDATIONS

This section provides a summary of the information recovered from the one site and six isolates located during survey of the CMS4 project area. The only site found was limited to the surface and did not contain enough information to answer any questions regarding historic occupation of the project area. An IMACS site record for the site is found in Appendix A.

Summary of Isolates

The isolates recorded during field reconnaissance mainly relate to historic use of the project area. These include food cans and oil cans dating from the early to mid-20th century. The one prehistoric isolate found was a basalt biface shown in Figure 4.

What We Know and What We Could Find Out

The project vicinity is occasionally utilized by recreation users who have likely caused changes to the plant communities currently found in the vicinity, and who have probably collected some of the most visible diagnostic artifacts. No temporally diagnostic artifacts were found beyond cans dating to the early to mid-20th Century.

We postulated that Patayan ceramics might be found in the project area, documenting use of the Eldorado Valley as a route to the Las Vegas Valley. While utilization of the eastern portions of the Las Vegas Valley by Patayan groups is well documented, the routes that lower Colorado River groups used to enter the valley are still not understood. No Patayan ceramics were found in the project area that would have provided information regarding routes used by these groups.

NewFields documented one small historic site, five historic isolates, and one prehistoric isolate during field reconnaissance in the CMS4 project area. These sites and isolates cannot provide any additional information beyond that collected during field reconnaissance.

Recommendations

In summary, NewFields located 1 historic site and 6 isolates. These materials are limited to the surface and are constantly impacted by erosional and recreational actions. These do not contain data that can address any of the research questions we have developed for either the prehistoric or the historic period. Because the one historic site found was recommended not eligible for listing in the NRHP, recording constitutes sufficient recovery of the limited data this site can provide.

REFERENCES

ACRE and HRA (Associated Cultural Resources Experts and HRA Inc. Conservation Archaeology)

2004 *Intensive Cultural Resource Inventory of Bureau of Reclamation Lands in the Vicinity of Davis Dam, Clark County, Nevada and Mohave County, Arizona.* Report prepared by ACRE and HRA Inc. for the Bureau of Reclamation. Bureau of Reclamation Report No. LC-AZ-02-05, Boulder City.

Ahlstrom, Richard V.N.

2003 *Archaeological Investigations in Clark County Wetlands Park: The 170-A Pipeline Project.* HRA Inc. Archaeological Report No. 01-27. Submitted to the Southern Nevada Water Authority, Las Vegas and Bureau of Reclamation, Boulder City, Nev. HRA Inc. Conservation Archaeology, Las Vegas.

Ahlstrom, Richard V.N. and Heidi Roberts

1999 *Archaeology at the Apex: A Site Location Model in the Las Vegas Valley, Clark County, Nevada.* HRA Inc. Conservation Archaeology, Las Vegas.

2001a *Archaeological Test Excavations at Sites 26CK1282 and 26CK1474, Clark County Wetlands Park, Southern Nevada.* HRA Inc. Archaeological Report No. 00-07, HRA Inc. Conservation Archaeology, Las Vegas.

2001b *Archaeology at the Apex: Excavations in the Apex Project Area, Southern Nevada.* HRA Papers in Archaeology, No. 2. HRA Inc., Conservation Archaeology, Las Vegas.

Ahlstrom, Richard V.N., Andrea Carpenter, Reginaq Chapin-Pyritz, Linda Scott Cummings, Anne DuBarton, Suzanne Eskenazi, J. Jeffrey Flenniken, Richard G. Holloway, Jerry D. Lyon, Kathryn Puseman, Heidi Roberts, Gregory R. Seymour, Arthur W. Vokes and Claudia Woodman

2005 Desert Oasis: The Prehistory of Clark County Wetlands Park, Henderson, Nevada. *HRA Papers in Archaeology* No. 4. HRA Conservation Archaeology, Las Vegas, Nevada.

Aikens, C. Melvin, and Y.T. Witherspoon

1986 Great Basin Numic Prehistory: Linguistics, Archaeology, and Environment. In *Anthropology of the Desert West: Essays in Honor of Jesse D. Jennings,* edited by C.J. Condie and D.D. Fowler, pp. 7-20. University of Utah Anthropological Papers 110, Salt Lake City.

Asad, Talal

1979 Anthropology and the Analysis of Ideology. *Man.* 14:607–627.

Belshaw, Mike and Ed Peplow, Jr.

1980 *Historic Resources Study: Lake Mead National Recreation Area, Nevada, August 1980.* Historic Preservation Branch, Pacific Northwest/Western Team, Denver Service Center, USDI National Park Service, Denver.

Bettinger, R.L. and M.A. Baumhoff
1982 The Numic Spread: Great Basin Cultures in Competition. *American Antiquity* 47:485–503.

Bettinger, R.L., James F. O'Connell, and David Hurst Thomas
1991 Projectile Points as Time Markers in the Great Basin. *American Anthropologist* 93:166–172.

Buck, Paul E., William T. Hartwell, Gregory Haynes, and David Rhode
1998 *Archaeological Investigations at Two Early Holocene Sites near Yucca Mountain, Nye County, Nevada.* Quaternary Sciences Center, Desert Research Center, Las Vegas.

Binford, Lewis R.
1980 Willow Smoke and Dogs' Tails: Hunter Gatherer Settlement Systems and Archaeological Site Formation. *American Antiquity*, 45, pp. 4–20.

Blair, Lynda M.
1986 *A New Interpretation of Archaeological Features in the California Wash Region of Southern Nevada.* M.A. Thesis, Department of Anthropology, University of Nevada, Las Vegas.

Blair, Lynda M. and Jeffrey R. Wedding
2001 *Archaeological Excavations for the Apex Land Exchange, Clark County, Nevada. Vol. 1, Rockshelters 26CK415, 26CK3780, and 26CK4415.* USDI, Bureau of Land Management, Las Vegas, Report 5-2377(P). Harry Reid Center for Environmental Studies, University of Nevada, Las Vegas Report 5-164-13.

Blair, Lynda M., Diane L. Winslow, and Jeffrey R. Wedding
2000 *Northern Beltway Data Recovery Program Archaeological Sites 26CK3799 and 26CK4908, Clark County, Nevada: Vol. 1.* USDI, Bureau of Land Management, Las Vegas, Report 5-2373.

BLM (Bureau of Land Management)
2004 *Bureau of Land Management 8100 Cultural Resources Manual.* Supersedes Re. 8-38, 8-51: Rel. 8-72. United States Printing Office, Washington, DC.
2012 *Guidelines and Standards for Archaeological Inventory.* Nevada State Office, Bureau of Land Management, Reno.

Brooks, Richard H., Daniel O. Larson, Kathryn Olson, Joseph King, Gregory King, Robert Leavitt, and Patricia Anderson
1975 *Prehistoric and Historic Research along the Navajo-McCullough Transmission Line Right-of-way.* Nevada Archaeological Survey, University of Nevada, Las Vegas Report 4-2-1.

Buck, Paul E., William T. Hartwell, Gregory Haynes, and David Rhode
1998 *Archaeological Investigations at Two Early Holocene Sites Near Yucca Mountain, Nye County, Nevada.* Quaternary Sciences Center, Desert Research Institute, Las Vegas.

Carlson, Gary and Cindy
2012 Searchlight Road Pet Cemetery. Blurb Inc.

Crown, Patricia and W. H. Wills
1995 Economic Intensification and the Origins of Ceramic Containers in the American Southwest. In *The Emergence of Pottery Technology and Innovation in Ancient Society* edited by William K. Barnett and John W. Hoopes, pp. 241-254. Smithsonian Institution Press, Washington, D.C.

Dames & Moore
1997 *A Class III Inventory Survey for the Proposed Crystal Transmission Line Project, Nevada Power Company, Clark County, Nevada.* Dames & Moore, Las Vegas.

Dunbar, Andrew J. and Dennis McBride
1993 *Building Hoover Dam: An Oral History of the Great Depression.* Twayne Publishers, New York.

Ezzo, Joseph A.
1995 *A Class I Cultural Resources Survey for the Southern Nevada Water Authority Treatment and Transmission Facility, Clark County, Nevada.* Statistical Research Technical Series No. 55. Statistical Research, Inc., Tucson.

Ezzo, Joseph A., and Teresita Majewski
1995 Prehistory, Protohistory, and Ethnography. In *A Class I Cultural Resources Survey for the Southern Nevada Water Authority Treatment and Transmission Facility, Clark County, Nevada,* by Joseph A. Ezzo, pp. 35-74. Statistical Research Technical Series No. 55. Statistical Research, Tucson.

Fowler, Catherine
1999 Ethnohistory: Isabel Kelly's Data Relevant to the Southern Paiutes. In *Cultural Resource Management Plan for the Las Vegas Springs Preserve, Clark County, Nevada.* Gregory r. Seymour, pp. 111-120. HRC Report 4-9-3, Harry Reid Center for Environmental Studies, University of Nevada, Las Vegas.

Furnis, C.L.
2003 *Getting by in Limbo: Clues About Life in a Southern Nevada Squatters Camp.* Report prepared for the USDI Bureau of Reclamation. Summit Envirosolutions, Carson City.

Gilreath, Amy J.

2003 *Archaeological Survey of the Harry Allen to Mead 500 kV Transmission Line.* Nevada Cultural Resources Report No. CR5-2462(P). Far Western Anthropological Research Group, Inc., Davis, California.

Graf, Kelly and Anne DuBarton
2001 *A Class III Cultural Resource Survey of the Southern Nevada Water Authority North Valley Lateral Pipeline.* Bureau of Reclamation Report 59. Desert Research Institute, Las Vegas.

Grayson, Donald K.
1993 *The Desert's Past, A Natural Prehistory of the Great Basin.* Smithsonian Institution Press, Washington, D.C.

Hardesty, Donald L.
1988 *The Archaeology of Mining and Miners: A View from the Silver State.* Special Publications Series No. 6. Society for Historical Archaeology, Pleasant Hills, California.

Harrington, Mark Raymond
1933 *Gypsum Cave, Nevada.* Southwest Museum Papers Number 8, Southwest Museum, Highland Park, California.

Haynes, C.V., Jr.
1967 Quaternary Geology of the Tule Springs Area, Clark County, Nevada. In *Pleistocene studies in Southern Nevada.* Edited by H.M. Wormington and D. Ellis, pp.15-104. Anthropological Papers 13. Nevada State Museum.

Haynes, Gregory M.
2001 Two Paleoindian Lanceolates from Southwest Nevada. *In-Situ. Newsletter of the Nevada Archaeological Association* (Spring):8-11.

Hester, Thomas R.
1973 Chronological Ordering of Great Basin Prehistory. *University of California Archaeological Research Facility Contributions* 17, Berkeley.

Hester, Thomas R., and Robert F. Heizer
1973 *Review and Discussion of Great Basin Projectile Points: Forms and Chronology.* Archaeological Research Facility, Department of Anthropology, University of California, Berkeley.

Hodder, Ian
1986 *Reading the Past: Current Approaches to Interpretation in Archaeology.* Cambridge University Press, Cambridge.

Holmer, Richard N.

1978 *A Mathematical Typology for Archaic Projectile Points of the Eastern Great Basin.* Unpublished Ph. D. Dissertation in Anthropology, University of Utah, Salt Lake City.

HRA
2004 *An Archeological Survey for the Las Vegas Valley Disposal Boundary Environmental Impact Statement, Clark County.* HRA Inc., Las Vegas.
2012 *A Prehistoric Context for Southern Nevada.* Archaeological Report No. 11-05, HRA, Inc., Las Vegas.

Jennings, Jesse
1957 *Danger Cave.* University of Utah Anthropological Papers, No. 27. Salt Lake City.

Johnstone, Jeff
1994 *A Class II Inventory of the Proposed Eldorado Valley Land Acts, Clark County, Nevada.* BLM Report 5-2259. Mariah Associates, Reno.

Jones, Florence Lee, and John F. Cahlan
1975 *Water: A History of Las Vegas,* Vol. I. Las Vegas Valley Water District, Las Vegas. Document on file Special Collections, University of Nevada, Las Vegas.

Jones, George T., and Charlotte Beck
1990 An Obsidian Hydration Chronology of Late Pleistocene-Early Holocene Surface Assemblages from Butte Valley, Nevada. *Journal of California and Great Basin Anthropology* 12:84–100.

Joyce, A.A., and M. Winter
1996 Ideology, Power, and Urban Society in Pre-Hispanic Oaxaca. *Current Anthropology* 37:33–47.

Kelly and Fowler
1986 Southern Paiute. In *Great Basin*, edited by Warren L. d'Azevedo, pp. 368-397. Handbook of North American Indians, vol. 11, general editor, William C. Sturtevant. Smithsonian Institution, Washington.

Kelly, Michael S., James H. Cleland, Kathleen L. Hull, Alison J. Macdougall, and Paul Friedman
1990 *Kern River Gas Transmission Company, Kern River Pipeline, Cultural Resources Survey Report, Nevada.* Dames & Moore, Las Vegas.

King, Jerome, D., Craig Young and Allika Ruby
2003 *Archaeological Survey of 5,430 Acres of BLM Lands for the Sloan Canyon NCA/Trace A, West Henderson, and Red Rock Canyon NCA/Hughes Land Exchanges, Clark County, Nevada.* Far Western Anthropological Group, Davis.

Kroeber, Alfred L.
1959 Ethnographic Interpretations, 7-11. *University of California Publications in American Archaeology and Ethnology* 47(3):235-310, Berkeley, California.

Las Vegas Age
1910 *Canyon Tragedy* (November 26, 1910).

Laird, Carobeth
1976 *The Chemehuevis.* Malki Museum Press. Banning, California.

Lyneis, Margaret M.
1982a Prehistory in the Southern Great Basin. In *Man and Environment in the Great Basin*, edited by David B. Madsen and James F. O'Connell, pp. 172–185. SAA Papers No. 2. Society for American Archaeology, Washington.
1982b *An Archaeological Element for the Nevada Historic Preservation Plan.* Prepared for Nevada Division of Historic Preservation and Archaeology Project No. 230-580, University of Nevada, Las Vegas.

Michels, J.W.
1986 Obsidian Hydration Dating. *Endeavor* (n.s.)10:97-100.

Miller, D. and C. Tilley
1984 Ideology, Power, Material Change, and Long-Term Change. In *Ideology, Power, and Prehistory,* edited by D. Miller and C. Tilley, pp. 147-152. Cambridge University Press, Cambridge.

Motor West
1917 *Arrowhead Trail From Los Angeles to Salt Lake.* Motor West Company,Volume 27 (11): 9. September 15, 1917.

Myhrer, Keith
1993 Viewing Transportation Features in Time and Space: A Regional Historic Transportation Systems Model, In *Nevada Archaeologist,* Volume 11:1-17. Nevada Archaeological Association, Las Vegas.

NPS (National Park Service)
1997 How to Apply the National Register Criteria for Evaluation. *National Register Bulletin 15*, National Park Service, Interagency Resources Division, Washington, D.C.

Nystrom, Eric Charles
2003 From Neglected Space To Protected Place: An Administrative History of Mojave National Preserve, National Park Service,

Paher, Stanley W.
1970 *Nevada Ghost Towns & Mining Camps.* Howell-North Books, Berkeley.

Pigniolo, Andrew R., Jackson Underwood and James H. Cleland
1997 *Where Trails Cross: Cultural Resources Inventory and Evaluation for the Imperial Project, Imperial County, California.* Bureau of Land Management, El Centro, California.

Rager, Hal Boyle
2001 *Burnt Rock Mound (26CK3601): Late Archaic and Ceramic Period Human Use of A Northern Mojave Spring Mound.* Master's Thesis, Anthropology Department, University of Nevada, Las Vegas.

Rafferty, Kevin A.
1984 *On Common Ground: Las Vegas as a Cultural Frontier in Prehistory.* USDI, Bureau of Land Management, Las Vegas, Report 5-1381. DAS Report 2-5-10.

Rhode, David and David B. Madsen
1994 Direct Dating of Brownware Ceramics Using Thermoluminescence and its Relation to the Numic Spread. In *Across the West: Human Population Movement and the Expansion of the Numa.* D.B. Madsen and D. Rhode, eds. pp. 124-131. University of Utah Press, Salt Lake City.

Ridings, Rosanna
1996 Where in the World Does Obsidian Hydration Work? *American Antiquity* 61:136-148.

Roberts, Heidi
2000 A Clovis Point Base from Clark County Wetlands Park. *In-Situ. Newsletter of the Nevada Archaeological Association* (Winter):10-16.

Roberts, Heidi, and Richard V.N. Ahlstrom
2000 *Fragile Past: Archaeological Investigations in Clark County Wetlands Park, Nevada.* HRA Inc. Archaeological Report No. 00-03. Submitted to the Southern Nevada Water Authority and Bureau of Reclamation. HRA Inc. Conservation Archaeology, Las Vegas.

Roberts, Heidi, Elizabeth von Till Warren, Richard V.N. Ahlstrom, and Claudia Woodman
2003a *Archaeological Survey for the Table Mountain Wind Generation Project, Clark County, Nevada.* USDI, Bureau of Land Management, Las Vegas, Report No. 5-2416. HRA Inc. Archaeological Report No. 01-02. Prepared for PBS&J, Henderson, Nev. HRA Inc. Conservation Archaeology, Las Vegas.

Roberts, Heidi, Richard V.N. Ahlstrom, Elizabeth von Till Warren, and William Eckerle
2003b *Coyote Named This Place Pakonapanti: An Archaeological Survey of the Corn Creek Dunes Site in the Desert National Wildlife Refuge, Clark, County, Nevada.* HRA Archaeological Report No. 02-03. HRA Inc., Conservation Archaeology, Las Vegas.

Roberts, Heidi and Richard V.N. Ahlstrom
2012 *A Prehistoric Context for Southern Nevada.* HRA Inc., Report 11-05, Las Vegas NV.

Rock
1987 *A Brief Commentary on Cans.* USDA, U.S. Forest Service, Klamath.

Roske, Ralph J.
1986 *Las Vegas: A Desert Paradise.* Continental Heritage Press, Tulsa, Oklahoma.

Roth, George E.
1976 *Incorporation and Changes in Ethnic Structure: The Chemehuevi Indians.* Unpublished Ph.D. Dissertation. Anthropology Department, Northwestern University, Evanston, Illinois.

Schroedl, Alan R.
1991 Paleo-Indian Occupation in the Great Basin and Northern Colorado Plateau. *Utah Archaeology* 1(1), pp. 1-15.
1995 *Open Site Archeology in the Little Boulder Basin: 1992 Data Recovery Excavations in the North Block Heap Leach Facility Area, North-Central Nevada.* Cultural Resources Report 492-02-9317. Little Boulder Basin Series No. 3. P-III Associates Inc. Salt Lake City. BLM Report No. 1-2021(n). Submitted to Bureau of Land Management, Elko District Office, Elko, Nevada.

Seymour, Gregory R.
1997 *A Reevaluation of Lower Colorado Buff Ware Ceramics: Redefining the Patayan in Southern Nevada.* Unpublished Master's thesis, University of Nevada, Las Vegas.
1999 *Cultural Resource Management Plan for the Las Vegas Springs Preserve, Clark County, Nevada.* Harry Reid Center for Environmental Studies, University of Nevada, Las Vegas Report 4-9-3.

Seymour, Gregory R., and Hal B. Rager
2001 *Tales from the Black Mat: The Prehistory of Burnt Rock Spring Mound in the Northern Mojave Desert.* Paper Presented at the Society for American Archaeology, New Orleans.
2002 *Prehistoric Settlement and Subsistence Strategies at Springs and Creeks in the Las Vegas Valley.* Paper presented at the Spring-Fed Wetlands Conference sponsored by the Desert Research Institute and Las Vegas Valley Water Department.

Seymour, Deni. J., David Wrobleski, Gregory R. Seymour, Jeffrey H. Hokanson, Sean Simpson, Vicky J.T. Cunningham, Lynn E. Hatzenbuehler, and Indre Antanaitis
1996 *Blue Diamond/Arden Archaeological Project: An Archaeological Survey of 5,984 Acres in the Las Vegas Valley, Clark County, Nevada.* Lone Mountain Archaeological Services, Inc., Las Vegas.

Seymour, Gregory R., Lynda M. Blair, Jeffrey R. Wedding, and William G. White

1998 *A Cultural Resource Investigation of Two Volkmar Exchange Parcels in the Las Vegas Valley, Clark County, Nevada.* Harry Reid Center for Environmental Studies, University of Nevada, Las Vegas Report 5-164-8. USDI, Bureau of Land Management, Las Vegas, Report 5-2370.

Southwest Gas
2009 *History of Southwest Gas.* Information available at the website: http://www.southwestgas.com/about/aboutus/history.php

State Historic Preservation Office.
2013 Personal communications with Jessica Axsom on August 5.

Stettler, Heather K.
1998 *Material Culture and Behavioral Change: Organic Artifacts from the site of El Juyo and the Cantabrian Upper Paleolithic.* Unpublished Ph.D. Dissertation, Department of Anthropology, University of Chicago.

Stevenson, C.M., J. Carpenter and B.E. Scheetz
1989 Obsidian Dating: Recent Advances in the Experimental Determination and Application of Hydration Rates. *Archaeometry* 31:193-206.

Steward, Julian H.
1938 *Basin-Plateau Aboriginal Sociopolitical Groups.* Bulletin No. 120. Bureau of American Ethnology, Smithsonian Institution, Washington, D.C.

Stoner, Edward J. and Mary Ringhoff
2008 *An Archaeological Inventory of Approximately 24 Miles and 1,207 Acres in Related Pull Sites, Substations, and Facilities for the Coyote Springs 138 kV Transmission Line Project, Lincoln County and Clark County, Nevada.* Western Cultural Resource Management, Sparks, Nevada.

Susia, Margaret L.
1964 Tule Springs Archaeological Surface Survey. *Nevada State Museum Anthropological Papers* 12. Carson City.

SWCA Environmental Consultants
2003 *Results of Class III Cultural Resource Inventory: Ivanpah Power Generation Project, Clark County, Nevada.* BLM Report 5-2455. SWCA, Reno.

Thomas, David H.
1973 An Empirical Test for Steward's Model of Great Basin Settlement Patterns. *American Antiquity* 38(1):155-176.
1981 How to Classify the Projectile Points from Monitory Valley, Nevada. *Journal of California and Great Basin Anthropology* 3:7-43.
1983 The Archaeology of Monitor Valley, 2: Gatecliff Shelter. *Anthropological papers of the American Museum of Natural History* 59(1). New York.

Thompson, Herbert J. and Raymond J. Haley
1974 *General Summary of National Flood Events*. Volume 25, No. 1. U.S. Department of Commerce, National Oceanic and Atmospheric Administration Environmental Data Service, Asheville, North Carolina.

Underwood, Jackson and James H. Cleland
1998 *Trails of the Indian Pass Area, Imperial County, California.* Bureau of Land Management, El Centro, California.

Valentine, David
2008 Digging a Little Deeper at Alunite. *Nevada Archaeologist*, Volume 23. Nevada Archaeological Association, Las Vegas.

Walling, Barbara A., Richard A. Thompson, Gardiner F. Dalley, and Dennis G. Weder
1986 *Excavations at Quail Creek.* Bureau of Land Management, Utah, Cultural Resource Series No. 20. Salt Lake City.

Warren, Claude N.
1981 *Mesquite and Subsistence in the eastern Mojave Desert.* Paper presented at the 41st Annual Meeting of the Society of American Archaeology, San Diego.

Warren, Claude N., and Robert H. Crabtree
1986 Prehistory of the Southwestern Area. In *Handbook of North American Indians, Vol. 11: Great Basin*, edited by W.L. D'Azevedo, pp. 183-193. Smithsonian Institution Press, Washington, D.C.

Western Area Power Administration
2002 *Serving the West: WAPA's First 25 Years as a Power Marketing Agency.* Information available at the web site: http://www.wapa.gov.

White, William G., Richard A. Bernstein, and Ronald James (editors)
1991 *Nevada Comprehensive Preservation Plan, Second Edition.* Division of Historic Preservation and Archaeology and the Nevada Historical Society, Carson City, Nevada.

Wikipedia.com
2009 Nelson, Nevada. Information available at the website: http://en.wikipedia.org/wiki/Nelson%2C_Nevada

Williams, P.A. and R.J. Orlins
1963 *The Corn Creek Dunes Sites: A Dated Surface Site in Southern Nevada.* Nevada State Museum Anthropological Papers No. 10, Carson City.

Wheeler, George M.

1872 *Preliminary report concerning explorations and surveys, principally in Nevada and Arizona, prosecuted in accordance with paragraph 2, special orders no. 109, War Department, March 18, 1871, and letter of instructions of March 23, 1871, from Brigadier General A. A. Humphreys, chief of engineers.* U.S. Army Corps of Engineers, Washington, D.C.

Woodman, Claudia, Richard V.N. Ahlstrom, and Heidi Roberts
2003 *Archaeological Investigations Along the Northern Boundary of Clark County Wetlands Park, Clark County, Nevada.* HRA Inc. Archaeological Report No. 01-11, HRA Inc., Conservation Archaeology, Las Vegas.

Woodman, Claudia, Heidi Roberts, and Richard V.N. Ahlstrom
2001 *Archaeological Investigations in the Western Portion of Wetlands Park, Clark County, Nevada.* Archaeological Report No. 00-08. HRA Inc. Conservation Archaeology, Las Vegas, Nevada.

York, Andrew L., Michael S. Kelly, and William Zukosky
1992 *Kern River Gas Transmission Company: Kern River Pipeline Cultural Resources Data Recovery Report, Nevada.* Dames & Moore, San Diego, California.

ACRONYMS AND ABBREVIATIONS

BLM	Bureau of Land Managements
HRA	Heidi Roberts Conservation Archaeology, Inc.
HRC	Harry Reid Center for Environmental Studies
kV	kilovolt
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
PV	Photovoltaic
SHPO	State Historic Preservation Office
UEPA	Utilities Environmental Policy Act
UTM	Universal Transverse Mercator

APPENDIX A: IMACS SITE RECORDs

Eligibility: Unevaluated __ Not eligible ✓ Eligible__ Criteria: A__B__C__D_ by: concur:

NEVADA SHORT FORM

If for any reason you think this form is inadequate, use the long form.

Administrative and Environmental Data

***1.** State Site No: 26CK9993 ***2.** Agency Site No: 53-9147

3. Temp. Site No: ESM 1

4. Project Name: Copper Mountain Solar 4 Project CRI

***6.** Report Number: 5-2724

County: Clark (CK)

7. Site/Property Name: N/A

8. Site Class: Historic Historic Theme/Affiliation: Unknown (ZZ)/ European/American (EA)

Site area: 10 (N-S) × 5 (E-W) m Age: Historic (1900-1920) Dating Method: Can lids Depth of Cultural Fill: None

9. Site Description:

Site 26CK9993X consists of a very sparse historic artifact scatter consisting of cylindrical food tins in an area 10 (N-S) × 5 m (E-W) just east of an ephemeral rill. It consists of seven artifacts representing five vessels/cans. All artifacts were analyzed in the field and include three lids measuring 2 15/16 in diameter, two lids measuring 4 9/16 in diameter (all turn-key opened), and two can bodies. The turn keys are still attached to the lids, and the key was attached to the lid or bottom of can with solder. The end seems of lids/cans are also soldered. Based on the diagnostic turn-key lids and presence of solder (as well as other artifacts noted in the area), the site date ranges from circa 1900-1920 (Goodman 1998 for end date).

Based on the limited nature of this site, the likelihood of buried deposits is quite minimal and unlikely to generate any additional information. This survey level recording has exhausted the research potential of the site. Therefore, EnviroSystems recommends 26CK9993 ineligible to the NRHP.

Reference:

Goodman, John D.
1998 *Late Historic Artifacts Field Recording and Dating Guide*. Arizona Archaeological Council, 1998 Spring Meeting Workshop held at Pueblo Grande Museum, Phoenix.

***10.** Elevation: 1,860 feet ***11.** UTM Grid: Zone 11

***12.** Township/Range (to quarter section only): SE¼ of Section 7, T25S, R63E

***13.** Meridian: Mt. Diablo/7 ***14.** Map Reference: Boulder City SW 7.5′ quadrangle (photorevised 1973)

***17.** Land Owner: Boulder City ***18.** Federal Administrative Unit: N/A

22. Photographs: (Roll & Frame nos.) Photos 8-13

23. Recorded by: T. Ellison Date: 7/10/14 ***26.** Survey Organization: EnviroSystems Management, Inc. (ES)

***30.** Distance to Permanent Water: ~15 miles Type: (A) spring (B) stream/river (C) lake (D) other

***31.** Geographic Unit: Eldorado Valley ***32.** Topographic Location/Primary Landform: Valley (E)

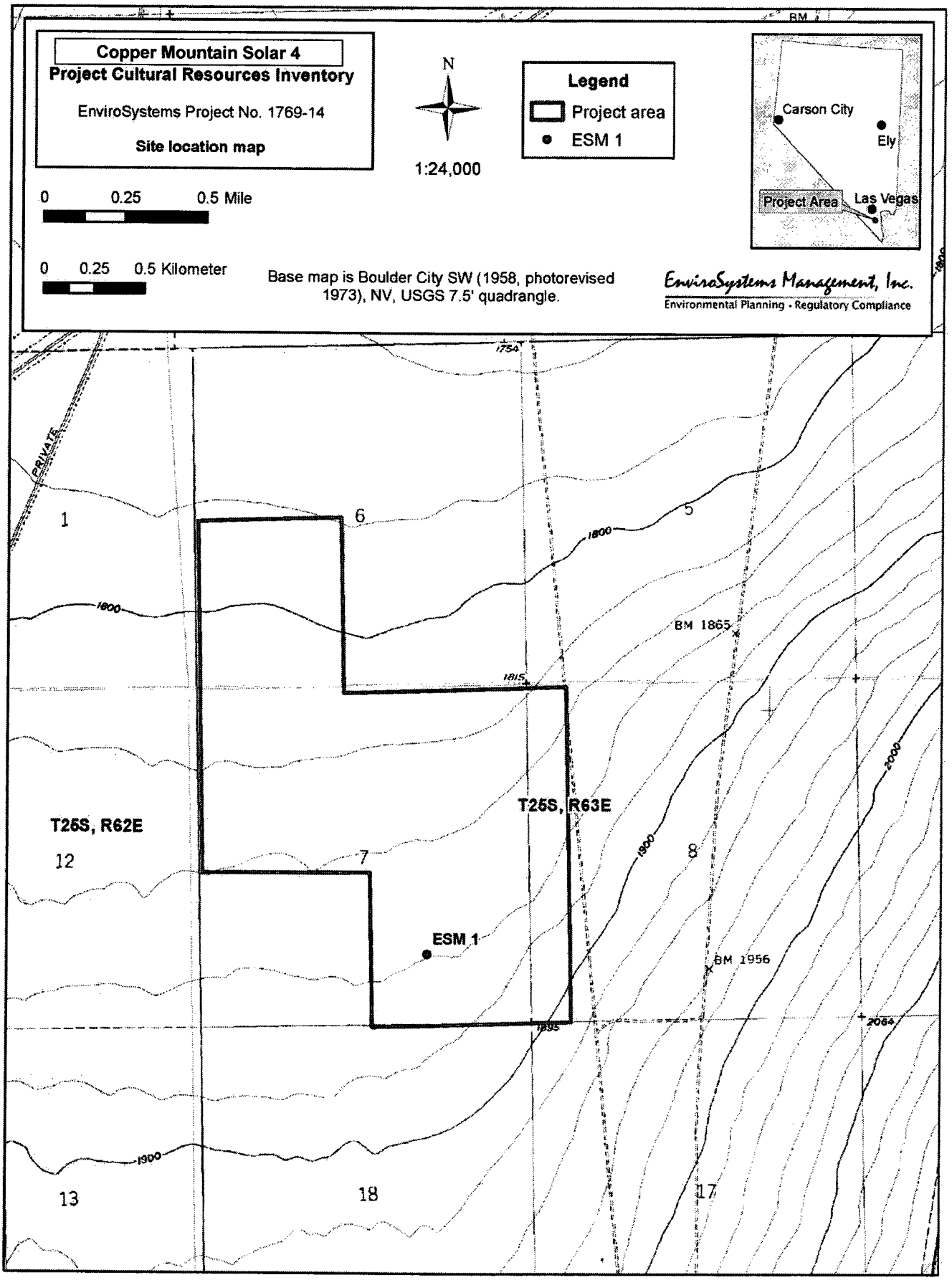
***33.** Depositional Context: Alluvial Plain (H) ***34.** Vegetation Community (primary only): Creosote brush (Y)

Artifact Summary: Record all culturally modified materials and artifacts (including but not limited to: projectile points, bifaces, debitage, ground stone, beads, FCR, textiles, glass, cans, ceramics, etc.) using IMACS codes and categories.

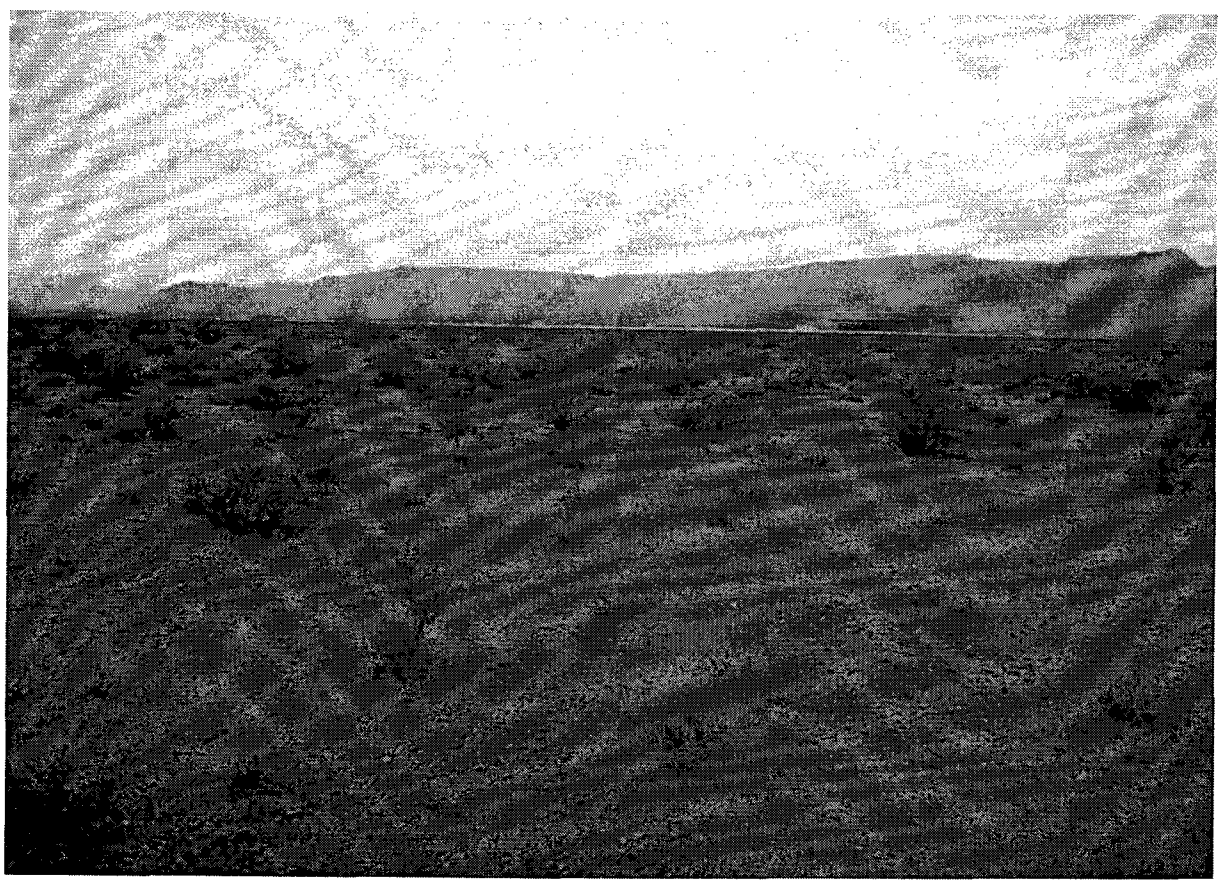
Count	Density/m²	Material/Code	Artifact/Code	Comments
3	1/m²	Tin	Food tin/TD	2 15/16 in diameter, turn-key opened; key still attached with score strip wound around key
2	1/m²	Tin	Food tin/TD	4 9/16 in diameter, turn-key opened; key still attached with score strip wound around key
1	1/m²	Tin	Food tin/TD	2 15/16 in diameter
1	1/m²	Tin	Food tin/TD	4 9/16 in diameter

Feature Description: N/A
Feature Dimensions: X m Area: m^2 Feature Type:
Feature Description (dimensions, materials, physical attributes, etc.)
No feature observed on site.
Artifacts Directly Associated with Feature: N/A

Attachments: 7.5 minute location map; photo pages


Copper Mountain Solar 4
Project Cultural Resources Inventory
EnviroSystems Project No. 1769-14
Site location map
N
1:24,000
Legend
Project area
ESM 1
Carson City
Ely
Project Area
Las Vegas
0 0.25 0.5 Mile
0 0.25 0.5 Kilometer
Base map is Boulder City SW (1958, photorevised 1973), NV, USGS 7.5' quadrangle.
EnviroSystems Management, Inc.
Environmental Planning - Regulatory Compliance
PRIVATE
1754
1800
1900
2000
BM 1865
1815
T25S, R62E
T25S, R63E
12
1
6
5
7
8
ESM 1
BM 1956
2064
13
18
17

Overview of Project site facing north. 7/10/14



Overview of site facing west; note ephemeral rill in background. 7/10/14

Close up of food tin lid measuring 4 9/16 inches in diameter with turn-key opener still attached. Pin flag wire to upper right at edge of can. 7/10/14

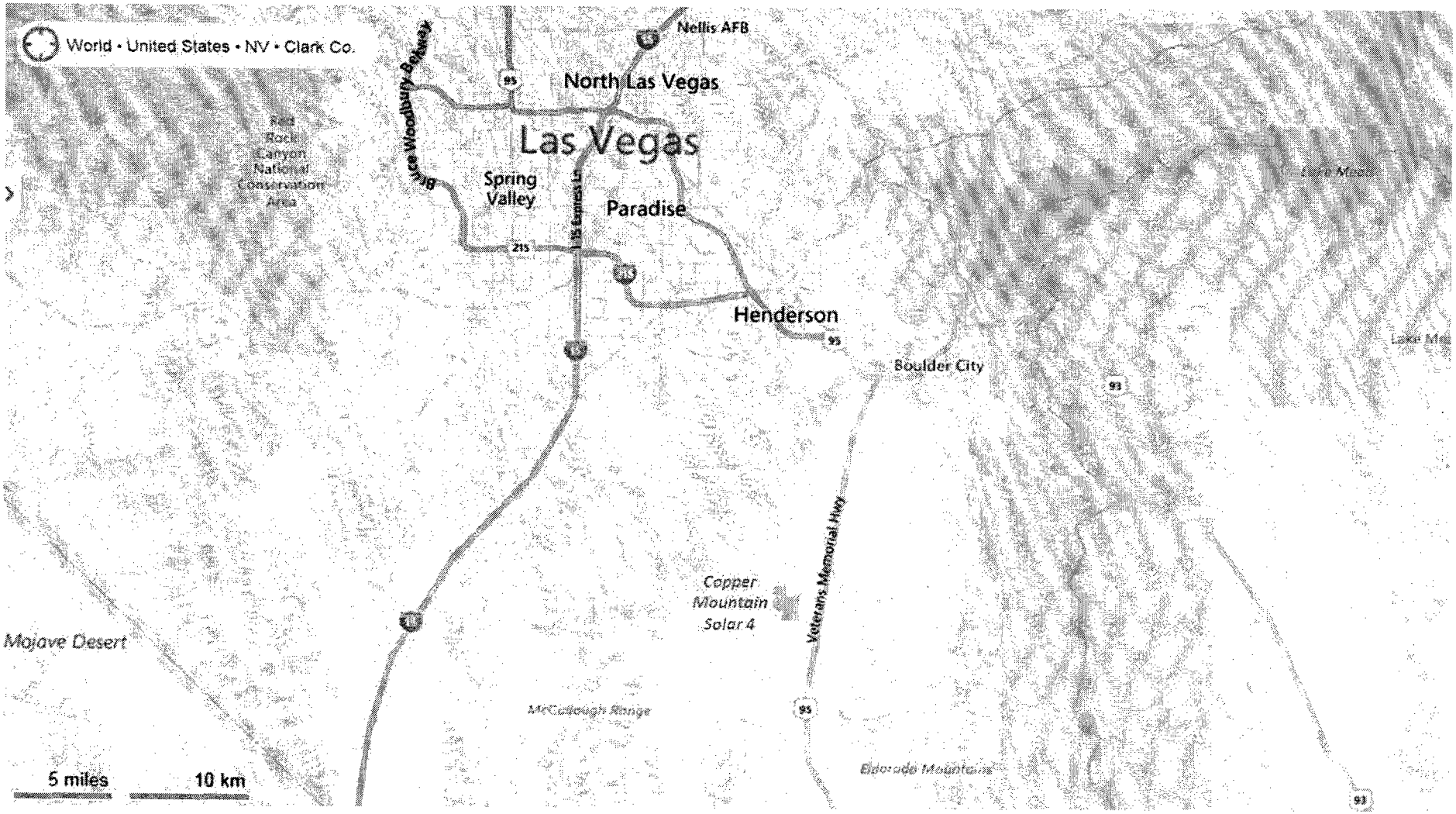
Close up of food tin lid measuring 2 15/16 inches in diameter with turn-key opener still attached. 7/10/14

Close up of food tin body exterior bottom measuring 2 15/16 inches in diameter. 7/10/14

Close up of food tin body interior bottom measuring 4 9/16 inches in diameter. 7/10/14

Exhibit B

Project Location Map

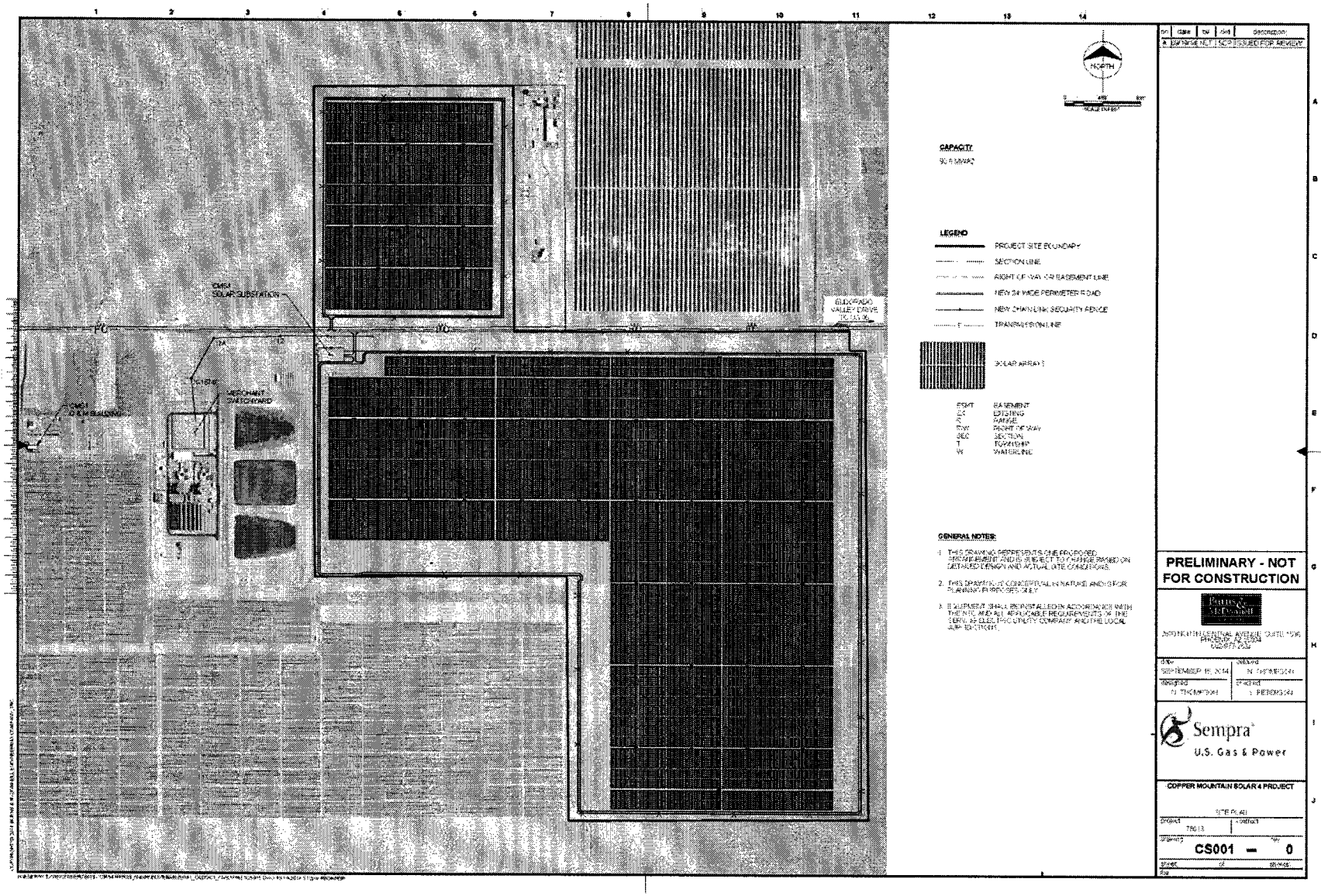


Project Location Map

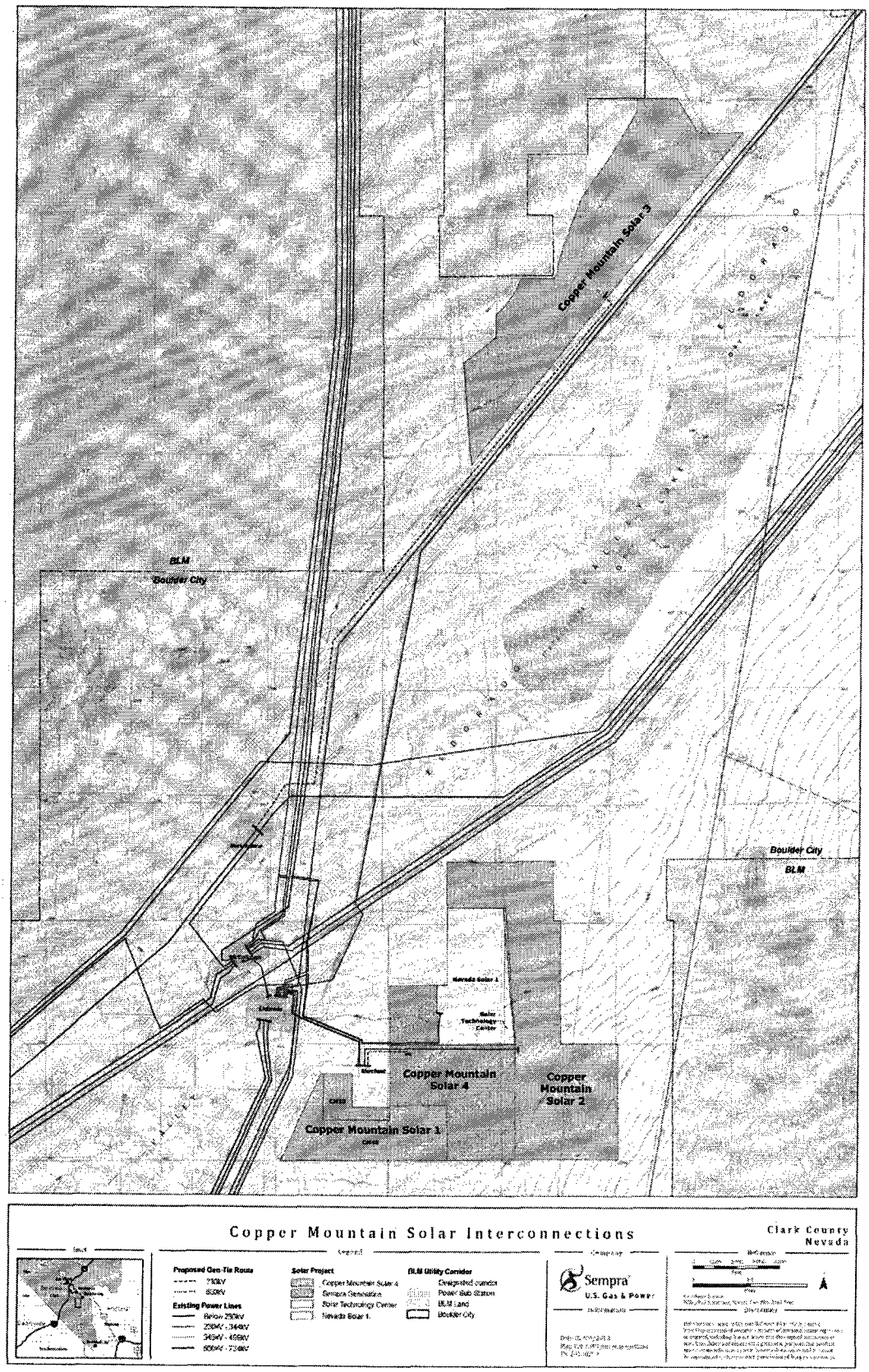
Clark County, Nevada

Exhibit C

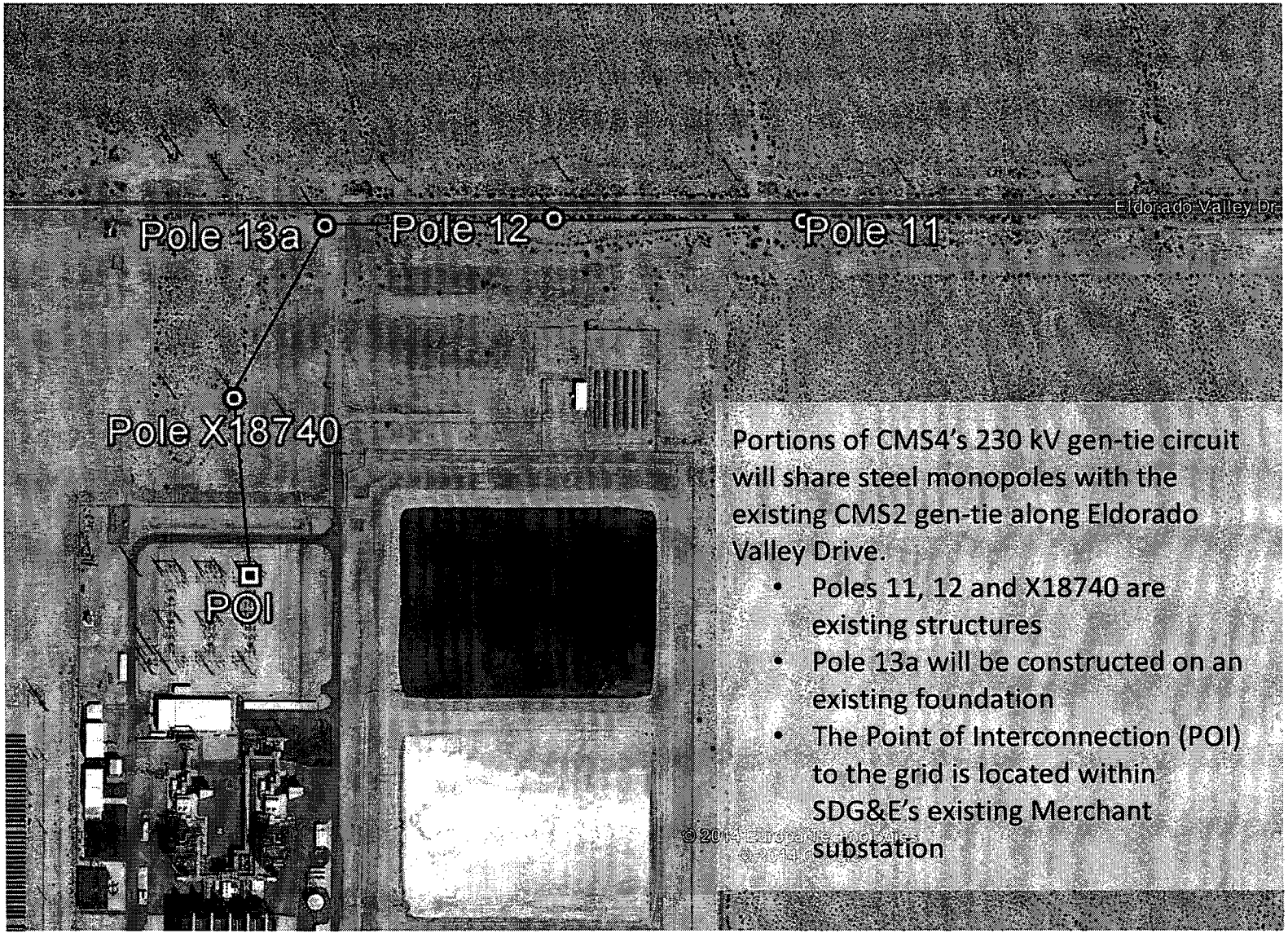
Site Plan Drawings, Vicinity Maps & Routing Maps



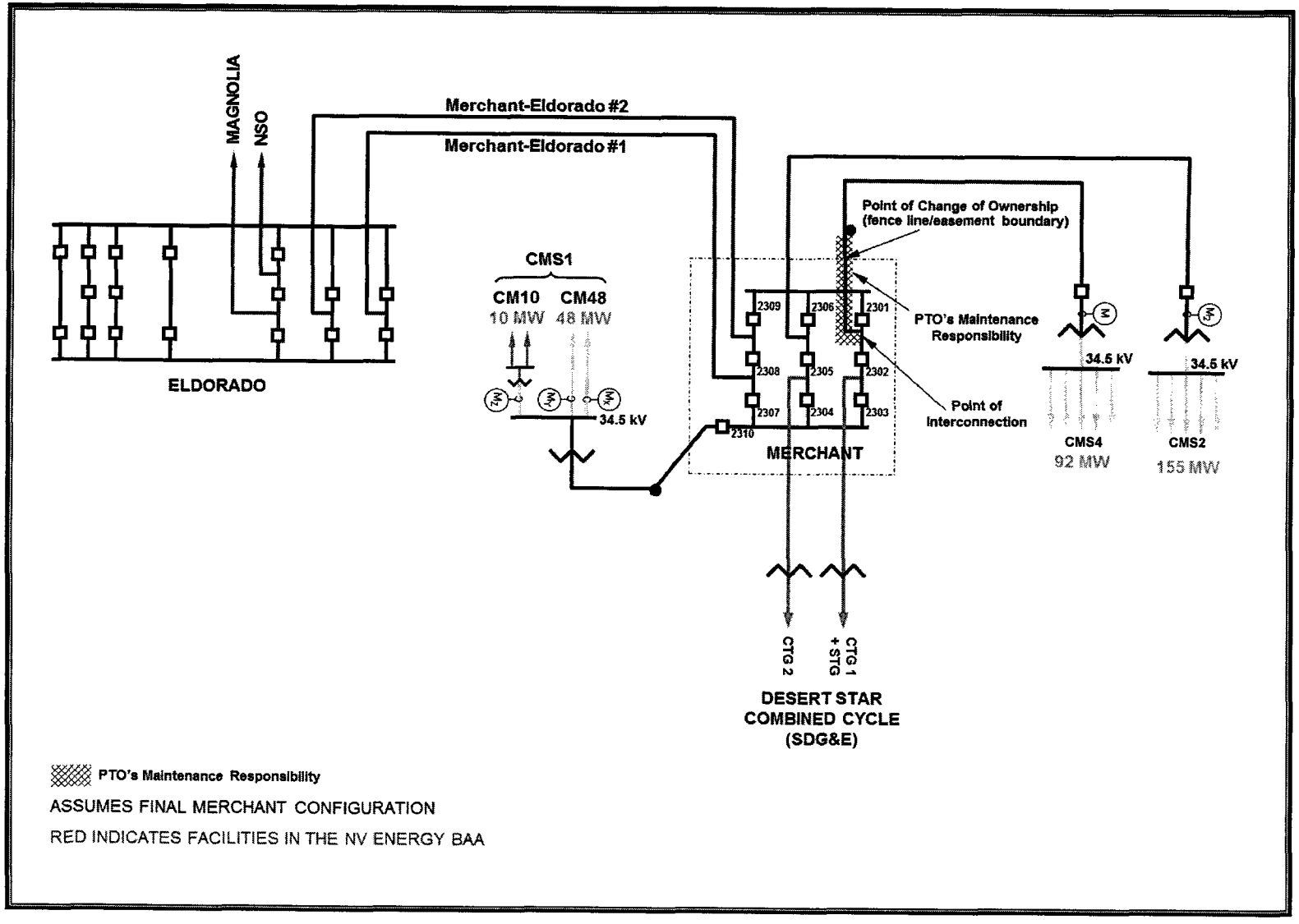
Site Plan Drawing



Vicinity Map



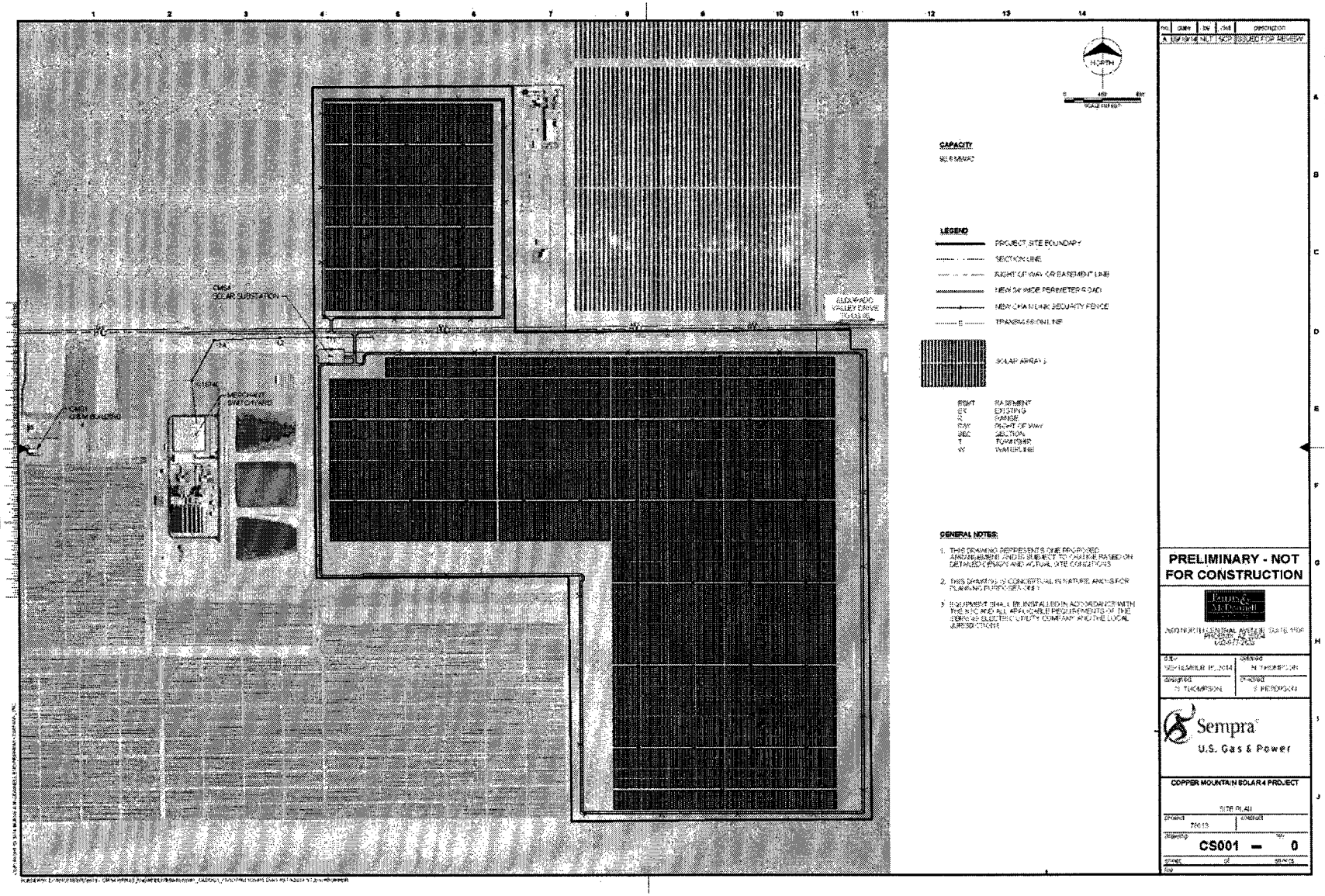
Gen-Tie Routing Map



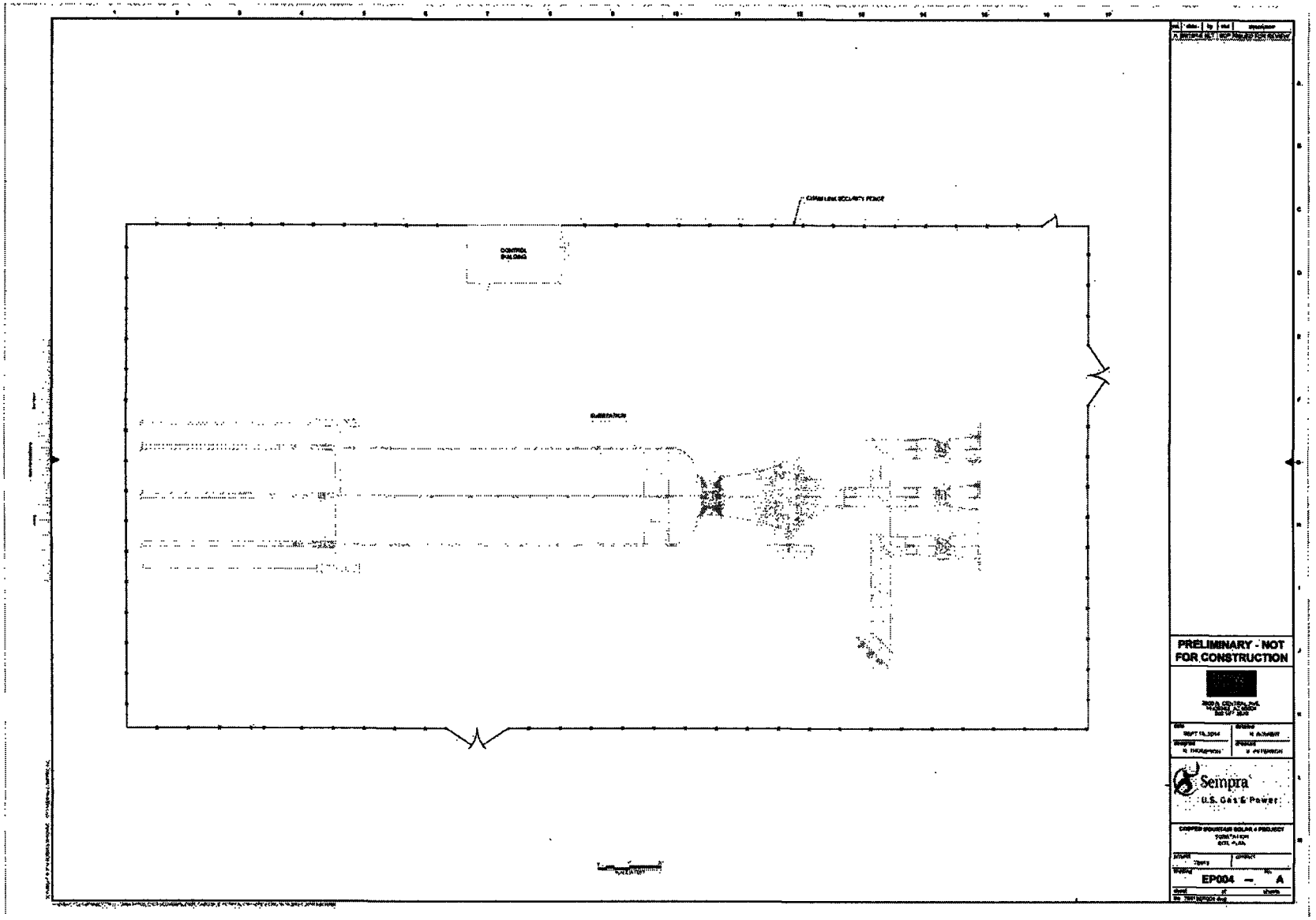
Conceptual Diagram of Point of Interconnection at Merchant

Exhibit D

Layout Diagrams



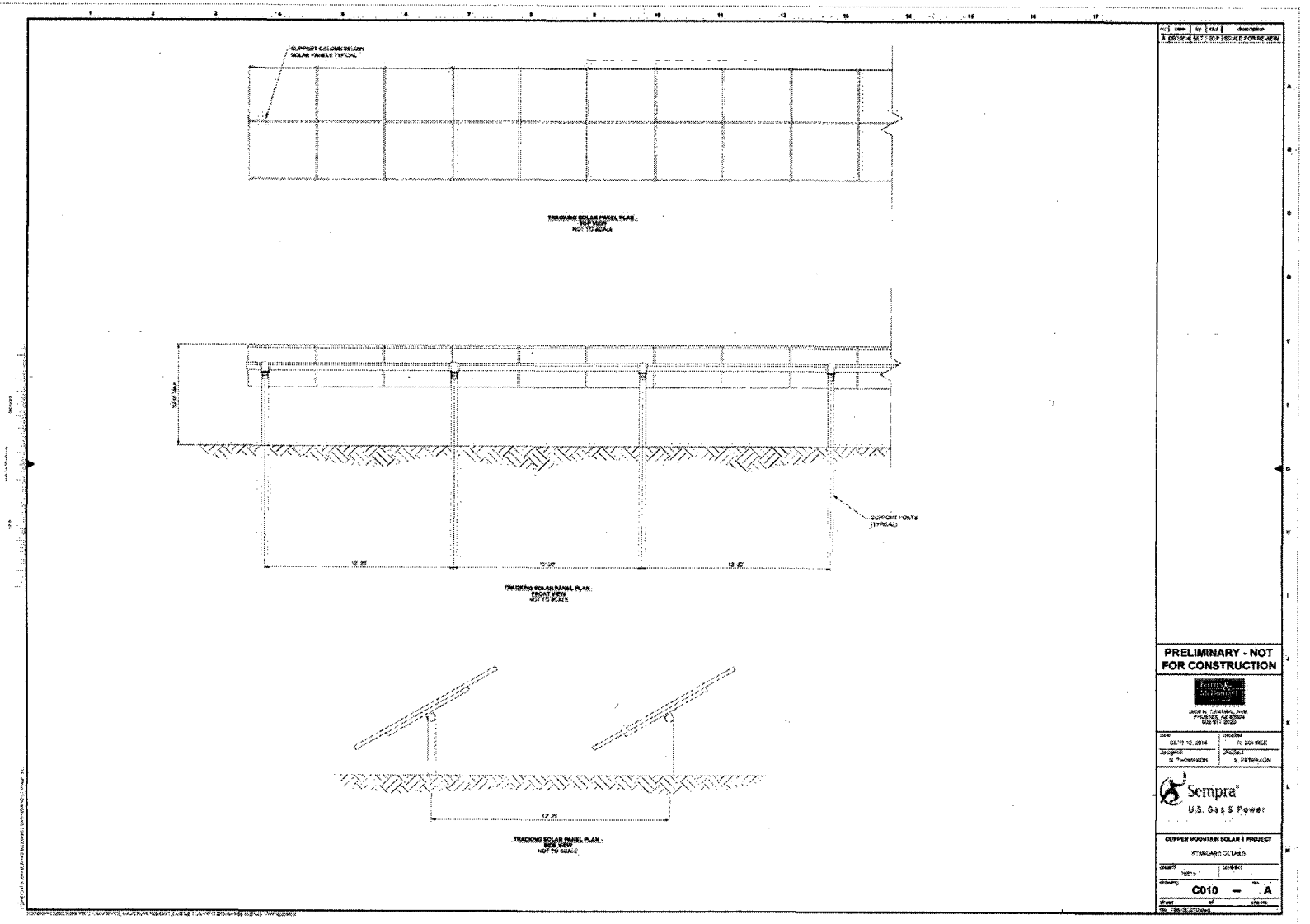
Site Layout Diagram



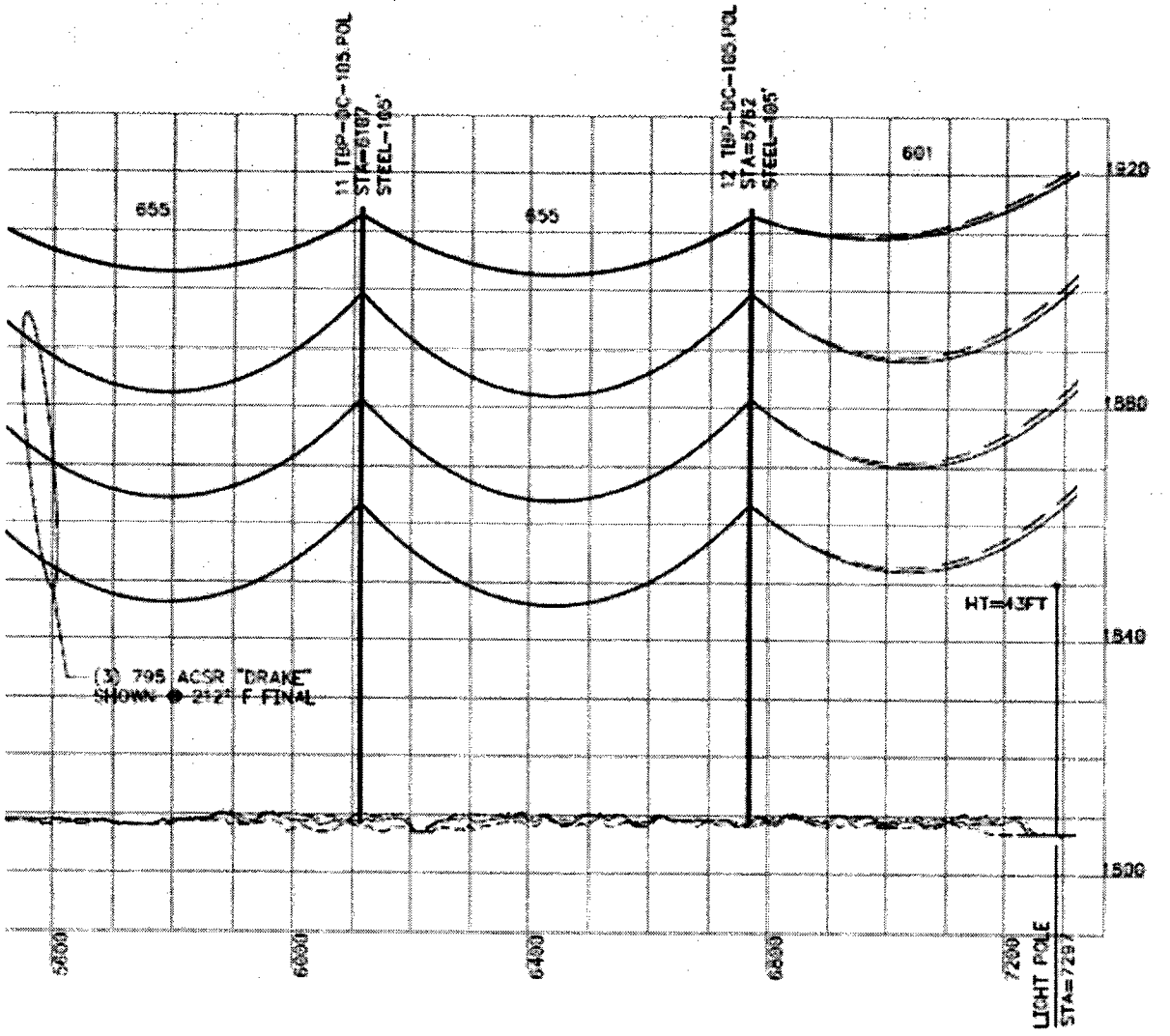
Solar Substation Layout

Exhibit E

Scaled Diagrams of Utility Structures



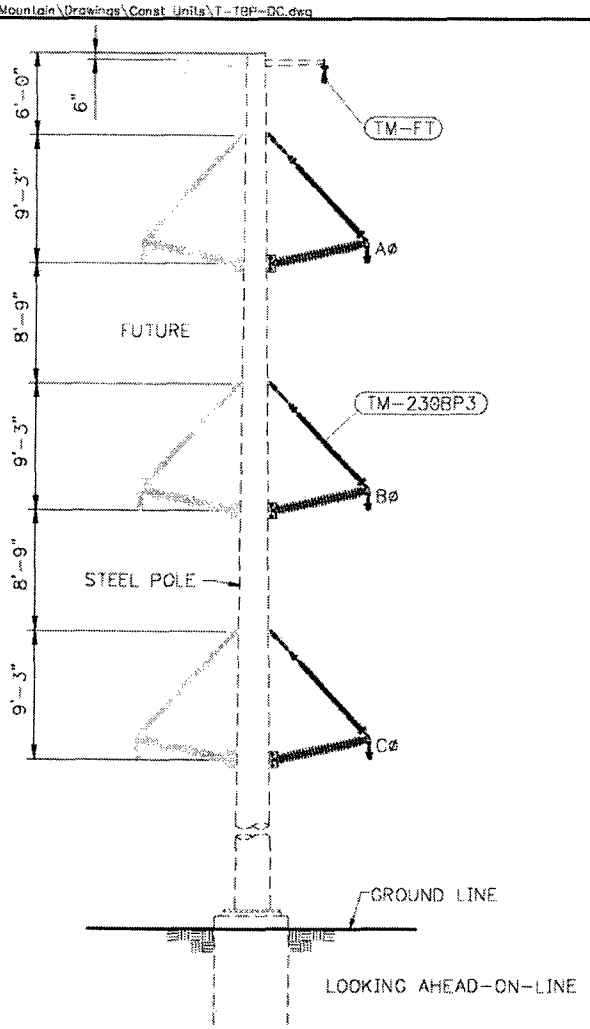
Solar PV Field Single Axis Tracker Scaled Drawing



CMS4 will share some existing steel poles with CMS2. This Drawing looks south from Eldorado Valley Drive.

Locations of CMS2 structures #11 and #12

1/18/12 X:\Cupertino\Copper Mountain\Drawings\Const Units\T-TBP-DC.dwg



NOTES:
1. MATERIAL LIST IS FOR ONE CIRCUIT ONLY. SECOND CIRCUIT IS A FUTURE INSTALLATION. FUTURE MATERIALS SUPPLIED BY OTHERS.

ITEM	QTY	DESCRIPTION
TM-230BP3	3	230-KV HORIZONTAL BRACED- POST INSULATOR ASSEMBLY, STEEL POLE (0° - 3° ANGLE)
TM-FT	1	FIBEROPTIC TANGENT SUPPORT ASSEMBLY

COPPER MOUNTAIN II

TriAxis Engineering, Inc.

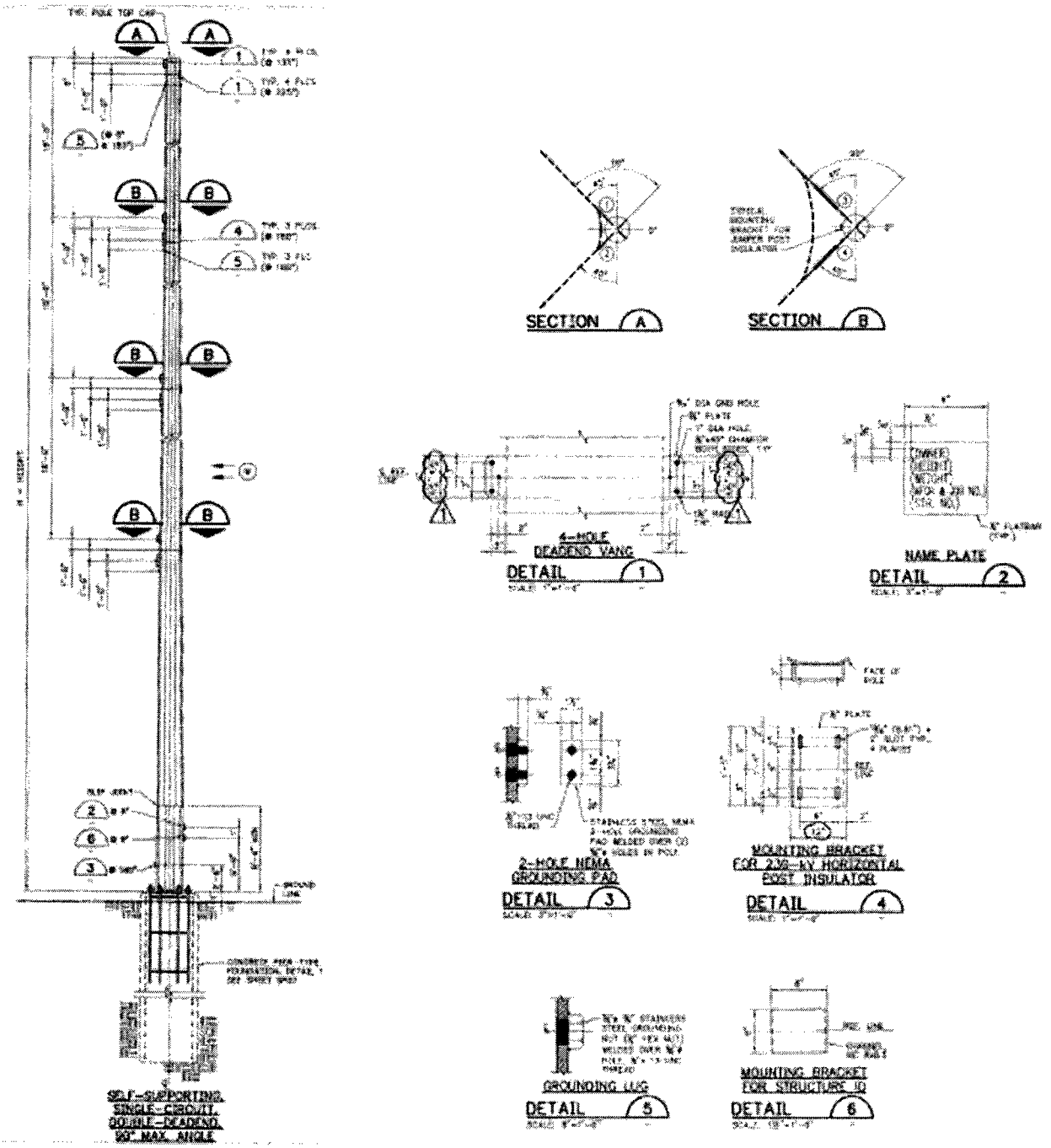
COPPER MOUNTAIN SOLAR II TRANSMISSION LINE

230-KV DOUBLE-CIRCUIT TANGENT ASSEMBLY (3° MAX ANGLE)

DSGN AJP	DR LWB	DATE NOV 2011	T-TBP-DC

The CMS4 circuit can be strung on existing CMS2 structures #11 and #12. Drawing looks west along Eldorado Valley Drive.

CMS2 structures #11 and #12



CMS4 will construct Structure #13a, a new turning pole, on an existing foundation at Merchant Substation.

Structure #13a

Exhibit F

Public Notice

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

NOTICE OF APPLICATION FOR A PERMIT TO CONSTRUCT A UTILITY FACILITY

COPPER MOUNTAIN SOLAR 4, LLC, will file with the Public Utilities Commission of Nevada ("Commission") an application for a permit to construct the Copper Mountain Solar 4 Project ("the Project") under the provisions of the Utility Environmental Protection Act ("UEPA").

The Project will consist of the following components: (1) a nominal 94-megawatt solar photovoltaic electricity generating facility on an approximately 682 acre site; (2) a gen-tie line of nominal voltage at 230-kV, consisting of a second circuit on existing pole structures, to deliver electricity to the Merchant Substation; and (3) a fiber-optic communications line constructed on the same existing pole structures and a redundant communications path connecting the electricity generating facility to the Merchant Substation.

The solar photovoltaic electricity generating facility will be constructed in the Eldorado Valley in the City of Boulder City in portions of Sections 6, 7, and 8, Township 25 South, Range 63 East. The location is approximately 25 miles southeast of the city of Henderson, and approximately 12 miles south of the intersection of Highway 93 and Highway 95, to the west of Highway 95.

The generation-tie power line and fiber-optic communications line, approximately 0.5 miles in length, will be constructed in the Eldorado Valley in the City of Boulder City in portions of Section 12, Township 25 South, Range 62 East, and Section 7, Township 25 South, Range 63 East, and will connect the Project to the Merchant Substation.

The application to the Commission will be filed under and governed by the provisions of UEPA, Nevada Revised Statutes 704.820 through 704.900, and the Commission's rules and regulations thereunder. The application will contain a description of the location of the Project and the utility facilities to be built thereon, a summary of the studies which have been made of the environmental impact of the Project, and a statement of the reasons why the proposed location is best suited for the Project.

A copy of the application will be available on the Commission's website after filing. Additional information about the UEPA application process and a person's right to participate in that process can be found in Chapter 704 of Nevada Revised Statutes and Chapter 703 of the Nevada Administrative Code.

Exhibit G

Affidavits of Publication

Affidavit of Publication

STATE OF NEVADA)
COUNTY OF CLARK) SS:

ROBERT G JOHNSTON LAW OFFC
ST 1A
204 N MINNESOTA ST
CARSON CITY NV 89703

Account # **21841**

Ad Number **0000310717**

Stacey M. Lewis, being 1st duly sworn, deposes and says: That she is the Legal Clerk for the Las Vegas Review-Journal and the Las Vegas Sun, daily newspapers regularly issued, published and circulated in the City of Las Vegas, County of Clark, State of Nevada, and that the advertisement, a true copy attached for, was continuously published in said Las Vegas Review-Journal and / or Las Vegas Sun in 1 edition(s) of said newspaper issued from 09/16/2014 to 09/16/2014, on the following days:

09 / 16 / 14

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

NOTICE OF APPLICATION FOR A PERMIT TO CONSTRUCT A UTILITY FACILITY

COPPER MOUNTAIN SOLAR 4, LLC, will file with the Public Utilities Commission of Nevada ("Commission") an application for a permit to construct the Copper Mountain Solar 4 Project ("the Project") under the provisions of the Utility Environmental Protection Act ("UEPA").

The Project will consist of the following components: (1) a nominal 94-megawatt solar photovoltaic electricity generating facility on an approximately 682 acre site; (2) a gen-tie line of nominal voltage at 230-kV, consisting of a second circuit on existing pole structures, to deliver electricity to the Merchant Substation; and (3) a fiber-optic communications line constructed on the same existing pole structures and a redundant communications path connecting the electricity generating facility to the Merchant Substation.

The solar photovoltaic electricity generating facility will be constructed in the Eldorado Valley in the City of Boulder City in portions of Sections 6, 7, and 8, Township 25 South, Range 63 East. The location is approximately 25 miles southeast of the city of Henderson, and approximately 12 miles south of the intersection of Highway 93 and Highway 95, to the west of Highway 95.

The generation-tie power line and fiber-optic communications line, approximately 0.5 miles in length, will be constructed in the Eldorado Valley in the City of Boulder City in portions of Section 12, Township 25 South, Range 62 East, and Section 7, Township 25 South, Range 63 East, and will connect the Project to the Merchant Substation.

The application to the Commission will be filed under and governed by the provisions of UEPA, Nevada Revised Statutes 704.820 through 704.900, and the Commission's rules and regulations thereunder. The application will contain a description of the location of the Project and the utility facilities to be built thereon, a summary of the studies which have been made of the environmental impact of the Project, and a statement of the reasons why the proposed location is best suited for the Project.

A copy of the application will be available on the Commission's website after filing. Additional information about the UEPA application process and a person's right to participate in that process can be found in Chapter 704 of Nevada Revised Statutes and Chapter 703 of the Nevada Administrative Code.

PUB: September 16, 2014
LV Review-Journal

/S/ Stacey M. Lewis
LEGAL ADVERTISEMENT REPRESENTATIVE

Subscribed and sworn to before me on this 17th day of September, 2014

Notary Mary A. Lee

MARY A. LEE
Notary Public State of Nevada
No. 09-8941-1
My Appt. Exp. Nov. 13, 2016

PROOF OF PUBLICATION

STATE OF NEVADA)
COUNTY OF CLARK) SS:

ROBERT G JOHNSTON LAW OFFC
ST 1A
204 N MINNESOTA ST
CARSON CITY NV 89703

Account # **21841**

Ad Number **0000310718**

Erin Dell, being 1st duly sworn, deposes and says: That she is the Legal Clerk for the Boulder City Review, a weekly newspaper regularly issued, published and circulated in the City of Boulder City, County of Clark, State of Nevada, and that the advertisement, a true copy attached for, was continuously published in said Boulder City Review in 1 edition(s) of said newspaper issued from 09/18/2014 to 09/18/2014, on the following days:

09 / 18 / 14

/S/_____

LEGAL ADVERTISEMENT REPRESENTATIVE

Subscribed and sworn to before me on this 18th day of September, 2014

Notary _____

JANET E. MILES
Notary Public State of Nevada
No. 09-8939-1
My Appt. Exp. Nov. 13, 2016

BEFORE THE PUBLIC UTILITIES COMMISSION OF NEVADA

NOTICE OF APPLICATION FOR A PERMIT TO CONSTRUCT A UTILITY FACILITY

COPPER MOUNTAIN SOLAR 4, LLC, will file with the Public Utilities Commission of Nevada ("Commission") an application for a permit to construct the Copper Mountain Solar 4 Project ("the Project") under the provisions of the Utility Environmental Protection Act ("UEPA").

The Project will consist of the following components: (1) a nominal 94-megawatt solar photovoltaic electricity generating facility on an approximately 682 acre site; (2) a gen-tie line of nominal voltage at 230-kV, consisting of a second circuit on existing pole structures, to deliver electricity to the Merchant Substation; and (3) a fiber-optic communications line constructed on the same existing pole structures and a redundant communications path connecting the electricity generating facility to the Merchant Substation.

The solar photovoltaic electricity generating facility will be constructed in the Eldorado Valley in the City of Boulder City in portions of Sections 6, 7, and 8, Township 25 South, Range 63 East. The location is approximately 25 miles southeast of the city of Henderson, and approximately 12 miles south of the intersection of Highway 93 and Highway 95, to the west of Highway 95.

The generation-tie power line and fiber-optic communications line, approximately 0.5 miles in length, will be constructed in the Eldorado Valley in the City of Boulder City in portions of Section 12, Township 25 South, Range 62 East, and Section 7, Township 25 South, Range 63 East, and will connect the Project to the Merchant Substation.

The application to the Commission will be filed under and governed by the provisions of UEPA, Nevada Revised Statutes 704.820 through 704.900, and the Commission's rules and regulations thereunder. The application will contain a description of the location of the Project and the utility facilities to be built thereon, a summary of the studies which have been made of the environmental impact of the Project, and a statement of the reasons why the proposed location is best suited for the Project.

A copy of the application will be available on the Commission's website after filing. Additional information about the UEPA application process and a person's right to participate in that process can be found in Chapter 704 of Nevada Revised Statutes and Chapter 703 of the Nevada Administrative Code.

PUB: September 18, 2014
Boulder City Review

Exhibit H

Proof of Submission

CERTIFICATE OF SERVICE

I certify that I am an employee of Robert G. Johnston, Attorney at Law, and that on the 8th day of October, 2014, I served the foregoing Application of Copper Mountain Solar 4, LLC for a Permit under the Utility Environmental Protection Act to Construct the Copper Mountain Solar 4 Project by either by U.S. Mail or electronic mail as indicated below, to each of the persons identified on the following list:

U.S. Mail Transmittal:

Clark County Clerk
200 Lewis Ave., 5th Floor
Las Vegas, NV 89155

Lorene Krumm
City Clerk
Boulder City Clerk's Office
401 California Avenue
Boulder City, NV 89005

Las Vegas City Clerk
City Hall, First Floor
400 Stewart Avenue
Las Vegas, NV 89101

Electronic Mail:

Skip Canfield, Program Manager
Nevada State Clearinghouse
Department of Conservation & Natural Resources, Division of State Lands
901 S. Stewart Street, Ste. 5003
Carson City, NV 89701
nevadaclearinghouse@lands.nv.gov

Misty Gower
Administrative Assistant
Nevada Division of Environmental Protection
901 S. Stewart Street, Suite 4001
Carson City, NV 89701
mgower@ndep.nv.gov

Eric Witkowski, Esq.
Chief Deputy Attorney General
Bureau of Consumer Protection
100 N. Carson Street
Carson City, NV 89701
bcpserv@ag.nv.gov

Rose Marie Sura, PLS

Exhibit I

Permits, Licenses & Approvals Obtained

PreCertified Eligible for California's Renewables Portfolio Standard

This is to officially state that beginning on ***January 21, 2014****, the proposed facility:*

Copper Mountain Solar 4

Owned by Copper Mountain Solar 4, LLC,
To be Located in Boulder City, NV,
And Anticipating the Commenced Commercial Operations on:
January 1, 2016

Has been precertified by the California Energy Commission as eligible for California's Renewables Portfolio Standard (RPS) under the criteria specified in the ***Renewables Portfolio Standard Eligibility Guidebook, Seventh Edition,*** *publication number CEC-300-2013-005-ED7-CMF, April 2013, and assigned CEC-RPS-ID number:*

62662C

RECEIPT OF PRECERTIFICATION STATUS DOES NOT GUARANTEE THAT THIS FACILITY WILL BE ELIGIBLE FOR RPS CERTIFICATION IN THE FUTURE.

The application for RPS precertification for this proposed renewable electrical generation facility was submitted by **Joseph Rowley**, of **Copper Mountain Solar 4, LLC**, on behalf of the facility owner **Copper Mountain Solar 4, LLC**. The accuracy of the information in the submitted application for RPS precertification was attested to by **Joseph Rowley**, the **Vice President** of **Sempra U.S. Gas & Power**.

The proposed facility has an identified total nameplate capacity, measured in alternating current, of

92 MW

Using the following renewable energy resource(s):

Photovoltaic

And using the following nonrenewable energy resource(s):

None

The contribution of each energy resource to the electrical generation is based on the No nonrenewable fuel used measurement methodology, as identified in the submitted application for RPS certification. California RPS-eligible Renewable Energy Credits will not be created for any electricity resulting from the use of nonrenewable energy resources, except in cases where the use of nonrenewable energy resources does not exceed a de minimis quantity or other allowance as specified in the Renewables Portfolio Standard Eligibility Guidebook, Seventh Edition, and sufficient evidence has been submitted in support of compliance with those requirements.

This precertification is based on an evaluation of the potential RPS-eligibility of the proposed facility, as described in the submitted application and supporting documentation, under the Renewables Portfolio Standard Eligibility Guidebook, Seventh Edition. The RPS-eligibility of this facility will be evaluated pursuant to the Renewables Portfolio Standard Eligibility Guidebook in place at the time a complete application for certification has been submitted to the California Energy Commission.

The RPS precertification of the Copper Mountain Solar 4 facility may be revoked if any of the information presented in the application for RPS precertification, or supporting documentation, submitted to the California Energy Commission is determined to be false or inaccurate.

The California Energy Commission must be promptly notified of any changes to the information included in the application for RPS precertification of the facility, including changes in the facility's operations, ownership, or representation, as specified in the Renewables Portfolio Standard Eligibility Guidebook, Seventh Edition. Failure to do so within 90 days of the change in the information may result in the revocation of the facility's RPS precertification.