

DESERT PAVEMENT PROTECTION PLAN

San Diego Gas & Electric Company

Sunrise Powerlink Project

San Diego and Imperial Counties, California

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Section 1.0 – EXECUTIVE SUMMARY

This desert pavement protection plan has been prepared for the Final Environmentally Superior Southern Route (FESSR; alignment ROW) of the San Diego Gas & Electric (SDG&E) Sunrise Powerlink Project (Project). The preparation of this plan is a requirement of Mitigation Measure G-2a - Protect Desert Pavement, as outlined in Appendix 12 of the Project's environmental impact report/environmental impact statement (FEIR/EIS) (California Public Utilities Commission and U.S. Department of the Interior, Bureau of Land Management 2008) and the associated Biological Opinion (BO) (U.S. Fish and Wildlife Service 2009).

As outlined in the FEIR/EIS and BO, this document provides a plan to identify, avoid and protect desert pavements. This plan includes the results of the preconstruction desert pavement inventory surveys within and adjacent to the right-of-way (ROW) and ancillary facilities (Action Area); appropriate preconstruction measures to avoid disturbance; procedures to minimize disturbance and protect desert pavement during construction; and techniques to restore pavement in areas of unavoidable temporary impacts.

All areas of the project are subject to restoration according to Mitigation Measures GEO-AMP-6, V-2b and V-2c to reduce the visual impacts of construction disturbance, including areas with bare ground or sparse rock mulch or lacking desert varnish (patina). However, areas with well-developed desert pavement may need specialized restoration efforts. This plan addresses those efforts. Criteria for identification of these areas were the presence of more than 65% clast cover or the presence of natural desert varnish. The Plan approach relied on field surveys to collect point-intercept data and photographs of sites of potential desert pavement. In total, eleven facility disturbance areas were identified that meet the criteria. Some of the sites identified were too uneven for matting to effectively protect the desert pavement. Therefore, the Plan addresses the use of restoration techniques to avoid impacts to desert pavement. This document presents a range of techniques that apply particularly to restoring desert pavement.

Section 2.0 – INTRODUCTION

The San Diego Gas & Electric Company (SDG&E) Sunrise Powerlink Project 230-kilovolt/500-kilovolt (kV) transmission line project (Project) right-of-way (ROW) is consistent with the Final Environmentally Superior Southern Route (FESSR), and related facilities, as identified in the Final Environmental Impact Report/Environmental Impact Statement (FEIR/EIS) issued October 2008 by the California Public Utilities Commission (CPUC) as the lead State agency under the California Environmental Quality Act (CEQA), and the BLM as the lead federal agency under the National Environmental Policy Act (NEPA). The Project ROW studied for the purposes of this Plan reflects the Project as described in the revised Project Modification Report submitted to the CPUC, BLM, and other responsible agencies for review on May 14, 2010. This document was prepared in compliance with Mitigation Measure G-2a: PROTECT DESERT PAVEMENT associated with this work.

Section 3.0 – MITIGATION MEASURE REQUIREMENTS

Mitigation Measure G-2a included in the Geology, Mineral Resources, and Soils portion of the Mitigation Monitoring, Compliance and Reporting Program (CPUC and BLM 2009) states:

MITIGATION MEASURE G-2a: PROTECT DESERT PAVEMENT. Grading for new access roads or work areas in areas covered by desert pavement shall be avoided or minimized. If avoidance of these areas is not possible, the desert pavement surface shall be protected from damage or disturbance from construction vehicles by use of temporary mats on the surface. A plan for identification and avoidance or protection of sensitive desert pavement shall be prepared and submitted to the CPUC and BLM for review and approval at least 60 days prior to start of construction.

The main tasks associated with this mitigation measure are the following:

- 1) Prepare a plan for identification and avoidance or protection of sensitive desert pavement.
- 2) Submit plan for identification and avoidance or protection of sensitive desert pavement to the CPUC and BLM for review and approval at least 60 days prior to start of construction.
- 3) Avoid or minimize grading for new access roads or work areas in areas covered by desert pavement.
- 4) Protect desert pavement surfaces from damage or disturbance from construction vehicles by use of temporary mats on the surface.

Mitigation Measure G-2a does not specifically address restoration of temporary disturbance areas with desert pavement. However, Mitigation Measures GEO-AMP-6, V-2b and V-2c address this issue. Mitigation Measures GEO-AMP-6 states, in part, "In areas where ground disturbance is substantial or where re-contouring is required (e.g., marshaling yards, tower sites, spur roads from existing access roads), surface restoration will occur as necessary for erosion control and re-vegetation." Mitigation Measure V-2b states, in part, "Furthermore, all graded roads and areas not required for on-going operation, maintenance, or access shall be returned to pre-construction conditions." Mitigation Measure V-2c states, in part, "For non-USFS-administered land areas where views of land scars from sensitive public viewing locations are unavoidable, disturbed soils shall be treated with Eonite or similar treatments to reduce the visual contrast created by the lighter-colored disturbed soils with the darker vegetated surroundings (Eonite and Permeon are commercially available chemical treatments that "age" or oxidize rock and are used specifically for coloring concrete or rock surfaces to tone down glare and contrast and simulate naturally occurring desert varnish). SDG&E will consult with the Authorized Officer (as determined by the CPUC and BLM as appropriate) on a site-by-site basis for the use of Eonite."

Section 4.0 – PROJECT FEATURES

The Project will include many permanent and temporary features essential to construct and operate the proposed transmission line. Features include access roads, spur roads, construction yards, tower pads, tower structures, wire pull sites and underground construction (i.e., trenching). The following section describes those features that will be in areas with desert pavement.

4.1. Access and Spur Roads

Construction of the 500kV transmission structures in areas with desert pavement will require access for construction crews, materials and equipment. An existing dirt access road will be utilized to access the structures in areas with desert pavement; however, one section of the existing access road will require minor improvement for project use. There will be spur roads constructed from the existing access road to the proposed structures. Spur roads will be constructed using a bulldozer or grader, followed by a roller to compact and smooth the ground. Front-end loaders will be used to move the soil locally or offsite. Some or all of this equipment will be used to improve the existing access road. Transmission access and spur roads are typically 14 feet wide in straight sections of the road and 16 to 20 feet wide at curves to facilitate safe movement of equipment and vehicles.

Following the completion of project construction, existing and new permanent spur roads to structure in areas with desert pavement will be used by maintenance crews and vehicles for inspection and maintenance activities.

4.2. Tower Pads (i.e., Structure Sites)

All 500kV structures on BLM and private property, and therefore all of the structures in areas with desert pavement, will have a temporary 200-foot-wide by 200-foot-long workspace (all within the proposed 200-foot-wide ROW) for traditional construction. The size and disturbance in these temporary work areas will be minimized to the maximum extent possible, and all minimization measures, will be used to limit impacts. The intent is to not alter these areas beyond what is absolutely necessary to allow teams to construct foundations and erect structures. At each structure location, an area approximately 100 feet wide by 100 feet long has been designated as a permanent impact area. This area will be for parking equipment, staging materials for the structure, and construction of the foundation, and structure. The structures will occupy a 40-foot-wide by 40-foot-long area with foundations at each of the four legs for the lattice structures and a single foundation for the monopoles. Additionally, a 35-foot-wide by 75-foot-long flat graded pad will be created and maintained adjacent to some structures for future maintenance activities. This pad will only be created at structures that are accessible by road, and if the road is adjacent to the structure, a maintenance pad will not be needed.

The 500kV dead end and angle structures will have a temporary 200-foot-wide by 400-foot-long (all within the proposed 200-foot-wide ROW) area for construction. There will be a 100-foot-wide by 100-foot-long permanent impact area around the proposed structure at these locations, and the conditions will be similar to what is described above.

4.3. Tower Structures

The overhead portion of the project will require the construction of transmission support structures. Each support structure will require the installation of foundations, which are typically drilled concrete piers. First, footing holes are excavated for each structure: four holes for each lattice structure and one for each single shaft tubular steel pole and transition structure. The holes will be drilled using a truck-mounted excavator equipped with augers of various sizes depending on the diameter and depth requirements of the hole to be drilled. Each foundation will extend approximately 2 feet above the ground level, and the leg of the structure is attached to the top of the foundation.

Where solid rock is encountered, blasting, rock-hauling, or the use of a rock anchoring or micro-pile system may be required. The rock anchoring or micro-pile system will be used in areas where site access is limited or adjacent structures could be damaged as a result of blasting or rock-hauling activities. In environmentally sensitive areas, a HydroVac, which uses water pressure and a vacuum, will be used to excavate material into a storage tank. In areas where it is not possible to operate large drilling equipment due to access or environmental constraints, hand digging may be required. Reinforcing steel anchor bolt cages and concrete will be installed after excavation and prior to structure installation.

Lattice towers and steel support structures will be assembled on site, except where helicopter delivery is performed. Steel members for each structure will be delivered to the site by flatbed truck, except where helicopter delivery is performed. Assembly will be facilitated onsite by a small truck-mounted crane. Subsequent to assembly, the structures will be lifted onto the foundation using a large crane designed for erecting towers. The crane will move along the ROW access roads and spur roads as towers are erected.

4.4. Pull Sites

Following the initial stringing operation, pulling and tensioning the line will be required to achieve the correct sagging of the transmission lines between support structures. Pulling and tensioning sites will be required every 1 to 4 miles along the ROW; each pull and tensioning site may encompass approximately 1/2 to 2 acres to accommodate required equipment. Equipment for pulling and tensioning activities will include tractors and trailers with spooled reels that hold the conductors and trucks with the tensioning equipment. Pulling and tensioning sites will be located within the ROW for all tangent structures, and at angle structures the pull sites are outside the ROW in order to maintain the proper angle on the conductor.

Depending on topography, minor grading may be required at some pull sites to create level pads for equipment. To the extent possible, vegetation at the pull sites will be left in place and access to the pull sites will be via a drive and crush technique. Various types of construction vehicles are driven across existing vegetation within a pull site and they crush it, depending on the type of vegetation. Upon completion of the work the vehicles are driven out and the vegetation is allowed to grow back. It is the least damaging to the vegetation and allows for more rapid re-growth. In areas where the vegetation is removed, the altered area will be restored and re-vegetated resulting in only temporary impacts to native vegetation, with the exception of two permanent pulling sites proposed for the crossing of Interstate 8 (USFWS 2009).

Section 5.0 – IDENTIFICATION OF DESERT PAVEMENT AREAS

Mitigation measure G-2a requires the “identification and avoidance or protection of sensitive desert pavements.” It singles out desert pavements as being different from other cover types and as sensitive. Identification of desert pavements requires a clear understanding of which land features constitute desert pavement, how they differ from other land covers and how their restoration differs from general visual mitigation measures. Necessary components of pavement identification and avoidance include objective standards and data collection. This section describes those components and presents the results of field survey efforts.

5.1. Preconstruction Survey

A preconstruction survey identified proposed disturbance areas related to the project with desert pavement. The survey initially identified locations with the potential to include desert pavement, which occur in the Imperial Valley, Imperial County. The range of area surveyed was based on the climate and soil types present in the area. Soil survey data from the Natural Resources Conservation Service was available for only part of the Project ROW. This information was used, where available. These areas included parts of the Project ROW between Milepost (MP) 0 and MP 17.

5.2. Methods

This section describes the rationale for the objective standards used to identify desert pavement features. They are based on published research relating to the mapping and pedogenesis of desert pavements in the Mojave Desert. This section describes the method of measuring and recording data on the presence of desert pavement at the sites of project features.

5.2.1 Identification of Desert Pavement

Desert pavement is a feature consisting of closely packed clasts (rock fragments), lying in a layer one to two deep, on fine soils or embedded in soils several centimeters to several meters thick (Springer, 1958; Cooke, 1965, 1970; Hunt & Mabey, 1966). Desert pavements cover many slightly inclined landforms including alluvial fans, basalt flows, pluvial lake benches, and ancient alluvial terraces (Cooke *et al.*, 1993).

Wood *et al.* (2002) defined six distinct mapping units of desert cover mosaic in the Mojave Desert based on (1) surface textural parameters of clast size, (2) percent cover, and (3) sorting. Boundaries of abutting map units are visually distinct and are easily identified in the field. The article classified surfaces as desert pavement map units if the surface had greater than 65% clast cover and as bare ground map units if the surface had less than 65% clast cover. The authors further classified three map units of desert pavement and three map units of bare ground based on the surface textural parameters of clast size and sorting.

In addition to clast cover, desert pavements in the southwestern deserts of the United States often have a vesicular soil horizon that underlies the clast surface. Such pavements have a vesicular A horizon, designated Av horizon (Anderson *et al.*, 2002). The presence of a vesicular horizon under many desert pavements was recognized by Marbut (1935) as common in arid environments. Anderson *et al.* (2002) reported that Springer (1958) reproduced vesicles from sieved Av material after only five wet and dry cycles. Other reports indicate that the original Av properties of sieved soils return after 20 to 30 wetting and drying cycles; additional cycles increase the number, size, surface area, sphericity, and continuity of pores (Miller, 1971; Figueira and Stoops, 1983; Figueira, 1984).

Anderson (2002) reported that the Av horizon has a 10YR hue, high value and low chroma, reflecting the low organic matter content and slight oxidation; high silt and clay content; and columnar and platy soil structure.

“Desert Varnish” or patina is another feature of desert pavements. It forms naturally on many rock surfaces in desert environments over very long periods of time through the accumulation of iron and manganese oxides on clast surfaces (Whalley, 1983).

The criteria used in this study to identify desert pavement areas were (1) percent clast cover and (2) presence of an evident patina on clasts. It was not feasible to test soils below desert pavements for presence of a vesicular (Av) horizon. However, the presence of adequate clast cover (i.e., > 65%) was sufficient to distinguish between desert pavement mapping units and bare ground mapping units. The other criteria used by Wood et al. (2002) served only to further define types of desert pavement and types of bare ground covers.

5.2.2 **Sampling Method**

Percent clast cover was estimated using a point intercept method. It utilized a frame measuring 1 meter in length with metal tines at intervals of 5 cm. It was placed on the surface at regular intervals along a route that evenly sampled all parts of the temporary and permanent disturbance areas. For each visual reading, the total number of tine tips that intercepted clasts was recorded along with the total number of tines. Data points were not collected on previously disturbed sites. A total of twenty (20) data points were recorded for each site with an additional eight (8) data points collected for each access road. Data points that occurred on vegetation, gravel washes or otherwise disturbed areas were excluded from calculations of average cover and standard deviation of the mean for that site.

All of the areas sampled occur within Imperial Valley near SDG&E’s Imperial Valley Substation between MP 0 and MP 17. Locations of proposed tower sites and proposed access roads were identified with a Garmin eTrex Vista[®] H Global Positioning System (GPS) with 10m accuracy. Engineering stakes on each site were used as points of reference to estimate boundaries.

5.3. **Results**

A total of seventeen (17) sites were considered potential sites for desert pavement initially. Four of those sites (EP308, EP309, EP336 and EP337) are located in areas designated for OHV recreational use and were removed from consideration for restoration. Two additional sites were heavily damaged by previous disturbance activity (EP328-1, EP342) and therefore not considered for special restoration efforts. Six (6) of the remaining sites had more than 65% clast cover, two (2) of which lacked rock patina. Five sites had less than 65% clast cover but desert patina was evident on clast surfaces. Only these eleven (11) sites are considered for pavement restoration. The eleven features with desert pavement or patina include nine (9) tower sites, two (2) pull sites and eleven (11) short spur roads, one at each site. Table 1 presents the estimated clast cover as measured by point intercept sampling and the standard deviation of the mean for each site. Table 1 indicates the presence of an observable desert patina on the clasts and summarizes expected disturbance acreage estimates for each feature.

Some disturbance areas within the project right-of-way have rock mulch cover that is less than 65%, but the mulch has a noticeable patina. The presence of a noticeable patina was used as one criterion to identify areas for mitigation, even though some are not truly desert pavement. Areas with greater than 65% clast cover were selected for mitigation even though no patina was evident. Sites in the designated OHV area are not included in disturbance calculations and no mitigation of impacts to desert pavements is planned for these sites.

Areas of sensitive cultural resources have been identified in areas near this portion of the Project ROW. Appropriate mitigation measures will be applied to avoid, protect or recover cultural resources according to the Historic Properties Management Plan.

Table 1. Summary of Desert Pavement Areas and Disturbances

Between Mileposts	Structure Number	Percent Cover	S.D.	n	Patina	Temporary Disturbance (acres)	Permanent Disturbance (acres)
5 and 6	EP347	41	22	28	Yes	0.64	0.48
	EP346	33	18	28	Yes	0.60	0.40
6 and 7	EP345	91	11	28	Yes	0.61	0.51
	EP344	45	24	28	Yes	0.64	0.47
	EP343	60	26	28	Yes	0.67	0.53
	EP343 – Pull Site	75	25	22	No	2.84	0.00
7 and 8	EP341	84	19	28	No	0.62	0.44
	EP340	82	13	26	Yes	0.58	0.45
	EP339	70	16	24	Yes	0.65	0.53
8 and 9	EP338	84	12	28	Yes	0.63	0.40
	EP338 – Pull Site	60	27	28	Yes	2.17	0.00
<i>Total Acres</i>						<i>10.65</i>	<i>4.21</i>

Section 6.0 – AVOIDANCE AND MINIMIZATION OF DESERT PAVEMENT DISTURBANCE

There are a number of avoidance measures included in the Record of Decision (BLM, 2008) that relate to the project in general and to specific resources, such as desert pavement areas. Other mitigation measures provide for avoidance of areas outside the immediate construction sites. Project Mitigation Measures and Applicant Proposed Measures that will avoid and minimize disturbance to desert pavement are cited below and included in Appendix A of this Plan.

Mitigation Measures that require avoidance or minimization of disturbance include the following:

B-1a	BIO-APM-23	G-CM-1	G-CM-26
B-1c	G-2a	G-CM-4	G-CM-31
B-2a	GEO-APM-1	G-CM-6	G-CM-43
B-7b	GEO-APM-2	G-CM-11	G-CM-44
BIO-APM-2	GEO-APM-5	G-CM-12	G-CM-46
BIO-APM-3	LU-APM-6	G-CM-14	
BIO-APM-4	V-2a	G-CM-15	
BIO-APM-6	V-2b	G-CM-21	
BIO-APM-18	V-2c	G-CM-23	
BIO-APM-20	WQ-APM-15	G-CM-25	

Protection of these areas can be mitigated through a combination of techniques appropriate to each site. The techniques are:

- 1) tower placement
- 2) travel restrictions
- 3) flagging and fencing area
- 4) monitoring
- 5) avoiding desert pavement, and
- 6) using the right sized equipment.

6.1. Placement of Towers

The placement of towers and power lines for the “Final Environmentally Superior Southern Route” and illustrated in the April 30, 2010 Mapbook submitted to the CPUC on May 14, 2010, was designed to minimize overall project environmental impacts as required by the mitigation measures, as well as satisfy engineering and routing constraints. At this time, there is no additional opportunity for adjusting tower locations to further reduce disturbance of desert pavement. Disturbance areas throughout the project will be minimized during construction.

6.2. Restricted Travel

All vehicular traffic and foot traffic will be restricted to the designated limits of the project. Except when not feasible due to physical or safety constraints, all project vehicle movement will be restricted to existing access roads and new access roads constructed as part of the project. Access routes are determined in advance of construction.

6.3. Flagging and Fencing

Prior to construction, appropriate flagging or fencing will delineate work area boundaries. This will clearly alert construction workers of boundary locations. Flagging or fencing is required by a number of mitigation measures.

6.4. Monitors

Environmental monitors will assist in placement of flagging. They will observe, document and report the level of compliance according to the approved monitoring plan (submitted to CPUC in compliance with P-1a on 5/10/2010).

6.5. Avoidance of Desert Pavement

To the extent feasible, construction activities will avoid disturbance of desert pavements. Construction crews will plan work to limit impacts to the designated areas.

In accordance with mitigation measures VR-APM-3 and LU-APM-10 (see Appendix A), placement of structures in the Project ROW was designed within or parallel to existing utility and transportation corridors to minimize surface disturbances by allowing for sharing of access and spur roads between facilities.

6.6. Use Appropriately-sized Equipment

Damage to desert pavements will be avoided by selecting and using construction equipment that is appropriately sized for each portion of the work. Use of larger and heavier equipment than needed would result in larger areas of damage and greater compaction and shearing disturbance of soils. It would produce greater trauma to plants and other habitat components.

Section 7.0 – PROTECTION OF DESERT PAVEMENTS

Mitigation Measure G-2a states, in part, “If avoidance of these areas is not possible, the desert pavement surface shall be protected from damage or disturbance from construction vehicles by use of temporary mats on the surface.”

Environmental monitors will work with construction supervisors to identify those areas of desert pavement that cannot be avoided. Wherever feasible and safe, contractors will install temporary protective mats prior to any activity that would result in disturbance of desert pavement areas.

Section 8.0 – RESTORATION OF DESERT PAVEMENT

In some project locations, the surface is too uneven to allow for matting and the topographic relief must be leveled in order for equipment to access the site and to erect the structures. Placement of mats on uneven surfaces may pose safety threats for operators of cranes and other heavy equipment.

Avoiding or protecting desert pavements and rock mulches in these areas with the use of construction mats is not feasible or safe. Project Mitigation Measures and Applicant Proposed Measures that call for restoration throughout the project are cited below and included in Appendix A of this Plan.

Mitigation measures referring to restoration include the following:

AG-1b	BIO-APM-25	G-CM-6
B-1a	V-2b	G-CM-16
BIO-APM-15	V-2c	G-CM-21
BIO-APM-19	GEO-APM-5	G-CM-22
BIO-APM-22	GEO-APM-6	G-CM-30
BIO-APM-23		

Damage to these areas can be mitigated through a combination of techniques appropriate to each site. The techniques are:

- 7) rock mulch salvage,
- 8) contouring,
- 9) watering,
- 10) application of safe rock colorants (i.e., Permeon® or equivalent), and
- 11) tilling.

8.1. Rock Mulch Salvage

Rock mulch salvage is the collection and stockpiling of surface rock mulch prior to grading. Grading equipment can accumulate the rock mulch in windrows or stockpiles within the temporary disturbance area of each site. After construction and appropriate contouring of the site, mulch will be applied to the surface. It may be advantageous to leave any surface fines mixed with rock mulch for application to the surface (see 8.3 below).

8.2. Contouring

Grading will change site contours and may change the natural drainages of the disturbance sites. Temporary disturbance areas will be restored to conform to natural drainages prior to application of rock mulch. This can be accomplished by hand tools, motorized grading equipment or a combination of both techniques.

8.3. Watering

As described above in Section 5.0 – Identification of Desert Pavement Areas, vesicular horizons reconstitute through a series of wetting and drying cycles. Springer (1958) reportedly reproduced vesicles from sieved Av material after only five wet and dry cycles. This process depends on the particle structure of the soil material.

The watering process would have a number of benefits. Fines salvaged along with the surface clasts would have the appropriate characteristics, if a vesicular horizon is present. Watering the disturbance

area after applying rock mulch (see 8.1) would wash fines from the clast surfaces, reduce wind erosion of the Av horizon materials, and begin to re-establish any Av horizon vesicular structure that may have been present before disturbance. A series of up to five (5) wetting and drying cycles would likely accelerate this natural process (see discussion in 5.2.1). Wetting can be accomplished by use of water trucks already present on the site for dust suppression.

8.4. Rock Colorant

The use of colorants to simulate desert varnish disguises disturbed sites when viewed from a distance (Marble, 1985). Spraying rock surfaces with formulations to approximate surrounding natural patina reduces the visual impacts of disturbance. This can reduce the likelihood of attracting additional disturbance activities by recreationists or other casual users. Colorants contain manganese and iron cations that react with various anions to form the respective salts on surfaces. These compounds are chemically similar to natural rock patina. It is particularly useful where rock surfaces have been broken or rock clasts have been turned over to expose a non-patina undersurface or a calcium carbonate deposit.

Product selection should consider the effects of each product on plants. Marble (1985) reported that some formulations destroy plants in a matter of minutes. The product selected should have a nearly neutral pH, no toxic substances and be of sufficient concentration and appropriate formulation to provide a durable colorant deposit (i.e., Permeon® or equivalent.)

8.5. Tilling

Raking is often used to restore damaged desert pavement or distribute rock mulch. James R. Marble reports that his field trials in 2009 showed certain types of soil improvement implements with rotating tines are effective implements for restoring desert pavement or rock mulch with minimal soil impacts, such as those formed by few or light passes of vehicles or pedestrians, especially in areas without trampled vegetation or minimally compacted soil (James R. Marble, personal communication, May 2010). These tools generally consist of a long handle attached to a bar with a series of rotating tined wheels (i.e., Garden Weasel® or Hound Dog® garden cultivators, or similar tools). Rotating hand cultivators lift imbedded clasts from soil surfaces with minimal rearrangement of soil materials and less lateral redistribution of soil materials than raking. The appearance is restored with little effort. The surface appearance is nearly natural immediately. Appearance is further improved by subsequent watering. Water removes clinging soil particles from upper surfaces of rocks and transports them downward, reforming the soil surface below the rock layer.

Rakes and other hand tools (i.e., rakes, shovels, hoes, etc.) may be appropriate in some areas in combination with rotary tilling. Hand tools would be useful where motorized equipment has roughly applied rock mulch. Work crews with hand tools can knock down berms and smooth mulch distribution. Crews can move heavy deposits of rock mulch with greater ease by using hand tools than by tilling with rotating hand cultivators. However, the appearance of raked surfaces with parallel lines from rake tines may be improved by subsequent hand rotary tilling to remove rake marks and to separate rock materials from fine soil materials. Further improvements may result from watering (see 8.3). The appropriate combination of treatments for each area will depend on the extent of damage and the type of damage from construction activities. The restoration specialist selected by SDG&E will include this in the post-construction survey and apply those treatments to each area.

Section 9.0 – REFERENCES

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Appendix A: Mitigation Measures and Conservation Measures Requiring Disturbance Avoidance, Minimization, and Restoration

Items highlighted in yellow are Avoidance/Minimization Measures. Items highlighted in green are Restoration Measures.

Measures	Task Title	Task Text
<i>Mitigation Measures</i>		
AG-1b: Restore compacted soil.	Restore disturbed soils 30 days after completion of construction clean-up	The Applicant shall restore soils compacted or disturbed such as by excavation during construction by conferring with the property owner or tenant to identify and then implement a mutually agreed means to restore such soils. Restoration actions may include, but are not be limited to, disking, plowing, removal of excavated soil, or other suitable restoration methods. This shall occur thirty (30) days after completion of construction clean-up and site restoration at each property.
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Locate surface disturbing components in previously disturbed areas	Surface-disturbing components of the project shall be located in previously disturbed areas or where habitat quality is poor to the extent possible, and disturbance of vegetation and soils shall be minimized.
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Use construction mats to minimize disturbance	Temporary construction mats may be used to minimize vegetation and soil disturbance only where deemed appropriate by the qualified biologist (see Mitigation Measure B-1c). The construction mats shall not be left on the ground for more than three weeks. Use of construction mats shall be considered a temporary impact to vegetation and shall be mitigated in accordance with this mitigation measure.
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Restore sensitive vegetation communities to pre-construction conditions	If avoidance of sensitive vegetation communities is not feasible due, for example, to physical or safety constraints, the Applicant shall restore temporarily impacted areas to pre-construction conditions following construction (or emergency repairs) and shall permanently block off all public access to them, and/or shall purchase/dedicate suitable habitat for preservation to off-set permanently impacted areas. Restoration of some vegetation communities in temporarily impacted areas may not be possible if those areas are subject to vegetation management to maintain proper clearance between transmission lines and vegetation. In those instances, the mitigation shall consist of off-site acquisition and preservation of the vegetation community instead. Any area that can be preserved as intact or restored habitat, or if it contains any species (plant or animal) that require project-related compensatory mitigation will qualify as offsite mitigation lands. Restoration involves recontouring the land, replacing the topsoil (if it was collected), planting seed and/or container stock, and maintaining (i.e., weeding, replacement planting, supplemental watering, etc.) and monitoring the restored area for a period five years (or less if the restoration meets all success criteria). The success of the restoration is usually based on how the habitat compares with similar, nearby, undisturbed habitat. Any restoration efforts would be subject to a Habitat Restoration Plan approved by the CPUC, BLM, Wildlife Agencies, State Parks (for restoration in ABDSP), and USDA Forest Service (for alternatives with restoration on National Forest lands). The mitigation ratios also apply to impacts from emergency repairs.
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Delineate all limits of construction	All limits of construction shall be delineated with orange construction fencing. (Per the APRIL 1, 2010 version of the MMCRP, "Flagging is acceptable as a delineation method instead of orange fencing. Orange fencing can be limited to unique situations.")

Appendix A: Mitigation Measures and Conservation Measures Requiring Disturbance Avoidance, Minimization, and Restoration

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Measures	Task Title	Task Text
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Provide funding for off-road vehicle patrols	To control unauthorized use of project access roads by off-road vehicle enthusiasts, SDG&E shall provide funding to land management entities responsible for areas set aside for habitat conservation to provide for off-road vehicle enforcement patrols. The responsible land management entities will formulate what funding is reasonable to control unauthorized use of project access roads.
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Mitigate for impacts by unauthorized activity	Any impacts associated with unauthorized activity (e.g., exceeding approved construction footprints) shall be mitigated at a 5:1 ratio (5.5:1 in FTHL MA). Restoration of the unauthorized impacts shall be credited at a 1:1 ratio (i.e., mitigated by in-place habitat restoration); the remaining 4:1 (or 4.5:1 in FTHL MA) shall be acquired off site.
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Submit a Habitat Restoration Plan	Areas to be restored shall include all areas temporarily impacted by construction, such as tower construction sites, laydown/staging areas, temporary access and spur roads, and existing tower locations where towers are removed. Where onsite restoration is planned, the Applicant shall identify a qualified Habitat Restoration Specialist to be approved by the CPUC, BLM, State Parks (for restoration in ABDSP), USDA Forest Service (for alternatives with restoration on National Forest lands), and the Wildlife Agencies. The Habitat Restoration Specialist shall prepare and implement a Habitat Restoration Plan, for restoring temporarily impacted sensitive vegetation communities, to be approved by the CPUC, Wildlife Agencies, BLM, State Parks (for ABDSP restoration), and USDA Forest Service (for National Forest land restoration). The Applicant shall work with the CPUC, BLM, Wildlife Agencies, and State Parks until a plan is approved by all. This Habitat Restoration Plan must be approved in writing by the above-listed agencies prior to the initiation of any vegetation disturbing activities. Hydroseeding, drill seeding, or an otherwise proven restoration technique shall be utilized on all disturbed surfaces using a locally endemic native seed mix approved by the CPUC, Wildlife Agencies, BLM, State Parks (for ABDSP restoration), and USDA Forest Service (for National Forest land restoration). The Habitat Restoration Plan shall incorporate Desert Bioregion Revegetation/Restoration Guidance measures for restoration of temporary impacts to desert scrub and dune habitats. These measures generally include alleviating soil compaction, returning the surface to its original contour, pitting or imprinting the surface to allow small areas where seeds and rain water can be captured, planting seedlings that have acquired the necessary root mass to survive without watering, planting seedlings in the spring with herbivory cages, broadcasting locally collected seed immediately prior to the rainy season, and covering the seeds with mulch. The Habitat Restoration Plan shall incorporate the measures identified in the May 25, 2006 Memorandum of Understanding among Edison Electric Institute, USDA Forest Service, BLM, USFWS, National Park Service, and the Environmental Protection Agency (Edison Electric Institute, et al., 2006) where applicable. The MOU discusses vegetation management along ROWs for electrical transmission and distribution facilities on federal lands. The major provisions of the MOU include reducing soil erosion and water quality impacts; promoting local ecotypes in revegetation projects; planting native species and protecting rare species; and reducing the introduction of non-native, invasive or noxious plant species to the ROWs. The MOU can be viewed online at http://www.eei.org/industry_issues/environment/land/vegetation_management/EEI_MOU_FINAL_5_25_06.pdf .

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Measures	Task Title	Task Text
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Maintain and monitor habitat restoration for 5 years	The restoration of habitat shall be maintained and monitored for five years after installation by an experienced, licensed Habitat Restoration Contractor, or until established success criteria identified in the Restoration Plan (specified percent cover of native and non-native species, species diversity, and species composition as compared with an undisturbed reference site) are met. Maintenance and monitoring for restoration in ABDSP shall be for a minimum of five years, even if established success criteria are met before the end of five years. Maintenance and monitoring shall be conducted following a prescribed schedule to assess progress and identify potential problems with the restoration. Remedial action (e.g., additional planting, weeding, erosion control, use of container stock, supplemental watering, etc.) shall be taken by an experienced, licensed Habitat Restoration Contractor during the maintenance and monitoring period if necessary to ensure the success of the restoration. If the restoration fails to meet the established success criteria after the maintenance and monitoring period, maintenance and monitoring shall extend beyond the five-year period until the criteria are met or unless otherwise approved by the CPUC, BLM, State Parks (for ABDSP restoration), USDA Forest Service (for alternatives with restoration on National Forest lands), and the Wildlife Agencies.
B-1a: Provide restoration/compensation for impacted sensitive vegetation communities.	Maintain and monitor all restoration for 10 years	All restoration shall be maintained and monitored for a minimum of 10 years. The restoration shall be directed according to a Habitat Restoration Plan approved by the CPUC, BLM, State Parks (for ABDSP restoration), USDA Forest Service (for National Forest land restoration), and the Wildlife Agencies.
B-1c: Conduct biological monitoring.	Provide biological monitoring and perform periodic inspections once or twice a week	Monitoring shall be provided by a qualified biologist approved by the CPUC, BLM, State Parks (for monitoring in ABDSP), USDA Forest Service (for alternatives that require monitoring on National Forest lands), and the Wildlife Agencies to ensure that all impacts occur within designated limits. Monitoring entails communicating with contractors, taking daily notes, and ensuring that the requirements of the APMs and mitigation measures are being met by being present during construction activities including all initial grubbing and clearing of vegetation. A qualified biologist employed by SDG&E shall be present during maintenance involving ROW repair requiring ground disturbance (i.e., grading/repair of access road and work areas and spot repair of areas subject to flooding or scouring). Biological monitoring of these maintenance activities is to prevent impacts to vegetation communities or wildlife habitat not within the permanent project impact footprint or to record and report unauthorized impacts outside the footprint to the CPUC, BLM, State Parks (for monitoring in ABDSP), USDA Forest Service (for alternatives that require monitoring on National Forest lands), and the Wildlife Agencies to ensure the unauthorized impacts are mitigated in accordance with Mitigation Measure B-1a. The qualified biologist shall conduct monitoring for any area subject to disturbance from construction and the maintenance activities listed above (or access roads used during maintenance activities in the case of vernal pools/water-holding basins; see Mitigation Measure B-1b). The qualified biologist shall perform periodic inspections of construction once or twice per week, as defined by the Wildlife Agencies, depending on the sensitivity of the resources.
B-1c: Conduct biological monitoring.	Send weekly monitoring reports	The qualified biologist shall send weekly monitoring reports to the CPUC and BLM and shall record any reduction or increase in construction impacts so that mitigation requirements can be revised accordingly. The final impact/mitigation calculations shall be submitted to the CPUC, BLM, State Parks (for monitoring in ABDSP), USDA Forest Service (for alternatives that require monitoring on National Forest lands), and the Wildlife Agencies for review and approval.

Appendix A: Mitigation Measures and Conservation Measures Requiring Disturbance Avoidance, Minimization, and Restoration

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Measures	Task Title	Task Text
B-1c: Conduct biological monitoring.	Send annual monitoring reports	The qualified biologist shall send annual monitoring reports of maintenance activities to the CPUC, BLM, State Parks (for monitoring of maintenance activities in ABDSP), and USDA Forest Service (for alternatives that require monitoring of maintenance activities on National Forest lands) that describe the types of maintenance that occurred, at what locations they occurred, and whether or not there were unauthorized impacts that require mitigation.
B-1c: Conduct biological monitoring.	Qualified biologists shall handle all environmental issues and have the authority to issue stop work orders	The Applicant, its contractors and subcontractors, and their respective project personnel, shall refer all environmental issues, including wildlife relocation, sick or dead wildlife, hazardous waste, or questions about environmental impacts to the qualified biologist. Experts in wildlife handling (e.g., Project Wildlife) may need to be brought in by the qualified biologist for assistance with wildlife relocations. The qualified biologist shall immediately notify the CPUC, BLM, State Parks (for monitoring in ABDSP), USDA Forest Service (for alternatives that require monitoring on National Forest lands), the Wildlife Agencies, and SDG&E of any significant events, including impacts outside the construction zone or maintenance impacts outside the authorized permanent impact footprints if they are discovered during construction or monitoring of maintenance activities. The qualified biologist shall have the authority to issue stop work orders if any part of the mitigation measures or APMs are being violated. Reinitiation of work following a stop work order shall only occur when the CPUC, BLM, State Parks (for impacts in ABDSP), USDA Forest Service (for alternatives with impacts on National Forest lands), and the Wildlife Agencies are satisfied that the impacts have been fully documented, that compensation for these impacts shall be made, and that any additional protection measures they deem necessary shall be undertaken.
B-2a: Provide restoration / compensation for impacted jurisdictional areas.	Delineate all limits of construction	All limits of construction shall be delineated with orange construction fencing and/or silt fencing. (Per the APRIL 1, 2010 version of the MMRP, "Flagging is acceptable as a delineation method instead of orange fencing. Orange fencing can be limited to unique situations.")
B-7b: Implement avoidance/ mitigation/ compensation according to the Flat-Tailed Horned Lizard Rangewide Management Strategy.	Mitigate impact by following all applicable measures in the Flat-Tailed Horned Lizard Rangewide Management Strategy	Mitigation for impacts to the FTHL shall follow all applicable measures in the Flat-Tailed Horned Lizard Rangewide Management Strategy (Flat-Tailed Horned Lizard Interagency Coordinating Committee, 2003). This mitigation includes, but is not limited to, locating impacts outside of MAs, delineating work limits, using existing roads, biological monitoring, and worker education. According to the Flat-Tailed Horned Lizard Rangewide Management Strategy (Flat-Tailed Horned Lizard Interagency Coordinating Committee, 2003), compensation for FTHL habitat impacts could involve purchase of FTHL habitat and/or monetary compensation as determined by the Flat-Tailed Horned Lizard Interagency Coordinating Committee. Impacts shall be mitigated at a 1:1 ratio for habitat outside a MA. Mitigation inside a MA shall be at a 3.5:1 ratio for temporary impacts (2.5:1 for disturbed habitat, developed land, or agriculture) and a 5.5:1 ratio for permanent impacts (4.5:1 for disturbed habitat, developed land, or agriculture). For the Proposed Project, the required mitigation for FTHL impacts (if offsite acquisition is the method of compensation) is 403.48 acres. On-site restoration requirements for the Project would be 232.84 acres. Any FTHL habitat acquired shall be approved by the Flat-Tailed Horned Lizard Interagency Coordinating Committee, CPUC, BLM, Wildlife Agencies, and State Parks (for land in ABDSP)

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Measures	Task Title	Task Text
BIO-APM-2: Compliance Training	Environmental training prior to construction	Prior to construction, all SDG&E's contractors, subcontractors and project personnel shall receive training regarding the appropriate work practices necessary to effectively implement the biological APMs and to comply with the applicable environmental laws and regulations including appropriate wildlife avoidance, and impact minimization procedures, the importance of these resources and the purpose and necessity of protecting them; and methods for protecting sensitive ecological resources.
BIO-APM-3: Access roads	Restrict vehicle movement to existing access roads	Except when not feasible due to physical or safety constraints, all project vehicle movement shall be restricted to existing access roads and access roads constructed as a part of the project and determined and marked by SDG&E in advance for the contractor, contractor-acquired accesses, or public roads.
BIO-APM-3: Access roads	Observe a 15 mph speed limit on dirt access roads	In addition to regular watering to control fugitive dust created during clearing, grading, earth-moving, excavation, and other construction activities which could interfere with plant photosynthesis, a 15-mile-per-hour speed limit shall be observed on dirt access roads to reduce dust and allow reptiles and small mammals to disperse.
BIO-APM-4: Project area limits	Restrict project activity to disturbance areas	The area limits of project construction and survey activities would be predetermined based on the temporary and permanent disturbance areas noted on the final design engineering drawings, with activity restricted to and confined within those limits.
BIO-APM-4: Project area limits	Keep survey vehicles on existing roads	Survey personnel shall keep survey vehicles on existing roads.
BIO-APM-6: Environmental compliance	Comply with all applicable environmental laws and regulations	In the construction, operation, and maintenance of the project, SDG&E shall comply with all applicable environmental laws and regulations, including, without limitation, those regulating and protecting wildlife and its habitat.
BIO-APM-18: Sensitive features	Design structures and access roads to minimize impacts to sensitive features	In areas designated as sensitive by SDG&E or the resource agencies, to the extent feasible structures and access roads would be designed to minimize impacts to sensitive features. These areas of sensitive features include but are not limited to high value wildlife habitats, sensitive vegetation communities, and high value plant habitats, and/or to allow conductors to clearly span the features, within limits of standard structure design. If the sensitive features cannot be completely avoided, structures and access roads would be placed to minimize the disturbance to the extent feasible.
BIO-APM-19	Implement and comply with BLM mitigation measures	Restoration and habitat enhancement and mitigation measures developed during the consultation period with the BLM under Section 7 of the Endangered Species Act (ESA) would be implemented and complied with as specified in the Biological Opinion (BO) of the USFWS. The Section 7 process would be used to obtain an incidental take authorization through a compensation-based mitigation program for permanent impacts to occupied sensitive plant and animal habitat at a ratio of 1:1 or 2:1 based on site-specific studies, as outlined in BIO-APM-1. The Section 7 process may include consideration of SDG&E's existing NCCP mitigation credits as compensation for project impacts.

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Measures	Task Title	Task Text
BIO-APM-20: Re-contouring	Leave vegetation in place where re-contouring is not required	In construction areas where re-contouring is not required, vegetation shall be left in place wherever possible to avoid excessive root damage and allow for re-sprouting.
BIO-APM-22	Salvaging may include removal and stockpiling for replanting	Species identified as sensitive by the land managing agency shall be salvaged where avoidance is not feasible in accordance with state law. Generally, salvage may include: <ul style="list-style-type: none"> • removal and stockpiling for replanting on site, • removal and transplanting out of surface disturbance area, • removal and salvage by private individuals, • removal and salvage by commercial dealers, or • any combination of the above.
BIO-APM-23: Vegetation and topsoil disturbance	Remove only minimum amount of vegetation necessary for construction	Only the minimum amount of vegetation necessary for the construction of structures and facilities will be removed.
BIO-APM-23: Vegetation and topsoil disturbance	Conserve topsoil in areas of sensitive habitat	Topsoil located in areas containing sensitive habitat shall be conserved during excavation and reused as cover on disturbed areas to facilitate re-growth of vegetation. Topsoil located in developed or disturbed areas is excluded from this APM.
BIO-APM-25: Revegetation	Revegetate disturbed soils	Disturbed soils shall be revegetated.
G-2a: Protect desert pavement.	Avoid or minimize desert pavement grading	Grading for new access roads or work areas in areas covered by desert pavement shall be avoided or minimized. If avoidance of these areas is not possible, the desert pavement surface shall be protected from damage or disturbance from construction vehicles by use of temporary mats on the surface.
G-2a: Protect desert pavement.	Submit a plan to identify and protect desert pavement 60 days prior to construction	A plan for identification and avoidance or protection of sensitive desert pavement shall be prepared and submitted to the CPUC and BLM for review and approval at least 60 days prior to start of construction.
GEO-APM-1: Existing access roads	No widening or grading of existing access roads if soil is sensitive to disturbance	No widening or upgrading of existing access roads will be undertaken where soils are very sensitive to disturbance, except repairs, widening or upgrades necessary to make roads passable.

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Measures	Task Title	Task Text
GEO-APM-2: Minimize soil disturbance	Minimize soil disturbance or return to pre-construction contours and condition	<ol style="list-style-type: none"> 1. Vehicle and construction equipment use will be restricted to access roads and areas in the immediate vicinity of construction work sites to help reduce soil disturbance. 2. In agricultural areas, topsoil would be left in roughened condition. 3. When practical, construction activities will be avoided on wet soil to reduce the potential for soil compaction, rutting, and loss of soil productivity. 4. Disturbed areas will be returned to their pre-construction contours and allowed to re-vegetate naturally, or will be reseeded with an appropriate seed mixture if necessary. 5. Affected landowners having property directly impacted by the project will be compensated to disc or till soil upon construction completion. 6. Construction of access roads in inaccessible terrain will be reduced by using helicopters to place structures in select locations.
GEO-APM-5	Implement construction to avoid or minimize new soil disturbance	Project construction activities shall be designed and implemented to avoid or minimize new disturbance, erosion on manufactured slopes, and off-site degradation from accelerated sedimentation. Maintenance of cut and fill slopes created by project construction activities would consist primarily of erosion repair.
GEO-APM-5	Implement construction to avoid or minimize new soil disturbance	Where re-vegetation is necessary to improve the success of erosion control, planting or seeding with native seed mix would be done on slopes.
GEO-APM-6: Surface restoration	Perform surface restoration for erosion control and re-vegetation	In areas where ground disturbance is substantial or where re-contouring is required (e.g., marshaling yards, tower sites, spur roads from existing access roads), surface restoration will occur as necessary for erosion control and re-vegetation. The method of restoration will normally consist of returning disturbed areas back to their original contour, reseeding (if required), installing cross drains for erosion control, placing water bars in the road, and filling ditches for erosion control. Potential for erosion will be minimized on access roads and other locations primarily with water bars. The water bars will be constructed using mounds of soil shaped to direct the flow of runoff and prevent erosion. Soil spoils created during ground disturbance or re-contouring shall be disposed of only on previously disturbed areas, or used immediately to fill eroded areas. Cleared vegetation can be hauled off-site to a permitted disposal location, or may be chipped or shredded to an appropriate size and spread in disturbed areas of the ROW with the approval of the biological monitor. To limit impact to existing vegetation, appropriately sized equipment (e.g., bulldozers, scrapers, backhoes, bucket-loaders, etc.) will be used during all ground disturbance and re-contouring activities.
LU-APM-6: Limits of construction	Restrict and confine activity within limits of construction	The limits of construction activities within and outside the ROW will typically be predetermined, with activity restricted to and confined within those limits.

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Measures	Task Title	Task Text
LU-APM-6: Limits of construction	Provide flagging for environmentally sensitive areas	The ROW boundary and limits of construction activity inside and outside the ROW will be flagged in environmentally sensitive areas to alert construction personnel that those areas should be minimize or avoided.
V-2a: Reduce in-line views of land scars.	Construct access and spur roads at appropriate angles	Construct access or spur roads at appropriate angles from the originating, primary travel facilities to minimize extended, in-line views of newly graded terrain. Contour grading should be used where possible to better blend graded surfaces with existing terrain.
V-2a: Reduce in-line views of land scars.	Consult with visual resources specialist to evaluate access road visibility prior to final design	All proposed new access roads shall be evaluated for their visibility from sensitive viewing locations prior to final design. Prior to final design, SDG&E shall consult with a visual resources specialist representing the CPUC and BLM and a qualified biologist to identify the following: <ul style="list-style-type: none"> • Definition of access roads with sensitive viewing areas from which visibility of access roads is a concern. • Approximate location and length of alternative access road routes if straight line roads are not used. Define habitat affected and steepness of terrain for consideration of habitat and erosion impacts. The biologist and visual resources specialist shall confirm that the overall impacts of the alternate access road are less than that of the original access road design. • “Drive and crush” access is a feasible measure for avoiding access road scars (i.e., no grading or vegetation removal is required). If this means of access is to be used, SDG&E shall define frequency of driving and vehicle types such that a biologist confirms that vegetation would be likely to recover.
V-2a: Reduce in-line views of land scars.	Submit table 60 days prior to construction	A table shall be submitted to the CPUC and BLM for review and approval at least 60 days before the start of construction to document towers for which this measure is applied, and the proposed resolution for each access road (i.e., retain straight line roads due to greater impacts from alternative routes, use “drive and crush” access, or develop alternate access road route).
V-2a: Reduce in-line views of land scars.	Submit final construction plans 60 days prior to construction	SDG&E shall submit final construction plans demonstrating compliance with this measure to the CPUC and BLM, as well as the Forest Service and Anza-Borrego Desert State Park (as appropriate), for review and approval at least 60 days prior to the start of construction.
V-2b: Reduce visual contrast from unnatural vegetation lines.	Revegetate boundaries of disturbed areas	In those areas where views of land scars are unavoidable, the boundaries of disturbed areas shall be aggressively revegetated to create a less distinct and more natural-appearing line to reduce visual contrast.
V-2b: Reduce visual contrast from unnatural vegetation lines.	Return graded roads to pre-construction conditions	All graded roads and areas not required for on-going operation, maintenance, or access shall be returned to pre-construction conditions.
V-2b: Reduce visual contrast from unnatural vegetation lines.	Create barriers for public access if opened as a construction route	In those cases where potential public access is opened by construction routes, SDG&E shall create barriers or fences to prevent public access and patrol construction routes to prevent vandalized access and litter clean-up until all vegetation removed returns to its pre-project state.

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Measures	Task Title	Task Text
V-2b: Reduce visual contrast from unnatural vegetation lines.	Submit final construction and restoration plans 60 days prior to construction	SDG&E shall submit final construction and restoration plans demonstrating compliance with this measure to the BLM and CPUC, as well as Forest Service and Anza-Borrego Desert State Park (as appropriate), for review and approval at least 60 days prior to the start of construction.
V-2c: Reduce color contrast of land scars on non-Forest lands.	Treat disturbed soils visible from sensitive public viewing locations	For non-USFS-administered land areas where views of land scars from sensitive public viewing locations are unavoidable, disturbed soils shall be treated with Eonite or similar treatments to reduce the visual contrast created by the lighter-colored disturbed soils with the darker vegetated surroundings (Eonite and Permeon are commercially available chemical treatments that “age” or oxidize rock and are used specifically for coloring concrete or rock surfaces to tone down glare and contrast and simulate naturally occurring desert varnish). SDG&E will consult with the Authorized Officer (as determined by the CPUC and BLM as appropriate) on a site-by-site basis for the use of Eonite.
V-2c: Reduce color contrast of land scars on non-Forest lands.	Submit final construction and restoration plans 60 days prior to construction	SDG&E shall submit final construction and restoration plans demonstrating compliance with this measure to the BLM and CPUC, as well as Anza-Borrego Desert State Park (as appropriate), for review and approval at least 60 days prior to the start of construction.
WQ-APM-15: Construction access routes	Clearly mark approved construction traffic routes	To minimize ground disturbance, construction traffic routes will be clearly marked with temporary markers such as easily visible flagging. Construction routes, or other means of avoidance, must be approved by the appropriate agency or landowner before use.

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Measures	Task Title	Task Text
<i>Conservation Measures</i>		
G-CM-1: Biological monitoring during construction.	Provide biological monitoring and perform periodic inspections once or twice a week	<p>A qualified biologist will monitor all work areas to ensure that all impacts occur within designated limits. Monitoring entails communicating with contractors, taking daily notes, and ensuring that the requirements of the Conservation Measures are met by being present during construction activities including all initial grubbing and clearing of vegetation. The qualified biologist will conduct monitoring for any area subject to disturbance from construction activities. The qualified biologist will perform periodic inspections of construction once or twice per week, as defined by the Wildlife Agencies (the Service and CDFG, collectively), depending on the sensitivity of the resources. The qualified biologist will send weekly monitoring reports to the CPUC and BLM and will record any reduction or increase in construction impacts so that compensation requirements can be revised accordingly. The final impact calculations will be submitted to the CPUC, BLM, USFS (for sections of the Project that require monitoring on National Forest lands), and Wildlife Agencies for review and approval.</p> <ul style="list-style-type: none"> • SDG&E, its contractors and subcontractors, and their respective project personnel, will refer all environmental issues, including wildlife relocation, sick or dead wildlife, hazardous waste, or questions about environmental impacts to the qualified biologist. Experts in wildlife handling (e.g., Project Wildlife) may need to be brought in by the qualified biologist for assistance with wildlife relocations. • The qualified biologist will have the authority to issue stop work orders if any part of the Conservation Measures are being violated. The qualified biologist will immediately notify the CPUC, BLM, USFS and Wildlife Agencies of any significant events discovered during the monitoring. Reinitiation of work following a stop work order will only occur when the CPUC, BLM, USFS, and Wildlife Agencies are satisfied that the impacts have been fully documented, that compensation for these impacts will be made, and that any additional protection measures they deem necessary will be undertaken.
G-CM-4: Training to effectively implement conservation measures.	Training to implement conservation measures.	Prior to construction, all of SDG&E's contractors, subcontractors, and project personnel will receive training regarding the appropriate work practices necessary to effectively implement the Conservation Measures and to comply with the applicable environmental laws and regulations including appropriate wildlife avoidance and impact minimization procedures, the importance of these resources, and the purpose and necessity of protecting them.
G-CM-6: Construction limits.	Keep all activities within designated temporary and permanent disturbance areas.	The area limits of project construction and survey activities will be predetermined based on the temporary and permanent disturbance areas noted on the final design engineering drawings, with activity restricted to and confined within those limits.
G-CM-6: Construction limits.	Keep survey vehicles on existing roads.	In addition, survey personnel will keep survey vehicles on existing roads.
G-CM-6: Construction limits.	Impacts associated unauthorized activity will be mitigated at higher ratios.	Any impacts associated it unauthorized activity (e.g., exceeding approved construction limits) will be mitigated at a 5:1 ratio (5.5:1 in FTHL MA). Restoration of the unauthorized impacts will be credited at a 1:1 ratio (i.e., offset by in-place habitat restoration); the remaining 4:1 (or 4.5: in FTHL MA) will be acquired offsite.

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Measures	Task Title	Task Text
G-CM-11: Sensitive areas and features.	Structures and access roads should be designed to minimize impacts to sensitive features.	In areas designated as sensitive by SDG&E or the Wildlife Agencies, to the extent feasible, structures and access roads will be designed to minimize impacts to sensitive features. These areas of sensitive features include, but are not limited to, high-value wildlife and plant habitats, sensitive vegetation communities, and habitat occupied by listed species. If the sensitive features cannot be completely avoided or spanned, structures and access roads will be placed to minimize the disturbance to the extent feasible.
G-CM-12: Minimize vegetation clearing.	Leave vegetation in place where re-contouring is not required. Restore disturbed soils based on HRP per G-CM-16.	In construction areas where grading or re-contouring is not required, vegetation will be left in place wherever possible to avoid excessive root damage and allow for re-sprouting. Only the minimum amount of vegetation necessary for the construction of structures and facilities will be removed. Topsoil located in areas containing sensitive habitat will be conserved during excavation and reused as cover on disturbed areas to facilitate regrowth of vegetation. Topsoil located in developed or disturbed areas is excluded from this measure. Disturbed soils will be restored based on a Habitat Restoration Plan per G-CM-16.
G-CM-14: Minimize disturbance.	Locate surface-disturbing activities in previously disturbed areas, to the extent practical.	To the extent practicable, surface-disturbing components of the project will be located in previously disturbed areas or where habitat quality is poor to minimize disturbance of vegetation and soils.
G-CM-15: Temporary construction mats.	Use of construction mats.	Temporary construction mats may be used to minimize vegetation and soil disturbance only where deemed appropriate by the qualified biologist. The construction mats will not be left on the ground for more than three weeks.
G-CM-15: Temporary construction mats.	Incorporate impact of using mats into HRP (G-CM-16).	Use of construction mats will be considered a temporary impact to vegetation and will be incorporated into the Habitat Restoration Plan per conservation measure G-CM-16.
G-CM-16: Habitat Restoration Plan.	Temporary impacts to desert scrub and dune habitats.	For restoration of temporary impacts to desert scrub and dune habitats, a separate Habitat Restoration Plan will be developed for desert vegetation communities and incorporate Desert Bioregion Revegetation/Restoration Guidance measures. These measures generally include alleviating soil compaction, returning the surface to its original contour, pitting or imprinting the surface to allow small areas where seeds and rain water can be captured, planting seedlings that have acquired the necessary root mass to survive without watering, planting seedlings in the spring with herbivory cages, broadcasting locally collected seed immediately prior to the rainy season, and covering the seeds with mulch.

Appendix A: Mitigation Measures and Conservation Measures Requiring Disturbance Avoidance, Minimization, and Restoration

Items highlighted in yellow are Avoidance/Minimization Measures. Items highlighted in green are Restoration Measures.

Measures	Task Title	Task Text
G-CM-21	Implementation of erosion control measures.	<p>Project construction activities will be designed and implemented to avoid or minimize new disturbance, erosion on manufactured slopes, and off-site degradation from accelerated sedimentation. Where revegetation is necessary to improve the success of erosion control, planting or seeding with native seed mix, approved by the Wildlife Agencies, will be done on slopes. In addition to the measures above, the following erosion control procedures will be implemented:</p> <ul style="list-style-type: none"> • Vehicle and construction equipment use will be restricted to access roads and areas in the immediate vicinity of construction work sites to help reduce soil disturbance. • In agricultural areas, topsoil will be left in roughened condition. • When practical, construction activities will be avoided on wet soil to reduce the potential for soil compaction, rutting, and loss of soil productivity. • Disturbed areas will be returned to their pre-construction contours and allowed to revegetate naturally, or will be reseeded with an appropriate seed mixture if necessary. Construction of access roads in inaccessible terrain will be reduced by using helicopters to place structures in select locations.
G-CM-22: Surface restoration after disturbance.	Restoration where ground disturbance is substantial or where recontouring is required.	In areas where ground disturbance is substantial or where re-contouring is required (e.g., marshalling yards, tower sites, spur roads from existing access roads) surface restoration will occur as necessary for erosion control and revegetation. The method of restoration will normally consist of returning disturbed areas back to their original contour, reseeding (if required), installing cross drains for erosion control, placing water bars in the road, and filling ditches for erosion control. Potential for erosion will be minimized on access roads and other locations primarily with water bars. The water bars will be constructed using mounds of soil shaped to direct the flow of runoff and prevent erosion. Soil spoils created during ground disturbance or recontouring will be disposed of only on previously disturbed areas, or used immediately to fill eroded areas. Cleared vegetation can be hauled offsite to a permitted disposal location, or may be chipped or shredded to an appropriate size and spread in disturbed areas of the ROW with the approval of the biological monitor.
G-CM-23: Equipment size.	Use appropriately sized equipment.	To limit impact to existing vegetation, appropriately sized equipment (e.g., bulldozers, scrapers, backhoes, bucket loaders, etc.) will be used during all ground disturbance and re-contouring activities.
G-CM-25: Restrict vehicle movement to access roads.	Restrict vehicle movement to access roads.	Except when not feasible due to physical or safety constraints, all project vehicle movement will be restricted to existing access roads and access roads constructed as a part of the project and determined and marked by SDG&E in advance for the contractor, contractor-acquired accesses, or public roads.
G-CM-26: Delineate construction limits.	Delineate construction limits.	All limits of construction will be delineated with orange construction. During and after construction, entrances to access roads will be gated to prevent the unauthorized use of these roads by the general public. Signs prohibiting unauthorized use of the access roads will be posted on these gates. (Per the APRIL 1, 2010 version of the MMCRP, "Flagging is acceptable as a delineation method instead of orange fencing. Orange fencing can be limited to unique situations.")

Appendix A: Mitigation Measures and Conservation Measures Requiring Disturbance Avoidance, Minimization, and Restoration

Items highlighted in yellow are Avoidance/Minimization Measures. Items highlighted in green are Restoration Measures.

Measures	Task Title	Task Text
G-CM-29: Fund off-road vehicle enforcement patrols.	Provide funding.	To control unauthorized use of project access roads by off-road vehicle enthusiasts, SDG&E shall provide funding to land management entities responsible for areas set aside for habitat conservation to provide for off-road vehicle enforcement patrols. The responsible land management entities will formulate what funding is reasonable to control unauthorized use of project access roads.
G-CM-30: Close temporary construction access roads.	Permanently close access roads not required for project on-going maintenance.	To limit new or improved accessibility into the area, all new access roads or spur roads constructed as part of the project that are not required as permanent access for future project maintenance and operation will be permanently closed. Where required, roads will be permanently closed, with the concurrence of the underlying landowner and the governmental agency having jurisdiction, using the most effective feasible and least environmentally damaging methods (e.g., stockpiling and replacing topsoil or rock replacement) appropriate to that area. All permanently closed access roads and spur roads will be restored with native vegetation following closure.
G-CM-31: Mowing.	Mowing of access roads to maintain access for maintenance.	Mowing shall be used when permanent access is not required since, with time, total re-vegetation is expected. If mowing is in response to a permanent access need, but the alternative of grading is undesirable because of downstream siltation potential, it should be recognized that periodic mowing will be necessary to maintain permanent access. In such instances, SDG&E will mow at least once every two years. The project biological construction monitor will conduct checks on mowing procedures to ensure that mowing for temporary or permanent access roads is limited to a 4-m-wide (14-foot-wide) area on straight portions of the road and a 5-6-m-wide (16 to 20-ft-wide) area at turns, and that the mowing height is no less than 10 cm (4 in) from finished grade.
G-CM-43: Ground disturbance during O&M activities.	Qualified biologist present during ROW restoration.	A qualified biologist employed by SDG&E will be present during maintenance involving ROW repair requiring ground disturbance (i.e., grading/repair of access road and work areas and spot repair of areas subject to flooding or scouring). The qualified biologist will send annual monitoring reports of maintenance activities to the CPUC, BLM, and USFS (for sections of the project that require monitoring of maintenance activities on National Forest lands) that describe the types of maintenance that occurred, at what locations they occurred, and whether or not there were impacts that required mitigation.
G-CM-44: Limits for maintenance and survey activities.	Determine project limits for temporary and permanent disturbance to occur during maintenance activities.	The area limits of Project maintenance and survey activities will be predetermined based on the temporary and permanent disturbance areas noted on the final design engineering drawings, with activity restricted to and confined within those limits, within SDG&E's ROW. In addition, survey personnel would keep survey vehicles on existing roads. No paint or permanent discoloring agents would be applied to rocks or vegetation to indicate limits of survey or maintenance activity where any sensitive biological resources or wildlife habitats occur.
G-CM-46: Minimize disturbance during O&M operations.	Minimize impacts during O&M Operations.	All O&M activities will be conducted in a manner that would minimize disturbance to vegetation, drainage channels, and stream banks.