BOWMAN SOLAR PROJECT

April 2014

PRECONSTRUCTION PLANT INSPECTION

U.S. Geographic Survey Adelanto 7.5-minute Quadrangle Map, San Bernardino Base and Meridian, Township 5 North, Range 5 West, Sections 22 and 23

Assessor Parcel Numbers
0630-351-01,-02,-03,-04,-05,-06,-07,-08,-09,-10,-11,-12,-13,-14,-15

Conditional Use Permit Number
Unassigned

Owner
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1.0 EXECUTIVE SUMMARY

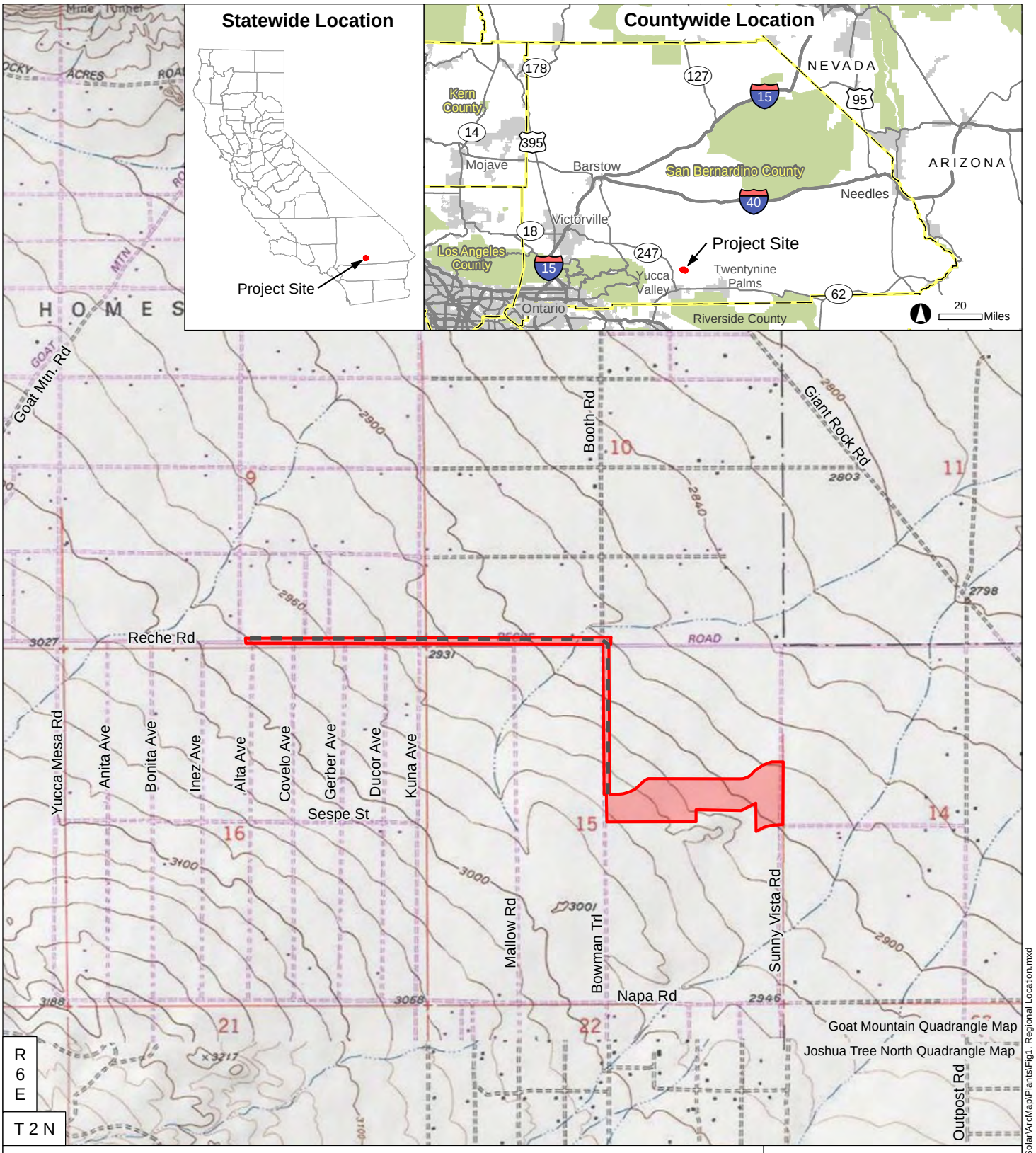
sPower, LLC (sPower) is proposing to develop the Bowman Solar Project east of Yucca Valley, in San Bernardino County, CA (hereafter referred to as the Project) (Figure 1). This report provides the methods and results of focused surveys which demonstrate compliance with the County of San Bernardino's Plant Protection and Management Ordinances, California Desert Native Plants Act, and California Fish and Game Code Sections 1925 and 1926. For the purposes of this report, the "study area" includes the Project's proposed ground disturbance footprint and the generation tie line location which extends from the facility footprint north along Bowman Trail Road, and east along Reche Road (Project Site) (Figure 2).

In summary, two vegetation communities/land cover types were observed: Creosote Bush Scrub and Developed/Disturbed Lands. Given the extent of anthropogenic disturbance (e.g., abundance of trash, cleared lots, and on- and off-highway vehicle and pedestrian-related traffic), any species currently occupying these lands are presumed to be acclimated to the disturbance regime present. A total of 33 Joshua trees were detected within Project limits. Eleven (11) of those trees are within the Project site and were determined to be candidates for transplant by a certified arborist and native plant specialist. Alternatively, 22 specimens will be avoided by Project implementation or were determined to have poor branching structure, defects, or other unique characteristics that imply they're poor transplant or salvage specimens.

Additionally, 1 silver cholla (*Cylindropuntia echinocarpa*), 13 branched pencil cholla (*Cylindropuntia ramosissima*), and 3 cottontop cactus (*Echinocactus polycephalus*) were mapped within the study area. No clonal creosote (*Larrea tridentate*) rings were found. Of the cacti species observed within the Project Site, 6 branched pencil cholla and 3 cottontop cactus are candidates for transplant / relocation. Seven (7) branched pencil cholla and 1 silver cholla will be avoided within the Project Site, or were determined to be either too large, defective, or were not healthy enough to undergo transplant or relocation activities with a reasonable probability of long term success. Furthermore, all Joshua trees and cacti identified within the Gen-Tie line will be avoided (i.e., 12 Joshua trees, 1 silver cholla and 2 branched pencil cholla).

2.0 PROJECT AND PROPERTY DESCRIPTION

The proposed Project's purpose is energy generation located on approximately 50 acres of previously disturbed land in the County of San Bernardino, CA (Figure 1). The Project will consist of a three Megawatt Alternating Current Solar Photovoltaic (PV) generating facility. The proposed generation-tie (gen-tie) line will connect the facility to Southern California Edison's (SCE) existing distribution line located to the north of the Project. It is assumed that any new facilities required to be constructed by SCE north and west of the Project Site will be completed within their existing right-of-way and will avoid Joshua Trees and other native plants that are protected by the County's Plant Protection Ordinances, the California Desert Native Plants Act, and the California Fish and Game Code. The proposed facility will utilize PV technology on either fixed-tilt or tracker mounting supports. The Project can be found on the Goat Mountain United States Geological Survey 7.5-Minute Topographic Quadrangle Map within the San Bernardino Base and Meridian – Township 2 North, Range 6 East, Sections 9, 10, 14, 15 and 16 (USGS 1989). The majority of the study area is disturbed creosote bush scrub; the remainder includes developed lands.



The Project Site is located on the Goat Mountain USGS 7.5-minute quadrangle map; San Bernardino Base and Meridian, Township 2 North, Range 6 East, Sections 9, 10, 14, 15 and 16. Center coordinates are: Latitude 34.259674, Longitude -116.338212.

Figure 1. Regional Location

3.0 FOCUSED STUDY/SPECIES OF CONCERN

For the purposes of this report, the "study area" includes the Project's proposed ground disturbance footprint (Project Site) (Figure 2). Prior to field surveys, natural resource databases, local resource management plans, aerial photos, and other readily available commercial data associated with the Project were reviewed to determine the locations and types of biological resources that have the potential to exist within the region.

Primary data sources included, but were not limited to, the following:

- 2014 California Natural Diversity Database maintained by the California Department of Fish and Wildlife (CDFW 2014);
- California Native Plant Society (CNPS) Electronic Inventory (CNPS 2014);
- Bowman Solar Project Biological Technical Report (NOREAS 2014); and
- Aerial Photographs (Microsoft Corporation 2014).

Furthermore, the following local and state provisions were reviewed:

- San Bernardino County Development Code, Section 88.01.060 Desert Native Plant Protection (San Bernardino County 2014);
- California Desert Native Plants Act, Division 23 of the California Food and Agriculture Code (California Food and Agriculture Department 2014b);
- California Food and Agriculture Code 80001 et seq (California Food and Agriculture Department 2014a); and
- California Fish and Game Code Section 1925 and 1926 (CDFW 2014b).

The aforementioned regulations provide details "for the removal or harvesting of specified desert native plants in order to preserve and protect species and to provide for the conservation and wise use of desert resources." As part of these codes, the following plants are identified for special consideration:

- The following desert native plants with stems 2 inches or greater in diameter or 6 feet or greater in height:
    a. *Dalea spinosa* (smoketree).
    b. All species of the genus *Prosopis* (mesquites).
- All species of the family *Agavaceae* (century plants, nolinas, yuccas).
- Creosote rings, 10 feet or greater in diameter.
- All Joshua trees.
- Any part of any of the following species, whether living or dead:
    c. *Olneya tesota* (desert ironwood).
    d. All species of the genus *Prosopis* (mesquites).
    e. All species of the genus *Cercidium* (palos verdes).

With deference to Joshua trees specifically, the San Bernardino County Development Code asserts that "Joshua trees that are proposed to be removed will be transplanted or stockpiled for future transplanting wherever possible." While the California Food and Agriculture Code identifies the following additional species of plants to be evaluated for transplant:

- All members of the family *Cactaceae* (cacti), except for saguaro cactus (*Carnegiea gigantea*), and barrel cactus (*Ferocactus acanthodes*);

- All species of the family *Fouquieriaceae* (ocotillo, candlewood);
- Catclaw (*Acacia greggii*); and
- Desert-holly (*Atriplex hymenelytra*).

4.0 METHODS

Field surveys were conducted in March 2014 by NOREAS arboricultural and botanical staff; under the direction of an International Society of Arboriculture Certified Arborist. Pedestrian-based field census consisted of surveying the entire study area with transects and recording the location of individual native plants by means of a handheld global positioning system. Plants were identified to the lowest taxonomic level sufficient to determine whether the plant observed was non-native, native, or special-status. Plants of uncertain identity were subsequently identified from taxonomic keys (Baldwin et al. 2012). Scientific and common species names were recorded according to Baldwin et al. (2012). Survey methods were derived from published regional procedures.

As such, the surveys targeted native plants with stems ≥2 inches in diameter at breast height, or ≥6 feet in height of the following species:

- ✓ Smoketree;
- ✓ Mesquite;
- ✓ Yucca;
- ✓ Desert ironwood;
- ✓ Palo verde;
- ✓ Manzanita (*Arctostaphylos* spp.);
- ✓ California juniper (*Juniperus californica*);
- ✓ Desert willow (*Chilopsis linearis*);
- ✓ Piñon pine (*Pinus monophylla*);
- ✓ Catclaw;
- ✓ Desert-holly (*Atriplex hymenelytra*);
- ✓ Creosote rings ≥10 feet in diameter; and
- ✓ Any other plants[1] protected or regulated by the California Desert Native Plants Act and California Food and Agricultural Code 80001 et. seq.

Specific to Joshua trees, the following data was recorded: tree height, forking height, number of branches, branch attachment angle relative to 45° (<, equal to or >), canopy width, trunk diameter at breast height, and asymmetrical lean information. Evaluation characteristics for Joshua trees also included trunk taper[2], documentation of structural defects[3], health and vigor[4], and existing damage.

The overall health rating assigned to an individual specimen was A, B, C, D or F; and is further detailed below.

- A – Excellent: Absence of insect wounding or mechanical damage to tissue. Specimen color is vibrant, and appears to be hydrated (i.e., does not show evidence of cracking from shrinkage or overexpansion of the trunk). Specimen is free of substantial insect or disease damage. Good trunk flare and not buried with excess soil.
- B – Good: ≤25% of specimen is affected by disease, stress, cavities, or insect infestation. Specimen color is generally vibrant and individual appears to be adequately hydrated. Minor insect or disease damage. Fair trunk flare. Minor cavities may exist, but do not constitute ≥25% of total trunk circumference.

[1]All species of *Burseraceae* [elephant tree] and *Fouquieriaceae* families, *Carnegiea gigantea* [sahuaro cactus], *Ferocactus acanthodes* [barrel cactus], *Castela emoryi* [crucifixion thorn], *Dudleya saxosa* [panamint dudleya], *Pinus longaeva* [bristlecone pine], and *Washingtonia filifera* [fan palm].

[2]Trunk taper is defined as the change in diameter from the first branching fork to ground level. Good taper is a gradual increase in diameter with flaring at the "trunk buttress". Fair taper specimens exhibit little change in diameter or basal flair. In general, individuals with poor taper consisted of decreasing diameter with "pinched-in" locals along the trunk (i.e., diameter at a particular place along the trunk is smaller than the adjacent sections).

[3]Structural defects included but were not limited to specimen abnormalities such as abrupt changes in trunk direction or "kinks", and asymmetrical buttress flaring.

[4]Health metrics included but were not limited to: dead branches, leaf or stem tip die-back, presence of diseased tissues, presence and prevalence of insect damage or historic infestation.

- C – Fair: 25% to 50% of specimen affected by disease, stress, cavities, or insect infestation (e.g., dead branches and stems are present). Specimen color is muted and individual shows signs of stress (i.e., poor hydration). Significant (>25%) tissue die-back, trunk damage, or cavities are present (e.g., 25% to 50% of total trunk circumference is damaged).
- D – Struggling: ≥50% of specimen is affected by disease, stress, cavities, or insect infestation. Specimen is necrotic and individual shows obvious signs of drought stress. Significant tissue die-back, trunk damage, cavities or bark sloughing is apparent.
- F – Dead.

With regard to the suitability of transplant, specimen size, structural condition, and health were taken into consideration. Individuals considered suitable for transplant, exhibited all of the following:

- Height ≤10 feet;
- Branch attachments ≤45°;
- Angle of tree lean ≤45°;
- Good or fair trunk taper;
- No significant evidence of mechanical or insect wounding; and
- Health rating of A or B.

5.0 RESULTS

The study area is heavily disturbed, with evidence of regular on- and off -highway vehicle use and other anthropogenic disturbances (e.g., abundance of trash, cleared lots, and on- and off-highway vehicle and pedestrian-related traffic). The Project Site supports creosote bush scrub vegetation; which was dominated by widely spaced creosote shrubs and white bursage (*Ambrosia dumosa*). Within the Project Site, a total of 33 Joshua trees were mapped and evaluated (Figure 2, Appendix A). Furthermore, 1 silver cholla, 13 branched pencil cholla, and 3 cottontop cactus were assessed within the study area (Figure 2, Appendix B). No clonal creosote rings were detected. Representative photos of the study area are provided in Appendix C.

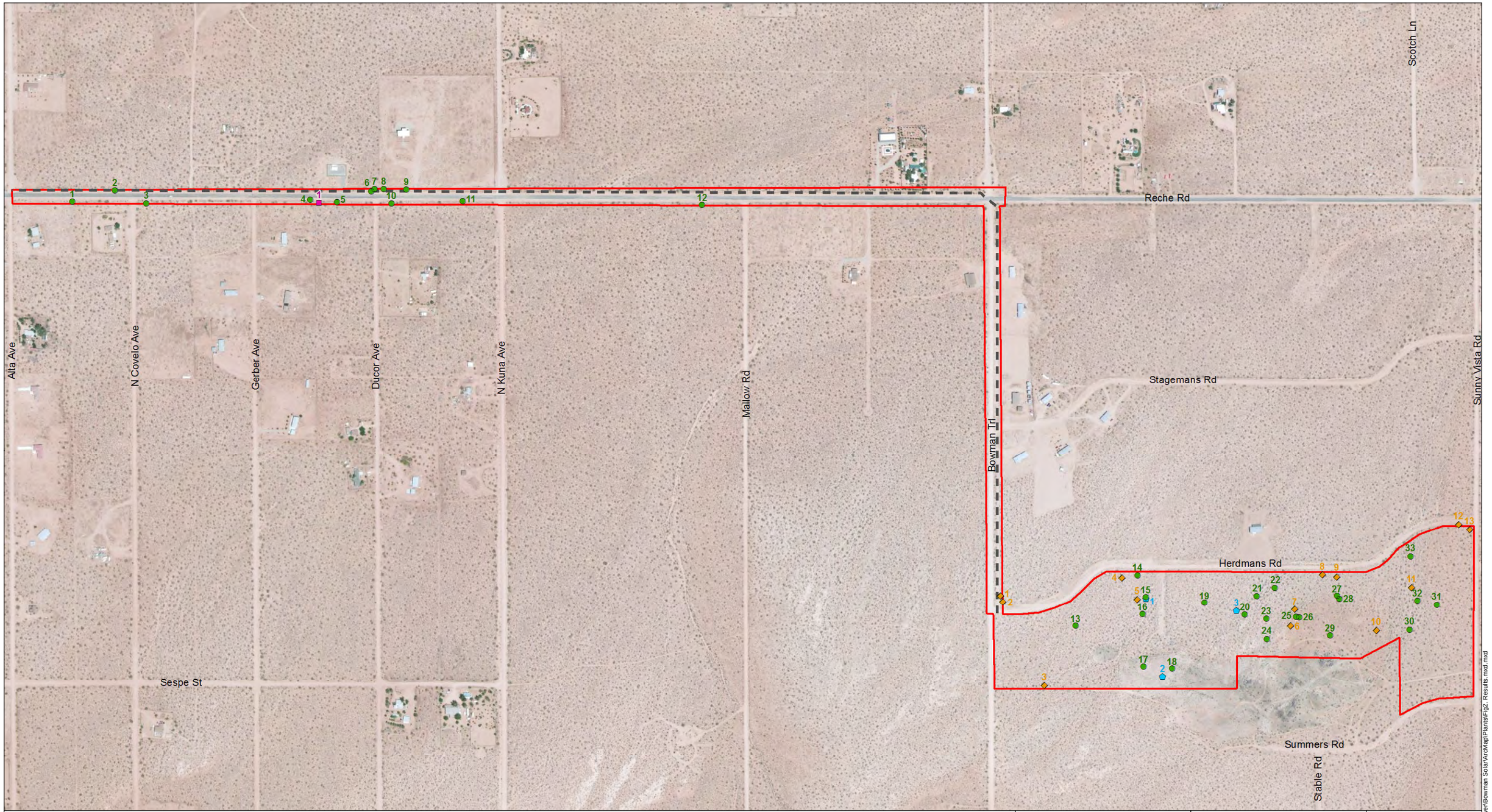


Figure 2. Preconstruction Plant Inspection Results

6.0 IMPACTS AND RECOMMENDATIONS

The majority of the Project Site consists of disturbed creosote bush scrub habitat. Given the extent of anthropogenic disturbance, the habitat quality is poor and any species currently using these lands are presumed to be acclimated to the disturbance regime present. For the purposes of this analysis, impact is being defined as grade alteration that buries any portion of a Joshua tree, significantly undercuts its root system, or otherwise disturbs the ground within the dripline of the specimen.

Of the 33 Joshua trees evaluated within the Project Site, 11 are candidates for transplant / relocation. Twenty two (22) Joshua trees will be avoided within the Project Site, or were determined to be either too large, defective, or were not healthy enough to undergo transplant or relocation activities with a reasonable probability of long term success. Of the cacti species observed within the Project Site, 6 branched pencil cholla and 3 cottontop cactus are candidates for transplant / relocation. Seven (7) branched pencil cholla and 1 silver cholla will be avoided within the Project Site, or were determined to be either too large, defective, or were not healthy enough to undergo transplant or relocation activities with a reasonable probability of long term success. No Creosote rings with a diameter of ≥10 will be impacted by Project implementation. All Joshua trees and cacti identified within the Gen-Tie line will be avoided (i.e., 12 Joshua trees, 1 silver cholla and 2 branched pencil cholla).

7.0 AVOIDANCE AND MINIMIZATION MEASURES

The following measures are recommended as a means of avoiding and minimizing adverse impacts to Joshua trees that occur within the Project Site:

1. If transplant or relocation operations are performed, they should be conducted during the late fall or winter (i.e., October through March), if possible.
2. Prior to removal, specimens should be systematically marked on their north side, so they can be transplanted and/or temporarily stored in the same orientation as they've been growing within the natural landscape.
3. Prior to the beginning of any transplant operation and pup salvage efforts, qualified professionals should coordinate a meeting with all individuals involved to detail proposed salvage specifications, and confirm the locations of specimens to be relocated.
4. To the maximum extent practical, marked specimens should be hand-dug, or mechanically removed in such a way as to leave the entire root ball intact. Immediately after removal, the root ball should be treated with water and wrapped in burlap (or equivalent material) before being moved to a transplant locale or temporary storage area. Alternatively, specimens can be immediately planted in large wooden crates (or equivalent material), backfilled with native soil extracted immediately adjacent to each removed individual, and subsequently watered.
5. Avoid damage to specimens during transplanting from straps and pulleys. Use burlap to prevent chafing and rubbing on the individuals to the maximum extent practical. Minimize exposure of the roots to air. Salvage specimens should be immediately transported to the storage area or transplantation site.
6. If specimens require storage, individuals should be oriented in their original direction and watered with a minimum of 2 gallons of water, two times a week unless other hydrologic inputs are available (i.e., precipitation).
7. With regard to transplant, the hole for the new individual should be 2 times the width of the rootball, but only as deep. The final grade of the specimen should allow for the base (flare) where the roots join the stem to be exposed. Once dug, each hole should be filled with water and allowed to drain before placing the salvaged specimen within it. Backfilling should be done with hand tools to fill air pockets around the roots of the specimen. After each hole is backfilled, the specimen should be watered again.
8. After transplant, a small berm should be established at the edge of the root zone around each specimen to retain irrigation water as needed. Individuals should be watered to allow the soil to be moist, but not saturated. The soil should be allowed to dry out between watering. After 3-4 months, the watering can be reduced to once monthly. All irrigation should be applied as needed based on actual soil conditions. A soil auger should be used to test soil conditions prior to water application. A qualified monitor should evaluate the transplants at 1 month and 3 months post relocation to document health and make recommendations to care regimens, as necessary. After the specimens show signs of establishment, the water application may be reduced.
9. Care should be taken to avoid wounds during horticultural operations. Wounds can become an entry point for pests and diseases. Any roots that are affected during transplanting processes should be cut cleanly with sterilized hand tool (sharpened shovel, pruners or equivalent equipment). These tools should be sterilized between specimen uses. Sterilization rates are listed below:

Material	% Solution	Soaking Time
Bleach	25%	5 minutes
Pine oil cleaner	25%	5 minutes

Material	% Solution	Soaking Time
Rubbing Alcohol (70%)	50%	5 minutes
Denatured Ethanol (95%)	50%	5 minutes

8.0 CERTIFICATION

I hereby certify that the statements furnished above and in the attached figures present the data and information required for this assessment, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief. Field work conducted for this investigation was performed by me or under my direct supervision. I certify that I have not signed a nondisclosure or consultant confidentiality agreement with sPower or sPower's representative, and that I have no financial interest in the Project.

DATE: April 25, 2014 SIGNED: 

Report Author

The following NOREAS employees performed the field work and/or participated in preparation of this report: Lenny Malo MS, Lincoln Hulse BS, Erin Serra BS, Ben Zamora BS, Onkar Singh BS, Rebecca Latta BS, and Ken Hashagen, BS.

9.0 REFERENCES

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APPENDIX A

Joshua Tree Evaluation Data

Joshua Tree Evaluation Data																					
		Height and Canopy Measurements								Trunk Condition					Health Condition						
Tree # New	Species	Tree height	Fork height	Trunk Diameter (DBH)	# of Primary Branches	N/S canopy width	E/W canopy width	Branch Spread (</=/>45°)	Lean (degrees) and direction	Good Trunk Taper/ Flare	Fair Trunk Taper/Flare	Poor Trunk Taper/Flare	Protrusions or abnormalities	Damage	Leaf tip die-back (>25%)	# Dead Branches	% Dieback of Living Branches	Diseased	Health Rating	Recommend for Transplant[5]	Comments
1	Joshua	10″		N/A		8″	8″	<			X								A	N	**Protect in place, no impacts expected.**
2	Joshua	23′	10′	17″	5	15′	20′	<	5 S		X					2	5		B	N	**Protect in place, no impacts expected.**
3	Joshua	8′		4″		2′	2′	<	2 S		X								B	N	**Protect in place, no impacts expected.**
4	Joshua	17′	10′	16″	3	15′	15′	<	3 S		X					1			B	N	**Protect in place, no impacts expected.**
5	Joshua	20′	9′	14″	5	18′	15′	<	15 S		X								B	N	**Protect in place, no impacts expected.**
6	Joshua	15′	5′	15″	3	12′	17′	<	3 S		X								B	N	**Protect in place, no impacts expected.**
7	Joshua	12′	6′	9″	3	7′	9′	<			X					1			C	N	**Protect in place, no impacts expected.**
8	Joshua	14′	6′	13′	3	12′	13′	<	3 S	X						1			B	N	**Protect in place, no impacts expected.**
9	Joshua	15′	7′	11″	3	8′	12′	<	10 S		X					1			B	N	**Protect in place, no impacts expected.**
10	Joshua	15′	9′	11″	3	5′	5′	<	10 S		X								B	N	**Protect in place, no impacts expected.**
11	Joshua	22′	10′	20″	3	18′	18′	<	5 S		X						10		C	N	**Protect in place, no impacts expected.**
12	Joshua	19′	11′	13″	4	8′	10′	<	2 S	X									B	N	**Protect in place, no impacts expected.**
13	Joshua	9′	8′	6″	2	2′	3′	>	5 S	X									B	Y	
14	Joshua	13′	10′	6″	2	3′	5′	<			X								B	N	
15	Joshua	4′	N/A	N/A	1	1′	1′		3 SE		X								A	Y	
16	Joshua	14′	5′	13″	3		10′	<			X					2	20		C	N	**Two trunks**

[5] Y = yes, N = No and P = Possible, N/A = Tree cannot be measures at breast height.

Joshua Tree Evaluation Data																				
		Height and Canopy Measurements								Trunk Condition					Health Condition						
Tree # New	Species	Tree height	Fork height	Trunk Diameter (DBH)	# of Primary Branches	N/S canopy width	E/W canopy width	Branch Spread (</=/>45°)	Lean (degrees) and direction	Good Trunk Taper/ Flare	Fair Trunk Taper/Flare	Poor Trunk Taper/Flare	Protrusions or abnormalities	Damage	Leaf tip die-back (>25%)	# Dead Branches	% Dieback of Living Branches	Diseased	Health Rating	Recommend for Transplant[5]	Comments
17	Joshua	8”	N/A	N/A	1	4”	4”		10 SW		X								B	N	**Located in rocky substrate.**
18	Joshua	2’	N/A	N/A	1	4’	3’				X								D	N	**Very Poor Health**
19	Joshua	2’	N/A	N/A	1	1’	1’		3 S	X									B	Y	
20	Joshua	16’	10’	8”	2	5’	8’	=	5 SE		X								B	N	
21	Joshua	3’	N/A	N/A	1	1.5’	1.5’			X									A	Y	
22	Joshua	1’	N/A	N/A	1	7”	7”				X								B	Y	
23	Joshua	13’	12’	4”	1	2’	2’		5 SE		X								C	N	
24	Joshua	5”	N/A	N/A	1	3”	3”		10 S	X									B	Y	
25	Joshua	14’	10’	7”	3	4’	4’	<	30 S		X					1			C	N	
26	Joshua	12’	9’	6”	2	2.5’	1’	>	2 S		X								B	N	
27	Joshua	10”	N/A	N/A	1	5”	5”		10 W		X				X				B	Y	
28	Joshua	1’	N/A	N/A	1	8”	8”		30 SW		X				X				C	N	
29	Joshua	2’	N/A	N/A	1	1.5’	1.5’			X									A	Y	
30	Joshua	6.5’	N/A	3”	1	2’	2’		3 W	X									A	Y	
31	Joshua	8’	N/A	5”	1	1.5’	1.5’		2 W	X									A	Y	
32	Joshua	7’	6’	6”	2	1.5’	1.5’		2 S		X			X		5			C	N	**Broken top**
33	Joshua	2’	N/A	N/A		1’	1’		1 S	X									A	Y	

APPENDIX B

Cacti Evaluation Data

Map Number	Species	Height (ft.)	% Dieback of Living Branches	Health Rating	Recommend for Transplant	Comments
1	Branched Pencil Cholla	4	5	B	N	**Protect in place, no impacts expected.**
2	Branched Pencil Cholla	3	10	B	N	**Protect in place, no impacts expected.**
3	Branched Pencil Cholla	3	10	B	Y	
4	Branched Pencil Cholla	2	0	A	Y	
5	Branched Pencil Cholla	1	0	B	Y	
6	Branched Pencil Cholla	1.5	15	C	N	
7	Branched Pencil Cholla	1.5	50	D	N	
8	Branched Pencil Cholla	2	5	B	Y	
9	Branched Pencil Cholla	1.5	10	C	N	
10	Branched Pencil Cholla	1	3	B	Y	
11	Branched Pencil Cholla	1.5	3	B	Y	
12	Branched Pencil Cholla	2	5	B	Y	
13	Branched Pencil Cholla	1.5	25	C	N	
1	Silver Cholla	2	5	A	N	**Protect in place, no impacts expected.**
1	Cottontop Cactus	7”		A	Y	
2	Cottontop Cactus	6”		B	Y	
3	Cottontop Cactus	6”		A	Y	

APPENDIX C

Photographic Log

	**Photograph: 1.**
	**Photograph: 2.**

	**Photograph: 3.**
	**Photograph: 4.**