MBCA

morongo basin conservation association

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February 23, 2015

California Energy Commission
Dockets Office, MS-4, Docket No. 09-RENEW EO-01
1516 Ninth Street
Sacramento, CA 95814-5512
docket@energy.ca.gov Via email only

RE: Morongo Basin Conservation Association comments on the DRECP NEPA/CEQA

The Morongo Basin Conservation Association (MBCA) is a 501(c) 3, community-based, California Nonprofit Corporation, incorporated in 1969 and dedicated to preserving the economic and environmental welfare of the Morongo Basin. MBCA advocates for a healthy desert environment that nurtures our rural character, cultural wealth, and economic well-being. Our tools are education and information; collaborative efforts with citizens, officials, and other organizations; and the support of community-based organizing and solutions.

We appreciate this opportunity to comment and the extensions provided. It was grueling none the less. These comments deal with Geology and Soils in Volumes III, IV, and Appendix R. In general, the geology and soils need serious revisions to be applicable for understanding how soils will be affected by and affect industrial solar energy facilities on desert drylands. Suggestions are provided with the comments for your consideration when developing the Final EIR/EIS.

It was disappointing to find no references to how solar energy facilities will affect rural communities. At stake is their health (air quality), livelihood (tourism economy), quality-of-life (visual resources), and water supply. Dust is an important hazard and a prime cause of asthma. I found no references to asthma. This is a shameful oversight. Valley Fever outbreaks are also real possibilities but no substantive guidance is provided should it be found. Asthma and Valley Fever have not only air quality implications but also public health, socioeconomic, and environmental justice implications. A thorough analysis by experienced medical professionals should be in the FEIR/EIS.

Finally, I liked using the comment form but gave up on the location columns, they are too skinny for the lengthy identifiers. I provided the location information with each comment.

I am of course available to answer questions.
Sincerely,

Pat Flanagan

Pat Flanagan
Board Member Morongo Basin Conservation Association

Cc:
Board members

Sally Jewell Secretary of the Interior 1849 C Street, N.W. Washington, D.C. 20240

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Draft Desert Renewable Energy Conservation Plan (DRECP) and Environmental Impact Report/Environmental Impact Statement (EIR/EIS)

Comment Form

Commenter: Pat Flanagan, Board Member, Morongo Basin Conservation Association (MBCA)

- Peter Fahnestock, Soil Scientist, Natural Resources Conservation Service (NRCS), Victorville Office, responded to questions by Pat Flanagan regarding the accuracy, meaning, and relevance of certain statements, tables, and figures found in the DRECP. His comments are included in this form and his letter is attached to this document.

Contact Information: patflanagan29@gmail.com_760-362-4156 and
peter.fahnestock@ca.usda.gov_ 760-843-6882

Comment Number	Comments					
	Volume	Chapter	Section #	Page #	Paragraph	• Comments by Pat Flanagan of MBCA are preceded by **PF/MBCA** • Comments by Peter Fahnestock of NRCS are preceded by **PF/NRCS**
						Comment 1 - III.4.2.1.2, Page III.4-15 **Aeolian Processes** PF/MBCA Please insert the following sentences as the second sentence in the paragraph. It completes the description from Miller (Miller et al. 2009). Eolian materials are divided into two classes: coarse material (sand) that saltates (bounces) and forms dunes and sheets, and fine material (silt and clay in dust) that is suspended in the air and transported long distances. Dust promotes soil development. (David M. Miller, USGS, email communication February 13, 2015) Based on the suggestion of David. M. Miller, I submit the following paper modeling wind erosion in the presence of vegetation because of its implications for solar installations in the Mojave Desert.

						A new model of wind erosion in the presence of vegetation Gregory S. Okin. Geophys. Res., 113, F02S10, doi: 10.1029/2007JF000758**.** ABSTRACT Vegetation is known to impact strongly the erosion of soil by the wind. Lateral cover is the primary parameter used to represent the amount of vegetation in aeolian research and, in particular, shear stress partitioning research. Although lateral cover provides a simple means for representing how much vegetation is in an area, it is not capable of characterizing how vegetation is distributed. A new, nonequilibrium model for the representation of nonerodible roughness elements is presented that uses the size distribution of erodible gaps between plants to characterize the ratio of the maximum shear stress to the average shear stress at the surface. The model shows very good agreement with measured shear stress ratios from the laboratory and field experiments. The model also satisfactorily explains relatively high horizontal aeolian sediment flux at high lateral cover. The relationship between this model and another shear stress partitioning model is explored, and the new model is found to be superior to the existing model because it (1) utilizes parameters with physical meaning that are measurable in the field or laboratory, (2) explains observations of horizontal flux at high cover, (3) overcomes difficulties inherent in the use of lateral cover to characterize vegetation on the surface, (4) is scale-explicit, and (5) can be used at multiple scales from an individual unvegetated gap to an entire landscape. There are general descriptions of desert soils and eolian processes that would be useful for the public, and solar developers, to understand when investigating project locations. Poster: **Assessing the geology and geography of large-scale energy installations in the Mojave Desert, California and Nevada.** David R. Bedford and David M. Miller. U.S. Geological Survey. ABSTRACT (excerpts) The USGS analyzed the topography and surficial geology for an area 40,400 km2 (9,884,215 acre) from Lancaster and Mojave on the west to Jean NV, and Goffs, CA on the east to evaluate potential lands for energy installations. The geology was mapped using uniform methods across the northern Mojave Desert so that a consistent data-base is available for analytical purposes. We use slope categories, surficial geology attributes, and land ownership to describe this area in a series of maps. … About 48% of the entire area is less than 5% slope, and 8.3% is less than 1% slope, the favored slope category. For this lowest-slope category, deposits underlying about 98% of the area are either mixed eolian-alluvial origin or are fine-grained alluvial deposits, and thus are

susceptible to eolian dust and sand transport, especially after disturbance. In addition, in this low-slope category, 89% of the area is susceptible to flooding, abased on the age and geomorphology of alluvial deposits."

There are also specific descriptions of soil units available on the USDA/NRCS Web Soil Survey http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

For the purpose of analyzing local soils to understand wind erosion I analyzed the
Soil Survey of San Bernardino County California, Mojave River Area.
USDA Soil Conservation Service. 1986. 211 p., 36 maps. The 15 general mapping units are grouped under 3 general kinds of landscapes. There are 77 individual map units.

A wind speed of more than 12 miles per hour is sufficient to lift and carry sand. This is half the 25 mph triggering a shut down. Informative figures include data to support this statement.

Figure 2. Gusts from 40 to 87 mph can blow from any direction any time of the year.

Figure 3. Average monthly percentage of time winds are more than 12 mph; measured at the Daggett Airport Station.

Figure 4. Average annual percentage of time winds of more than 12 miles per hour blow from various directions; measured at George Air force Base and Daggett Airport.

The survey area covers 1,200,000 acres from El Mirage to Newberry Springs south to Lucerne Valley and north to Hinkley.

Four characteristics from the 77 map units were used for this analysis:
% slope, hazard of water erosion, hazard of sand blowing, and the depth to which roots can grow.   Of the 77 map units, 56 (72%) had had a 0 to 5% slope, optimal for solar facilities.

Of those 56 map units,

Water Erosion	40 rated slight and 9 slight to moderate
Sand Blowing	31 rated HIGH (56%)
	13 rated MODERATE (23%)
	12 rated SLIGHT (21%)

44/56 or **78% (936,000 acres) of the soils on slopes 0 to 5% in this survey of 1,200,000 acres, rate high to moderate for the hazard of sand blowing.**

This analysis shows that overall, the majority of this survey area is unsuitable for mass grading of desert soils without large and continuous applications of water, chemicals, vegetation, or gravel to stabilize the dust and compact the soil. Dust stabilization could be a necessity for years beyond the life of the project. The Pinto Lucerne Valley DFA is within this survey area.

Locally we have also learned firsthand about the amount of water required during construction.

Water impacts from solar projects in the Morongo Basin, San Bernardino County

- 3 solar projects (270AC) construction use: 35,189,532 gal/108AF
- 108AF supports 430+ desert households (@ .25AF per family f 2.3 avg.)
- 2014 Morongo Basin Pipeline water allocation = 982AF
- 11% of Morongo Basin Pipeline allocation was diverted for solar installation use

Data provided by California Desert Coalition, 2014.

Extrapolating from the above figures to the 177,000 AC of planned disturbance
270 /108AF = <u>2.5 AF/AC of drinking quality water</u>
2.5AF/AC X 177,000 AC = 442,500 AF or 144,189,258,611 gallons of drinking quality water to develop solar in the PA, enough to support 1,770,000 families (.25AF per family). Communities that rely on already stressed aquifers and uncertain deliveries from the State Water Project are concerned.

And we can always learn from the Owens Lake air quality mess. The following information was found in a recent article by Anne Raver, "The Dust Settlement". *Landscape Architecture Magazine*. Feb. 2015, Vol. 105, No. 2, pages 38-42.

Owens Lake, once the single largest source of particulate air pollution in the U.S., is an excellent case study of dust pollution from large un-vegetated areas. In 1997 the US EPA ordered the LA DWP to mitigate the Owens Lake dust problem.

LADWP has learned, after spending $1.3 billion to control dust from 40+ square miles of the 110 square mile lake bed, the best, and most economical, control dust control methods.

Under a new agreement with the Great Basin Unified Air Pollution Control District and the California State Lands Commission, they will control dust on 53.5 square miles using tillage, gravel, and wind breaks.

- Tillage with flooding backup costs $1 million per square mile (3 X less than keeping the area flooded)
- Their preferred method is gravel which costs $3 million per square mile ($160.5 million) but is relatively maintenance free for 20 years.

						Can solar developers in the DRECP DFAs learn from the costly lessons of Owens Lake? Is covering the ground with gravel all that is necessary. Let’s say the average solar development size is 4.5 sq. miles. That is $13 million in gravel. However, at the end of the project’s life time the gravel must be removed so the site can be restored to its original condition.
						Comment 2 - III.4.2.2 Soils, Page III.4-17 **Table III.4-1 Soil Types and Textures within the Plan Area (PA)**. PF/NRCS • Four ‘Soil Types’ are listed. There are ‘textures ‘associated with each of these soil types. The textures listed cover most but not all of the textures associated with Clay and Sand in the PA. • The definition of Clay is misleading as clay does not form “an impermeable” layer in the soil unless it has been deliberately and highly compacted under a narrow set of moisture conditions. • The definition of Sand is incorrect as it does not result from “erosion of siliceous and other rocks…” but rather from the natural weathering processes from which all soils originally came. • The definition of Loam is incorrect, especially as regards the plan area, where it is assumed to be “fertile soil…” and “… containing organic components…” Loam, by definition, does not necessarily translate into a fertile soil, although there are fertile loams and very infertile loams. More factors must be taken into consideration before fertility can be assigned. • Finally, Bedrock is not a soil type, nor does the definition give the reader much useful information as the definition specifies that “solid rock … underlying loose deposits such as soil or alluvium.” In reality all of the previous Soil Types should be included under Bedrock per this definition as they are all underlain by bedrock. The term “alluvium” is indicative of any soil material deposited in its current location by water. All of the soil in the plan area with the exception of soils on the mountains and rock pediments, sand sheets and dunes, and those soils in the playas is alluvium. This would approximate to be around 18 million of the 22.5 million acres covered by the plan area. • The “Textures” column lists soil modifiers such as “cobbly” and “gravelly”. These are not textures but rather modifiers to textures. An unwary reader would not know this fact. This table does nothing to inform the reader about the “Soil Types” in the plan area, nor do I see how this is useful in making any kind of assessment, evaluation or judgment on the

						suitability of soils of the plan area for renewable energy projects. PF/MBCA *Please provide corrections to this Table in the FEIR/EIS so that the reviewer is correctly informed as to soil types and how they can be used to assess and evaluate soils in the PA for renewable energy projects.*
						Comment 3 - III.4.2.2.1, Page III.4-18 **Soils Prone to Erosion** PF/NRCS • The first paragraph lists “silt and very fine sand” as being the most erodible by wind. Very fine sand is not listed in the previous table as being a textures which occurs in the plan area. This points back to the confusing nature of the previous table. In fact, very fine sand is nearly indistinguishable from fine sand when it comes to the forces of wind erosion. An examination of the sands in eolian deposits will show that the majority of them are “fine” sands as opposed to “very fine” sands. There are few deposits in the world where the soil textures are dominated by silts and none of these occur in the plan area. There are far more deposits where the soil textures are dominated by very fine sand but these situations are rare in the plan area and the amount of acreage they comprise would be negligible. • The statement “Aggregated soils that are bound together with high amounts of organic matter...” is misleading as it indicates that organic matter in high quantities is needed for aggregation. There is no quantification of what “high amounts” of organic matter is. In the plan area, 0.5% organic matter is considered to be “high” and this percentage rapidly declines below about 2 inches to less than 0.25% in most cases. The truth is aggregated soils are more resistant to erosion but that is not because “their more cohesive particles are larger” but rather the aggregates formed by these particles are larger than the individual particles themselves; and although organic matter can play a role in aggregation, it does not address the fact that the most aggregated soils in the plan area occur well below the 2 inches where we have the maximum amount of organic matter. • The statement that “highly permeable soils are the most resistant to erosion” is also misleading. First, there is no definition of “highly permeable soil” nor is there an indication of what units or ranges are used to measure permeability. This statement does not take into account that well aggregated soils which would not be assumed to be permeable by the nature of their individual particles may be so due to the actual fact of their aggregation and resulting structure. • The sentence regarding highly permeable soils finishes with the following completely

						false statement that highly permeable soils are "promoting soil compaction". I will just leave this statement as is because the writer either did not proof read their statement or really had no clue as to what they were saying. The biggest issue with this section is that after reading it the reader has absolutely no more information about the soils in the plan area than before reading it. PF/MBCA *Please provide information on erosive soils in the FEIR/EIS that can be used to correctly assess and evaluate soils in the PA for renewable energy projects. This topic is critical to understanding the impact of solar projects on the desert and reviewers should not be misinformed; they should not think they know something when they do not.*
						Comment 4 – III.4.2.2.11, Page III.4-18 **Sand Transport Corridors (STC)** PF/MBCA This discussion of STC does not include the sand ramps commonly found in the Mojave Desert. Sand ramps can be attractive for solar development. The leading edge of sand ramps can have minimal slope and be stabilized by plants. When plants are removed the sand is subject to aeolian transport. In the Morongo Basin three solar facilities, totaling 270 acres, have been built on sand ramps and, following construction, remain the source of sand/dust during wind events.

Cascade Solar Joshua Tree CA

Abstract: Geomorphology and sediments of sand ramps in the Mojave Desert.

N. Lancaster, V.P. Tchakerian. Geomorphology. Volume 17, Issues 1–3, September 1996, Pages 151–165

Sand ramps are amalgamated accumulations of aeolian, fluvial, and talus deposits. They have developed as a result of the interactions of wind-blown sand and desert piedmont processes adjacent to mountain ranges in the Mojave Desert and occur next to regional and local sand transport corridors. Sand ramps are dominated by aeolian sand that was deposited as sand sheets against the mountain front, but also include significant fluvial units. Periods of geomorphic stability are represented by paleosols and talus accumulations. The sand ramps provide a record of the response of aeolian processes to climatic change in the Mojave Desert. Most are now relict features and accumulated in periods of higher sediment supply from fluctuating and/or desiccating paleolakes during the late Pleistocene and early Holocene.

Please provide information on sand ramps in the FEIR/EIS that can be used to accurately assess and evaluate soils in the PA for renewable energy projects.

Comment 5 - III.4.2.2.4. Page III.4-21

Desert Pavement

						PF/MBCA **Desert Pavement** *Please amend this description to accurately describe the formation of desert pavement.* Desert pavement is composed of close packed angular or rounded rock fragments with an often dark varnish cover. These layers cover fine-grained silt and clay particles derived from dust that collects beneath the rock pavement surface to form a distinct horizon (AV horizon) marked by very low infiltration rates. ~~The~~ In deeper soil horizons, the interstitial ~~and underlying material~~ dust-derived materials can be highly calcareous with low permeability….(6 lines up from the bottom) The tightly packed pebbles ~~and caliche rich (calcium carbonate) surface~~ of the desert pavement armor the underlying Av horizon, which in turn inhibits infiltration of precipitation. Together, they ~~and~~ promote~~s~~ runoff, which funnels water into adjacent small channels. Aeolian processes facilitate the formation of desert pavements. If desert pavement is damaged by vehicle traffic or grading, it loses its armoring function and can increase the likelihood of soil erosion from surface runoff. (David M. Miller, USGS, email communication February 13, 2015)
						Comment 6 – III.4.4.1, Page III.4-5, paragraph 3 **Geomorphology and Surficial Geology** PF/MBCA "Surficial geology concerns the unconsolidated geological surface materials that lie above bedrock; it is an important factor in soil formation and in the type and distribution of local desert vegetation. Figure III.4-1, Surficial Geology, presents the surficial geologic units within the Plan Area. Table R1.4-1, Surficial Geology in the Plan Area (in Appendix R1), defines the acreage of the geologic formations across the Plan Area. The table lists 39 separate geologic units, but most would not affect development of renewable energy projects. For this analysis, the most prevalent and important geologic units are described below:" These 4 'most prevalent and important geologic units' include alluvium, young volcanic rocks sand dunes, and landslide deposits. Alluvium and sand dunes are important for renewable energy projects. *Why are volcanic rocks and landslide deposits included on this list. I understand that both present hazards but that does not make them among the 'most prevalent and important". This is distracting and misleading*

					Comment 7 – <u>Figure III.4-1</u>, Page III.4-6 and <u>Table R1.4-1</u>, Pages R1-4.1 & 2 **Figure III.4-1, Surficial Geology & Table R1.4-1, Surficial Geology in the Plan Area (in Appendix R1)** PF/NRCS What is the purpose of including this table in the report? It is of no value to the reader unless they have a geology background. Even with a geologic background, one would have to know a little bit about the mineralogical makeup of the rock types named to make inferences as to how they might weather or (have weathered) into sands and silts and subsequently transformed into clays etc. Attempting to associate soil structure and surface hydrologic properties with surface geology is very poor science. I could go on and explain the relationship of certain rock types with weathered particles of this or that size but it becomes far to tedious. The point of listing this table is lost on me as there is little value that can be derived from as it stands. PF/MBCA *Please remove Figure III.4-1 & Table R1.4-1 from the FEIR/EIS as they do not provide useful data and confuse the public.*
					Comment 8 – <u>Table R1.4-2</u>, Page R1.4-3 and Figure 3-3, Page? **Table R1.4-2 and Figure 3-3 Soil Textures mapped within the PA** PF/NRCS With the information you have provided I can state that this is a very misleading map. In the first place, where did the authors (Dudek and ICF, 2012) get their data? The map cites USGS and USDA as sources for the data contained in the map. I have no idea what USGS could possibly contribute to a map of Soil Textures as they have no expertise in this field, at least not officially. The NRCS provides a map called STATSGO which was put together many years ago which was designed to provide basic soils information over a regional basis. This map was not ground-truthed nor was it based on robust site data which was subsequently extrapolated. Rather it was a “best guess” by “knowledgeable” individuals using existing soils information, sometimes from hundreds of miles away, and their own experience to guess what soil texture might occur on a certain landform. This information would be appropriate to use, so long as the limitations of the model were explained to the reader. I suspect that this data probably comes from the STATSGO model. The level of detail in the map is misleading and would lead the reader to assume that such

						data is actually available for the entire plan area. Remember there is a significant portion of this map which was derived from "guesses" from hundreds of miles away by people who in most cases had not been in any of the DRECP area. Using this map and the table data for anything other than general regional analysis would be outside the stated parameters of the STATSGO model and should be avoided. PF/MBCA *Please remove Table R1.4-2 and Figure 3-3 from the FEIR/EIS as they are misleading and probably based on inaccurate data. They distract and confuse the public.*
						Comment 9 – Appendix R, Page R2.4-2 & 4-3 **<u>Table R2.4-1</u> Acreages of Soil Textures within Developable Areas for each Alternative** PF/NRCS See my comments above. The data was probably derived from STATSGO and appears it is being used beyond its intended parameters. PF/MBCA *Please remove this table from the FEIR/EIS as it is misleading, confusing, and probably based on inaccurate data.*
						Comment 10 – Appendix R **<u>Figure R1.4-1 through Figure R1.4-10</u> Soil Textures within Ecoregion Subarea** PF/NRCS As before, where is the data source? The reader is led to assume that this data represents actual soil textures in the various Ecoregion Subareas. In addition, the location of the soil texture is not specified. Is this the surface soil texture, the dominant soil texture in a certain depth or something different? If it were representing surface texture then what will the data be used for? Surface textures usually are often only 1 to 3 inches thick before changing to some other texture. I would suspect that at least three inches of soil will be removed during any grading process, rendering the information practically useless for predicting erosion, or PM10/dust/health issues. At any rate, the data is more likely to be incorrect than correct if STATSGO is used. The use of texture modifiers has been used in relation to soil textures in all of the preceding tables and maps. This is even more difficult to "guess" remotely than is soil texture. As

						before, I would be curious as to how they arrived at such specific textural modifiers without extensive site visits. The textural modifiers would certainly dictate different BMPs at different sites, but how can one be sure the listed modifier or soil texture actually occurs in a particular polygon without onsite data? PF/MBCA *Based on the comments above (and below) by PF/NRCS, we request NRCS soil studies and data be incorporated into DRECP to accurately characterize the DFAs for solar energy projects. Please consult with NRCS on how to display and characterize soils in the Ecoregions. Please include the DFAs (outline only is okay) on the Subarea maps.*
						IV.4.3.2 Preferred Alternative Comment 11 PF/MBCA **Impact SG-2** (Page IV.4-24) The discussion of soil erosion and sand transport are not substantive. The generalize statements referring to 516,000 acres of soils with moderate-to-high potential for wind erosion is meaningless. *We need to know the soil map units and characteristics before grading begins, if mitigation and restoration are to be effective. That information is entirely missing from the DRECP, nor is there any indication in the cited literature that anyone knows where to get it. The public, however, is led to believe that there is a great deal of information contained in all the tables and figures if only s/he were smart enough to understand what it all meant.* Comment 12 PF/MBCA **AM-PW-9** (Page 4-27) We are informed that implementation of project specific drainage, erosion, and sediment control actions will meet the approval of the **DREP Coordination Group** (DCG) and the applicable regulatory agencies, and will be carried out during all phases of this project. *Please give more information on the DCG, it is mentioned only briefly*. The content in this chapter and the cited literature do not support awareness of the science supporting drainage, erosion, and sediment control to be used throughout the project. *Whereas we can document change, where has control of drainage, erosion, and sediment on square miles of graded land been tested?*

						Comment 13 PF/MBCA **AM-PW-10** (Page IV.4-27): "Use construction and installation techniques that minimize new site disturbance, soil erosion and deposition, soil compaction, disturbance to topography, and removal of vegetation…" What is meant by "new site disturbance"? The solar development sites could be anywhere from 1.5 to 8 square miles. *I submit the following description and request it (or a similar treatment) be included in the FEIR/EIS. If it is not accurate a complete accurate description must be provided in the FEIR/EIS in an obvious (maybe 2 obvious) locations* "Plowing and ripping soil destroys the upper soil horizons, ruptures roots and destroys surface plants, and destroys biological soil crusts. Altered soil structure, soil armor, and plant communities lead to soil erosion by wind and water, nutrition loss, and widespread down-gradient effects. In addition to the altered water and nutrient cycling in soil and plant cover, animal habitat structure is significantly altered by agricultural type clearings. Erosion, transport, and redeposition of soil creates down-gradient effects that include abrasion and burial of plants, inhibited germination and growth, and altered plant species composition." (David M. Miller, USGS, email communication, February 13, 2015) The following publications on small drainage channels and their importance to plant communities and not in the DRECP referenced literature. PDFs will be provide with these comments. **The comparative importance of overland runoff and mean annual rainfall to shrub communities of the Mojave Desert** William H. Schlesinger and Cynthia S. Jones Bot. Gaz. 145 (1): 116-124. 1984 ABSTRACT The density, biomass, and pattern of shrubs on a desert piedmont in southern California were measured in a series of plots from which sheet-flow and stream-channel runoff from adjacent mountains have been excluded for 45 years. The plots were compared with undisturbed adjacent areas in which soil moisture is derived from both runoff and incident precipitation. Larrea tridentata and Ambrosia dumosa showed significantly lower density in areas of drainage diversion. There were no differences in mean shrub biomass for A. dumosa, but in areas of drainage diversion, mortality of L. tridentata was concentrated among larger individuals. The remaining population of smaller shrubs showed a more aggregated pattern than the population in undistributed sites. Biomass per hectare was lower for both species in areas of drainage diversion. Desert shrub communities depend on

soil moisture recharge during periods of overland runoff. Sources of runoff are important to consider in studies of composition and pattern of desert shrubs.

The influence of stream channels on distributions of *Larrea tridentata* and *Ambrosia dumosa* in the Mojave Desert, CA, USA: patterns, mechanisms and effects of stream redistribution

S. Schwinning, D. R. Sandquist, D. M. Miller, D. R. Bedford, S. L. Phillips, and J. Belnap

ECOHYDROLOGY Ecohydrol. (2010) Published online in Wiley InterScience (www.interscience.wiley.com) DOI: 10.1002/eco.116

ABSTRACT Drainage channels are among the most conspicuous surficial features of deserts, but little quantitative analysis of their influence on plant distributions is available. We analyzed the effects of desert stream channels (‘washes’) on *Larrea tridentata* and *Ambrosia dumosa* density and cover on an alluvial piedmont in the Mojave Desert, based on a spatial analysis of transect data encompassing a total length of 2775 m surveyed in 5 cm increments. Significant deviations from average transect properties were identified by bootstrapping. Predictably, shrub cover and density were much reduced inside washes, and elevated above average levels adjacent to washes. Average *Larrea* and *Ambrosia* cover and density peaked 1Ð2–1Ð6 m and 0 Ð5–1Ð0 m from wash edges, respectively. We compared wash effects in runon-depleted (-R) sections, where washes had been cut off from runon and were presumably inactive, with those in runon-supplemented (CR) sections downslope from railroad culverts to help identify mechanisms responsible for the facilitative effect of washes on adjacent shrubs. Shrub cover and density near washes peaked in both CR and -R sections, suggesting that improved water infiltration and storage alone can cause a facilitative effect on adjacent shrubs. However, washes of <2 m width in CR sections had larger than average effects on peak cover, suggesting that plants also benefit from occasional resource supplementation. The data suggest that channel networks significantly contribute to structuring plant communities in the Mojave Desert and their disruption has notable effects on geomorphic and ecological processes far beyond the original disturbance sites.

						Comment 14- IV.4.3 Impact Analysis, IV.4.3.2.7.1, Page IV.4-36 **<u>Table IV.4-3</u> Comparison of Preferred Alternative With No Action Alternative** PF/NRCS The acres of soils with “moderate to high potential” for wind or water erosion is listed in this table. I do not see a citation for their source of this data. I must assume the data was once again derived from other data. As such it is impossible to know if these numbers represent anything realistic. The table seems to indicate that water and wind erosion are both issues in the DRECP plan area. This is in fact not true. With an average of around 4 inches of rainfall per year, water erosion is of minor concern. Water is channeled in concentrated areas when it rains and very little erosion occurs, particular sheet erosion which is most damaging. The assumption is often made that erosion is an issue because of the dramatic features caused by channeled water in the desert. The actual acreage affected by water erosion in the desert is small. Most of that acreage would never be considered for development for the simple fact that water runs through there when it rains and engineering for that limitation would generally not be cost effective. On the other hand, wind erosion is a much larger problem. Without knowing how these numbers were derived we cannot really estimate anything. Are these surface textures? If so, much of the desert will be fine so long as it is not disturbed. Are these subsurface textures? If so, then we have something to work with, assuming we know that the subsurface textures are moderately accurate. The source of the original soils data is once again the major problem with this table. PF/MBCA *Please remove this table from the FEIR/EIS as the conclusions are unsupported in the text or cited literature and do not support analysis of the solar energy development in the PA.*
						Comment 15 –Appendix R, Page R2.2-3 **<u>Table R2.2-2</u> Potential Acres of Dust Emission Sources by Technology…** PF/NRCS My first thought in viewing this table is what is being considered as the definition of “dust”. The PM-10 or PM-2.5 dust fractions both have different implications on human health. There is “dust” that falls outside of these size fractions which may be generated by wind of

						sufficient velocity and duration which may be a visibility hazard but may only occur infrequently. There is no quantification of what is meant by “dust” or whether this nuisance/hazard will only occur during construction or will be a result of the construction activities and become a permanent issue. Will this dust be generated all at once or is the estimate for an unspecified period of time? How is this estimate derived? Soils data is needed to generate these numbers. All of the concerns previously mentioned as to whether the soil data used refers to the surface layer or the subsurface layer apply. PF MBCA *Please remove this table from the FEIR/EIS as the conclusions are unsupported in the text or cited literature and do not support analysis of the solar energy development in the PA. Please consult with NRCS for appropriate analysis.*
						Comment 16 – Appendix R, Page R2.4-4 **<u>Table R2.4-2</u> Acreage of Erosive Soils …** PF/NRCS I assume the data used to generate this table comes from STATSGO where K factors are used to determine the probable erosivity. Please see comments I made previously regarding the use of STATSGO as well as the methodology used in deriving the “data”. It would be difficult to actually produce a map showing this erosivity due to the number of assumptions that would need to be made. Soil map units in STATSGO (and in all soil surveys) may be composed of more than one soil depicted in a single polygon on a map. Each soil in a map unit may have a different erosivity but due to the relationship of the soils to each other and the landscape it may be difficult or impossible to show which parts of a given polygon belong to which soil, etc. At a minimum it would require significant effort to attempt to create a map based on erosivity for such a large scale. PF MBCA *Please remove this table from the FEIR/EIS as the conclusions are unsupported in the text or cited literature and do not support analysis of the solar energy development in the PA.*
						Comment 17 – Appendix R, Page R2.4-5 **<u>Table R2.4-3</u> Acreage of Expansive Soil Textures …** PF/NRCS It appears that this table uses the previous “Soil Textures” products to pull out the high clay textures and assign their acreages as reflecting the expansive soil textures in the area. This

						indicates ignorance of the structure and mineralogy of expansive soils. To simplify, depending on its mineralogy, a particular "clay" soil may be non-expansive, expansive or something in between. Many soils may be minimally expansive but this expansiveness will not affect the use of the soil. There is no quantification of what "expansive" means nor to what extent will it affect the project, nor which parts of the project will be affected. It does not assign a negative or positive connotation to "expansive" so the reader is left with a number which has little meaning. PF MBCA *Please remove this table from the FEIR/EIS as the conclusions are unsupported in the text or cited literature and do not support analysis of the solar energy development in the PA.*
						Comment 18 - III.7.3 Ecological Processes, III.7.3.1 Environmental Gradients, Page III.7-22 **Table III.7-8 and Figure 3-2 Distribution of Elevation Ranges…and Topography** PF/NRCS I have no idea what the significance of relevance of this Table and Figure is. There is no mention if one elevation range over another is desirable for one renewable energy project or another. It seems superfluous at best. The data and map are easily reproducible. PF MBCA *Please remove this table and figure from the FEIR/EIS as the conclusions are unsupported in the text or cited literature and do not support analysis of the solar energy development in the PA.*
						Comment 19-_III.7.3.1 Environmental Gradients, Page III.7-22 & 23 **Table III.7-9** **Distribution of Slope Ranges …** PF/NRCS This is a useful table but should be supported in the text as to what the significance of a slope range or slope ranges is to a particular renewable energy project. I am not sure why it is "notable" that 1 percent of the plan area is entirely flat. Very little of the earth's land surface is entirely flat. This data is readily available and easily duplicated. PF MBCA *Please discuss in the text of the FEIR/EIS what the significance of the slope ranges is to a*

						particular energy project.
						Comment 20 - III.7.3.1 Environmental Gradients, Page III.7-23 & 24 **Table III.7-10** **Distribution of Aspect …** PF/NRCS This is another useful table but should be supported in the text as to the significance of aspect, particularly as regards solar projects where this becomes critical information as to suitable siting locations. PF MBCA *Please discuss the significance of aspect in siting solar projects in the text of the FEIR/EIS.*

To submit comments, please deliver or send them to the following:

Email Address: docket@energy.ca.gov
Fax: (916) 654-4421
U.S. Mail or Other Delivery Address:

California Energy Commission
Dockets Office, MS-4
Docket No. 09-RENEW EO-01
1516 Ninth Street
Sacramento, CA 95814-5512

When submitting comments via e-mail, please use either Microsoft Word format or Portable Document Format (PDF). Please also include "DRECP NEPA/CEQA" in the subject line or your email comment or first paragraph of your mail comment.

Below find the comments send by Peter Fahnestock, Research Soil Scientist. USDA/Natural Resource Conservation Service to Pat Flanagan on January 30, 2015

January 30, 2015
Pat Flanagan
Morongo Basin Conservation Association

Hello Pat,

Thank you for the opportunity to comment on your concerns regarding the DRECP (Desert Renewable Energy Conservation Plan), particularly in regards to the soils and geological information given in the report. You stated that in your opinion the soils data presented in the report was either vague, misleading or of no practical use for evaluating the actual impact of the plan on the desert environment.

As an employee of the USDA Natural Resources Conservation Service (NRCS) I will refrain from offering a personal opinion on the plan itself. However, I am comfortable in examining each of the tables, maps and sections you listed and commenting as to whether, in my opinion, they provide accurate and realistic data which a concerned individual could use to reasonably assess the impact of the proposed plan on the desert environment at one or all of the Development Focus Areas (DFAs).

My background as a Soil Scientist, combined with over 20 years of experience in the area covered by the DRECP makes me uniquely qualified to offer my opinions. I have been intimately acquainted with the soils in the area covered by the DRECP, and in some cases have been the individual responsible for initially collecting what soil data is available for a particular area. I should reiterate that I have not collected any soils data at the request of the DRECP nor have I been asked by the DRECP agencies to collect soils data for the DRECP. USDA-NRCS is the agency tasked with obtaining all the official soils data in the United States and it is my opinion that much of the information contained in the plan was derived from data originally obtained from NRCS via public access. I am not a Geologist, thus any opinions offered by myself relating to geology, are based on my field knowledge of geology as it relates to soils data I have personally collected or observed in situ.

I will offer my comments on each of the tables, maps, paragraphs you have listed as being of concern to you.

<u>Table III.4-1</u> Soil Types and Textures within the Plan Area

In this table 4 “Soil Types” are listed. There are “Textures” associated with each of these soil types. The textures listed cover most but not all of the textures associated with Clay and Sand in the plan area.

The definition of Clay is misleading as clay does not form “an impermeable” layer in the soil unless it has been deliberately and highly compacted under a narrow set of moisture conditions.

The definition of Sand is incorrect as it does not result from “erosion of siliceous and other rocks…” but rather from the natural weathering processes from which all soils originally came.

The definition of Loam is incorrect, especially as regards the plan area, where it is assumed to be “fertile soil…” and “… containing organic components…” Loam, by definition, does not necessarily translate into a fertile soil, although there are fertile loams and very infertile loams. More factors must be taken into consideration before fertility can be assigned.

Finally, Bedrock is not a soil type, nor does the definition give the reader much useful information as the definition specifies that "solid rock … underlying loose deposits such as soil or alluvium." In reality all of the previous Soil Types should be included under Bedrock per this definition as they are all underlain by bedrock. The term "alluvium" is indicative of any soil material deposited in its current location by water. All of the soil in the plan area with the exception of soils on the mountains and rock pediments, sand sheets and dunes, and those soils in the playas is alluvium. This would approximate to be around 18 million of the 22.5 million acres covered by the plan area.

The "Textures" column lists soil modifiers such as "cobbly" and "gravelly". These are not textures but rather modifiers to textures. An unwary reader would not know this fact. This table does nothing to inform the reader about the "Soil Types" in the plan area, nor do I see how this is useful in making any kind of assessment, evaluation or judgment on the suitability of soils of the plan area for renewable energy projects.

<u>III.4.2.2.1</u> Soils Prone to Erosion

The first paragraph lists "silt and very fine sand" as being the most erodible by wind. Very fine sand is not listed in the previous table as being a textures which occurs in the plan area. This points back to the confusing nature of the previous table. In fact, very fine sand is nearly indistinguishable from fine sand when it comes to the forces of wind erosion. An examination of the sands in eolian deposits will show that the majority of them are "fine" sands as opposed to "very fine" sands. There are few deposits in the world where the soil textures are dominated by silts and none of these occur in the plan area. There are far more deposits where the soil textures are dominated by very fine sand but these situations are rare in the plan area and the amount of acreage they comprise would be negligible.

The statement "Aggregated soils that are bound together with high amounts of organic matter..." is misleading as it indicates that organic matter in high quantities is needed for aggregation. There is no quantification of what "high amounts" of organic matter is. In the plan area, 0.5% organic matter is considered to be "high" and this percentage rapidly declines below about 2 inches to less than 0.25% in most cases. The truth is aggregated soils are more resistant to erosion but that is not because "their more cohesive particles are larger" but rather the aggregates formed by these particles are larger than the individual particles themselves; and although organic matter can play a role in aggregation, it does not address the fact that the most aggregated soils in the plan area occur well below the 2 inches where we have the maximum amount of organic matter.

The statement that "highly permeable soils are the most resistant to erosion" is also misleading. First, there is no definition of "highly permeable soil" nor is there an indication of what units or ranges are used to measure permeability. This statement does not take into account that well aggregated soils which would not be assumed to be permeable by the nature of their individual particles may be so due to the actual fact of their aggregation and resulting structure.

The sentence regarding highly permeable soils finishes with the following completely false statement that highly permeable soils are "promoting soil compaction". I will just leave this statement as is because the writer either did not proof read their statement or really had no clue as to what they were saying.

The biggest issue with this section is that after reading it the reader has absolutely no more information about the soils in the plan area than before reading it.

<u>Table R1.4-1 and Figure III.4-1</u> Surficial Geology in the Plan Area

What is the purpose of including this table in the report? It is of no value to the reader unless they have a geology background. Even with a geologic background, one would have to know a little bit about the mineralogical makeup of the rock types named to make inferences as to how they might weather or (have weathered) into sands and silts and subsequently transformed into clays etc. Attempting to associate soil structure and surface hydrologic properties with surface geology is very poor science. I could go on and explain the relationship of certain rock types with weathered particles of this or that size but it becomes far to tedious. The point of listing this table is lost on me as there is little value that can be derived from as it stands.

<u>Table R1.4-2 and Figure 3-3</u> Soil Textures Mapped within the Plan Area

With the information you have provided I can state that this is a very misleading map. In the first place, where did the authors (Dudek and ICF, 2012) get their data? The map cites USGS and USDA as sources for the data contained in the map. I have no idea what USGS could possibly contribute to a map of Soil Textures as they have no expertise in this field, at least not officially. The NRCS provides a map called STATSGO which was put together many years ago which was designed to provide basic soils information over a regional basis. This map was not ground-truthed nor was it based on robust site data which was subsequently extrapolated. Rather it was a “best guess” by “knowledgeable” individuals using existing soils information, sometimes from hundreds of miles away, and their own experience to guess what soil texture might occur on a certain landform. This information would be appropriate to use, so long as the limitations of the model were explained to the reader. I suspect that this data probably comes from the STATSGO model.
The level of detail in the map is misleading and would lead the reader to assume that such data is actually available for the entire plan area. Remember there is a significant portion of this map which was derived from “guesses” from hundreds of miles away by people who in most cases had not been in any of the DRECP area. Using this map and the table data for anything other than general regional analysis would be outside the stated parameters of the STATSGO model and should be avoided.

<u>Table R2.4-1</u> Acreages of Soil Textures within Developable Areas for each Alternative

See my comments above. The data was probably derived from STATSGO and appears is being used beyond its intended parameters.

<u>Figure R1.4-1, Figure R1.4-10, Figure R1.4-7</u> Soil Textures within __ Ecoregion Subarea

As before, where is the data source? The reader is led to assume that this data represents actual soil textures in the various Ecoregion Subareas. In addition, the location of the soil texture is not specified. Is this the surface soil texture, the dominant soil texture in a certain depth or something different? If it were representing surface texture then what will the data be used for? Surface textures usually are often only 1 to 3 inches thick before changing to some other texture. I would suspect that at least three inches of soil will be removed during any grading process, rendering the information practically useless for predicting erosion, or PM10/dust/health issues. At any rate, the data is more likely to be incorrect than correct if STATSGO is used.

The use of texture modifiers has been used in relation to soil textures in all of the preceding tables and maps. This is even more difficult to "guess" remotely than is soil texture. As before, I would be curious as to how they arrived at such specific textural modifiers without extensive site visits. The textural modifiers would certainly dictate different BMPs at different sites, but how can one be sure the listed modifier or soil texture actually occurs in a particular polygon without onsite data?

Table IV.4-3 Comparison of Preferred Alternative….

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On the other hand, wind erosion is a much larger problem. Without knowing how these numbers were derived we cannot really estimate anything. Are these surface textures? If so, much of the desert will be fine so long as it is not disturbed. Are these subsurface textures? If so, then we have something to work with, assuming we know that the subsurface textures are moderately accurate. The source of the original soils data is once again the major problem with this table.

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Table III.7-10 Distribution of Aspect …

This is another useful table but should be supported in the text as to the significance of aspect, particularly as regards solar projects where this becomes critical information as to suitable siting locations.

If I can be of further assistance with the soils of the area please consider contacting me.

Peter Fahnestock
Resource Soil Scientist
Victorville, California
USDA-Natural Resources Conservation Service