WHICH WAY THE WIND BLOWS – SO GOES THE DUST

In the Mojave River Valley

by Pat Flanagan

Disquiet follows planning for Utility-Scale Solar (USS) development in rural San Bernardino County. Anxiety preoccupies wary residents in the unincorporated communities of Lucerne Valley, Daggett, and Newberry Springs, each targeted with thousands of acres of 15- to 20-foot-high, rotating solar panels with visible glare from all directions for many miles. This article is not directed at the Desert Renewable Energy Conservation Project (DRECP) or the Bureau of Land Management (BLM). This article is asking all agencies, county, state, and federal, to step back and look at location, location, location…and seriously evaluate the social justice and environmental consequences before approving solar projects sited on stabilized sand transport paths covered with carbon sequestering plants.

The county has under review three USS projects located on 2,700-acres (4.2 mi^2) of private land on either side of San Bernardino County Scenic Highway 247 in Lucerne Valley. There are another two projects on 5,500-acres (8.6 mi^2) within the Mojave River Valley (1) to the north and east of Barstow. This list doesn't include the 2,850-acre (4.5 m^2) Aurora Sorrel Solar project on state lands just east of Hwy 247, or the 112 miles of new transmission lines through both BLM and private lands connecting the substations in Barstow and Daggett with the planned Calcite substation in Lucerne Valley. The project locations are in favored low slope windy corridors with soils susceptible to eolian (wind) dust and sand transport, especially when disturbed. (2)

The communities receive no benefit from these solar projects and much will be taken from them should these projects be constructed, beginning with their air quality and the health impacts from fugitive dust (PM10). Wind-blown dust events are particularly hazardous to human health during the spring months, or any time the wind exceeds 15 mph.Traditional watering trucks and work stoppage are not the answer to this scale of disturbance. Based on their Owens Lake experience, the Great Basin Unified Control District would require four inches of 3/8 inch gravel over the entire area of a solar development to control dust. (3)

I first reported on sand transport paths and PM10 emissions (particulate matter less than 10 microns in diameter) in the March 2017 *Desert Report*. Sand transport paths, or sand sheets, are wind-driven low relief-accumulations of eolian sand deposits found in the basins between mountain ranges. Source areas for the sand are dry lakes, or in the case of the Daggett/Newberry Springs area, the Mojave River. Vegetation (usually creosote and big galleta grass [4]) and saltbush scrub (5) are the stabilizing plant communities for these particular soils. The root systems in the low-fertility soil "*form symbiotic associations with microorganisms that improve nutrient availability and uptake. The two root symbioses that are most significant in deserts are the mycorrhizal fungi and rhizobial bacteria."* (6) All goes well unless the stabilizing root systems are destroyed by activities such as unauthorized off highway vehicle riding, grading for agriculture, and now USS developments. The destruction of the vegetation, both above and below ground, is catastrophic, especially when grading is done on a massive scale. Restoration,

natural and intentional, can take from decades to hundreds of years before ecosystem function is restored. (See Figure 2) The cost can be very high.

In 2012 the Nature Conservancy produced a report identifying areas with least environmental conflict for solar energy siting in the West Mojave Desert. Their identified avoidance areas included dunes and sand transport areas. (7) Supporting this finding was the work of United States Geological Survey (USGS) scientists Bedford and Miller. Using topography and surficial geology, they assembled a poster to inform decision makers that data sets are available from the USGS that can help evaluate the best low-gradient smooth topography locations for large-footprint energy installations. "*These installations impact areas of 400 to 2000 hectares each, requiring land-use assessments that are novel compared to past decisions for relatively small installations such as mine sites and roadways*." The data cover an area of 40,400 km^2 stretching from Lancaster and Mojave on the west to Jean, NV, and Goffs CA, on the east.

The analyses demonstrated that "*About 48% of the entire area has less than 5% slope, and 8.3% has 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*." Ownership of the land with the favored 0-1% slope is 34% BLM and 42% Private.

Conclusions: If you plan to build utility-scale solar on 0-1% slope, dust will be a big problem. Steeper (1-3%) slopes characterize more of the desert and have less susceptibility to floods and eolian hazards.

National Resource Conservation Service (NRCS) Soils Analysis.

The place to go for soils information is the US Dept. of Agriculture NRCS office in Victorville, also home to the Mojave Desert Resource Conservation District (RCD). (8) Not being a farmer it is surprising I found my way there. Here you can find descriptive information to understand the scope of the air quality problems if even one of the solar projects under review is approved and built. Our bible is the *Soil Survey of San Bernardino County California Mojave River Area*. The field work was completed in 1978 by the Soil Conservation Service (now NRCS) and published as a boxed set with a report and paper maps. The files were digitized in 2003, and they are now publicly available. Community members are working to enlighten county planners, decision makers, and the Mojave Desert Air Quality Management District (MDAQMD) with GIS maps showing the proposed solar projects on soils hazardous for dust within the Soil Survey Boundary.

Dust and Water

USS projects are at a scale of impact requiring the preparation of an Environmental Impact Report (EIR) under the California Environmental Quality Act (CEQA). The EIR covers seventeen environmental factors including air quality, hydrology/water quality, and geology/ soils. Soil units and their hazard for blowing dust affect air-quality and water use, yet their consequences are rarely identified and described. Till now, the San Bernardino County has not

required that soil units and their dust potential be provided. The County relies on the AQMD to determine the air quality impacts. The AQMD does not require soil information, and the Environmental Protection Agency approved monitors are in urban locations and are thus unable to provide strategic baseline data or predict the air quality impacts for projects in the eastern desert planning area. The AQMD has purchased Purple Air monitors (9) designed for individual use and begun locating them in critical areas. The monitors measure PM10 and PM2.5 for the Air Quality Index (AQI) value and report in real time to the Purple Air Map. (10) This is a positive step forward.

The county requires an AQMD approved Dust Control Plan before construction. (11) Water is the default dust suppressant and the location and size of the water source must be provided. Lucerne Valley, Daggett, and Newberry Springs rely on groundwater and supplies are restricted and expensive. In Lucerne Valley the cost is now $.01/gallon. Just a penny? Yes, but in 2013 the amount considered necessary to adequately suppress the dust on 230 acres during the construction of two solar projects on Camp Rock Road was 70 acre-feet. The soil unit descriptions noted only a *slight* hazard of eolian dust. An acre foot of water is 326,000 gallons. At today's price that water would have cost $228,200. The Sienna Solar proposal on Lucerne Dry Lake (highly dusty when disturbed) is 1,625 acres, seven times the size of the Camp Rock Road projects and, conservatively, could need 560 acre-feet of water. If you do the math, remember that when you add in the acreage of the other proposed projects, the collective total will jump to 5,666 acres. The cumulative demand, cost, and supply of water becomes prohibitive.

The linked soil, water, and dust problem in the Daggett/Newberry Springs area (the Mojave River Valley) exceeds that in Lucerne Valley. Julie Laity's (2003) research traces the history of this arid valley and how the connection between an aquifer fed by infrequent recharge events from the surrounding mountains and the growth of agriculture eventually led to a complete dependence on groundwater. Over time the lowering of the groundwater table caused the death of stabilizing vegetation, and today the volume of active sand poses threats to human habitation. The dust has been blamed for fatal highway accidents. She concludes that "*Destabilization of the aeolian environment is not a consequence of drought or climatic fluctuations but is related solely to anthropogenic* [human] *influences."* (12) Could there be a worse place to industrialize by grading thousands more acres for a field of solar panels?

If the County of San Bernardino approves all projects under review, 3200 residents in the Mojave River Valley and 5800 residents in Lucerne Valley could be forced to either abandon their homes and flee or suffer the lung and heart damage associated with fugitive dust. (13) Why should anyone have to sacrifice their well-being and homes, especially when California has slashed emissions and is meeting its greenhouse gas goal years early. (14) As for location, location, location…solar belongs on rooftops and near point of use, not in favored low slope windy corridors covered with plants sequestering carbon into soils susceptible to eolian dust and sand transport.

The San Bernardino County Vision Statement includes the following promise

From our valleys, across our mountains, and into our deserts, we envision a county that is a destination for visitors and a hope for anyone seeking a sense of community and the best life has to offer.

Footnotes in this article can be accessed on the *Desert Report* website (*www.desertreport.org*) by clicking the button "notes."

To see what PG&E is doing on just 22 acres in the Mojave River Valley go to http://newberryspringsinfo.com/Alliance/PG&E.html

And then visit YouTube to watch the Sand Transport Paths and Sand Rivers flow across the Mojave River Valley on April 29, 2018: https://www.youtube.com/watch?v=NuOqSgLtKl8&t=78s

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(1) http://www.sbcounty.gov/uploads/LUS/Renewable/SolarProjectList_Maps.pdf Click on APN numbers for maps.

(2) David R. Bedford and David M. Miller. USGS Poster 2013. Assessing the geology and geography of large-footprint installations in the Mojave Desert, California and Nevada. PDF available.

(3) https://www.gbuapcd.org/OwensLake/DustControls/

(4) https://esis.sc.egov.usda.gov/ESDReport/fsReport.aspx?id=R030XB148CA&rptLevel=communities&approved=yes&repType=regular&scrns=&comm

(5) https://prod.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_045521.pdf

(6) David A. Bainbridge. A Guide for Desert and Dryland Restoration: New Hope for Arid Lands. 2007. Island Press. Page 22.

(7) https://www.scienceforconservation.org/assets/downloads/West-Mojave-Assessment-2012.pdf

(8) For more on the MDRCD its mission and ongoing work go to http://www.mojavedesertrcd.org/

(9) https://www.purpleair.com/

(10) http://mdaqmd.ca.gov/home/showdocument?id=2435

(11) Julie Laity (2003) Aeolian Destabilization Along the Mojave River, Mojave Desert, California: Linkages Among Fluvial, Groundwater, and Aeolian Systems, Physical Geography, 24:3, 196-221 PDF attached.

(12) https://www.sfchronicle.com/business/article/California-hits-2020-greenhouse-gas-reduction-13066821.php

(13) https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm

(14) https://www.sfchronicle.com/business/article/California-hits-2020-greenhouse-gas-reduction-13066821.php