Sand Transport Paths in the Mojave Desert

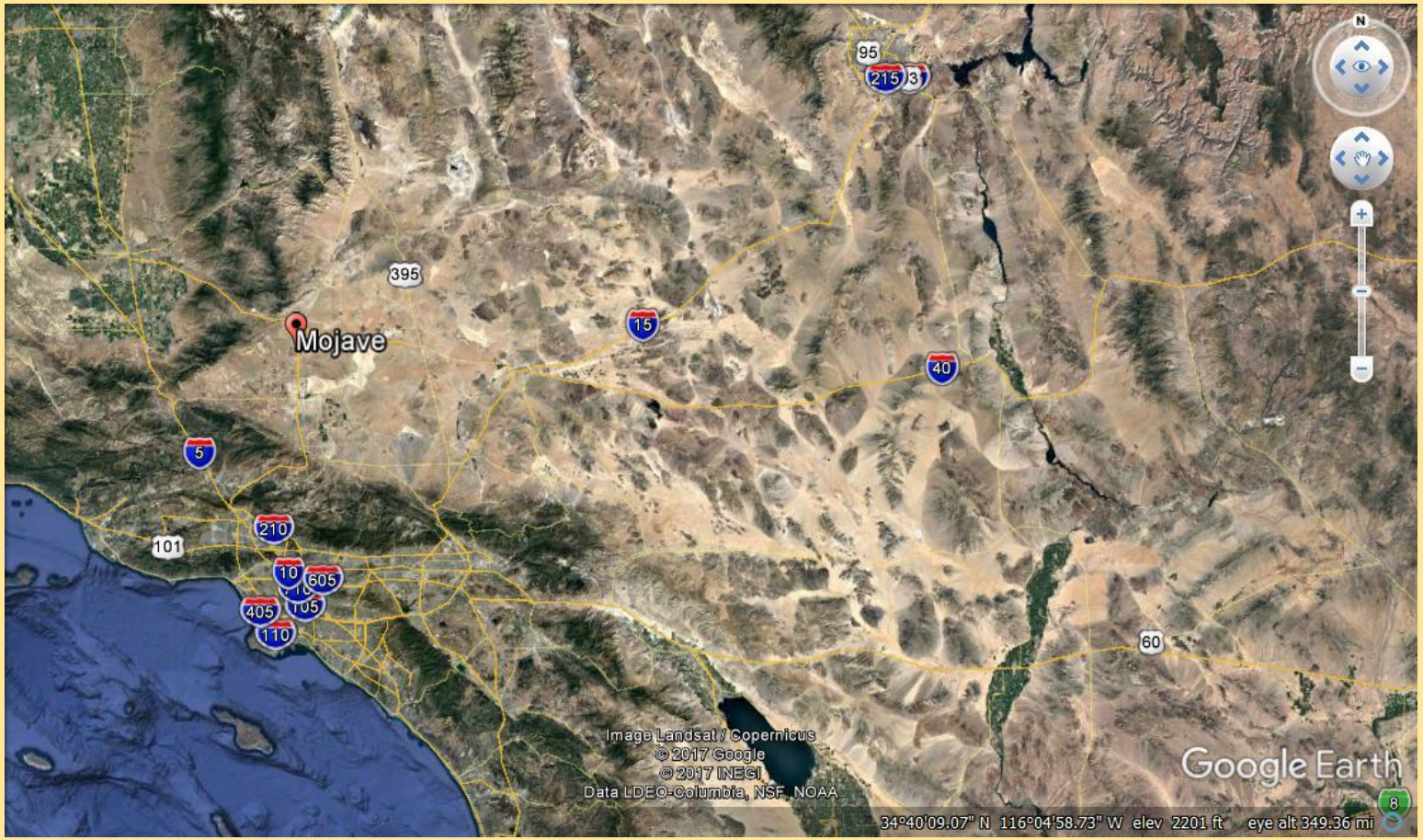
Lack of Monitoring Stations, Soil Analyses, and the Outdated Rule 403.2 Put Communities and the Environment at Risk

Sierra Club Desert Committee Meeting
February 11, 2018

Pat Flanagan
Member Morongo Basin MAC
Board Member MBCA
Technical Advisory Committee Mojave Desert AQMD
Patflanagan29@gmail.com

USGS - Assessing the geology and geography of large-footprint energy installations in the Mojave Desert, CA and NV

"About 48% of the entire area is less than 5% slope, and 8.3% is less than 1% slope, the favored slope category for large footprint energy installations. ***For the 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…"***



David R. Bedford and David M. Miller. USGS Poster 2012

From my House

Looking north across fine-grained alluvial deposits to the 29 Palms Marine Base.

Notice

The fine-grained deposits form sand ramps on the Bullion Mountains

Same Location Different Day

Fine-grained eolian dust obscures the Marine Base.

Source of the dust is Johnson Valley OHV area via NW winds.

The local vegetated area is not the dust producer.

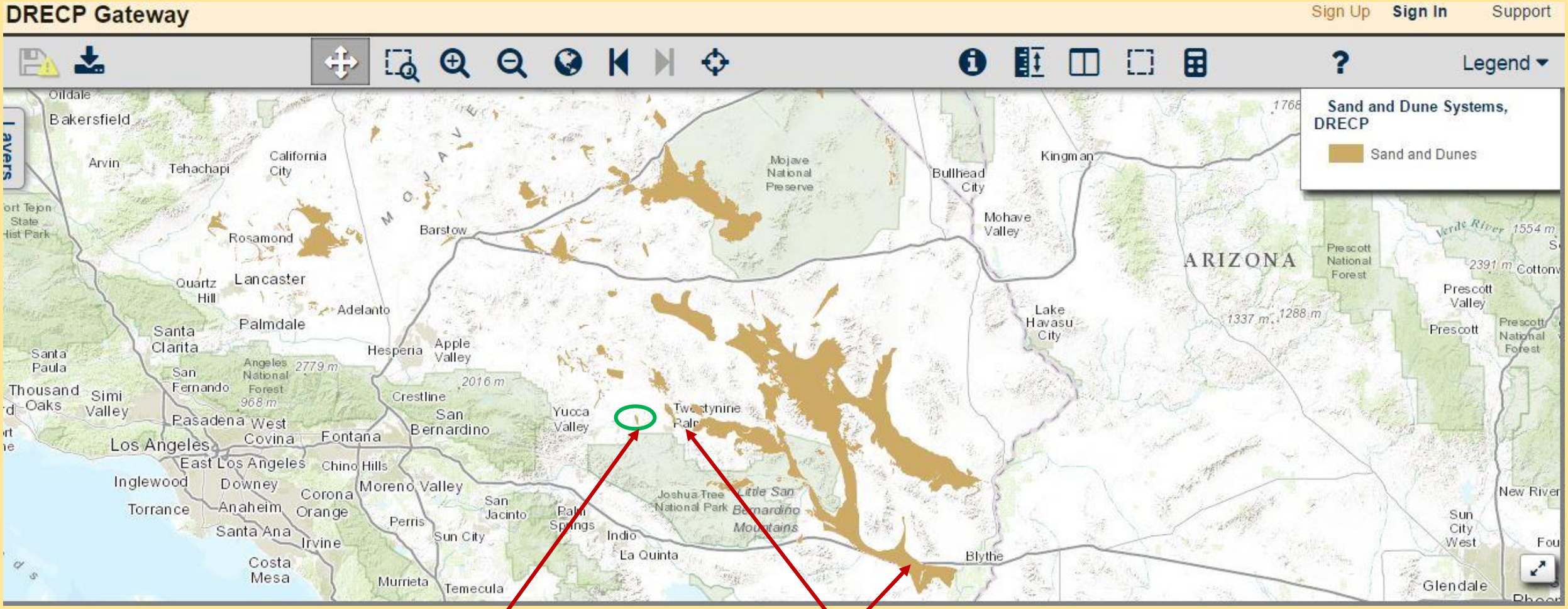
Clark's Pass Sand Transport Path

A Linear Dune you can drive almost to Blythe

Picture location previous 2 slides

Map of Sand and Dune Systems to support the DRECP

Data Basin



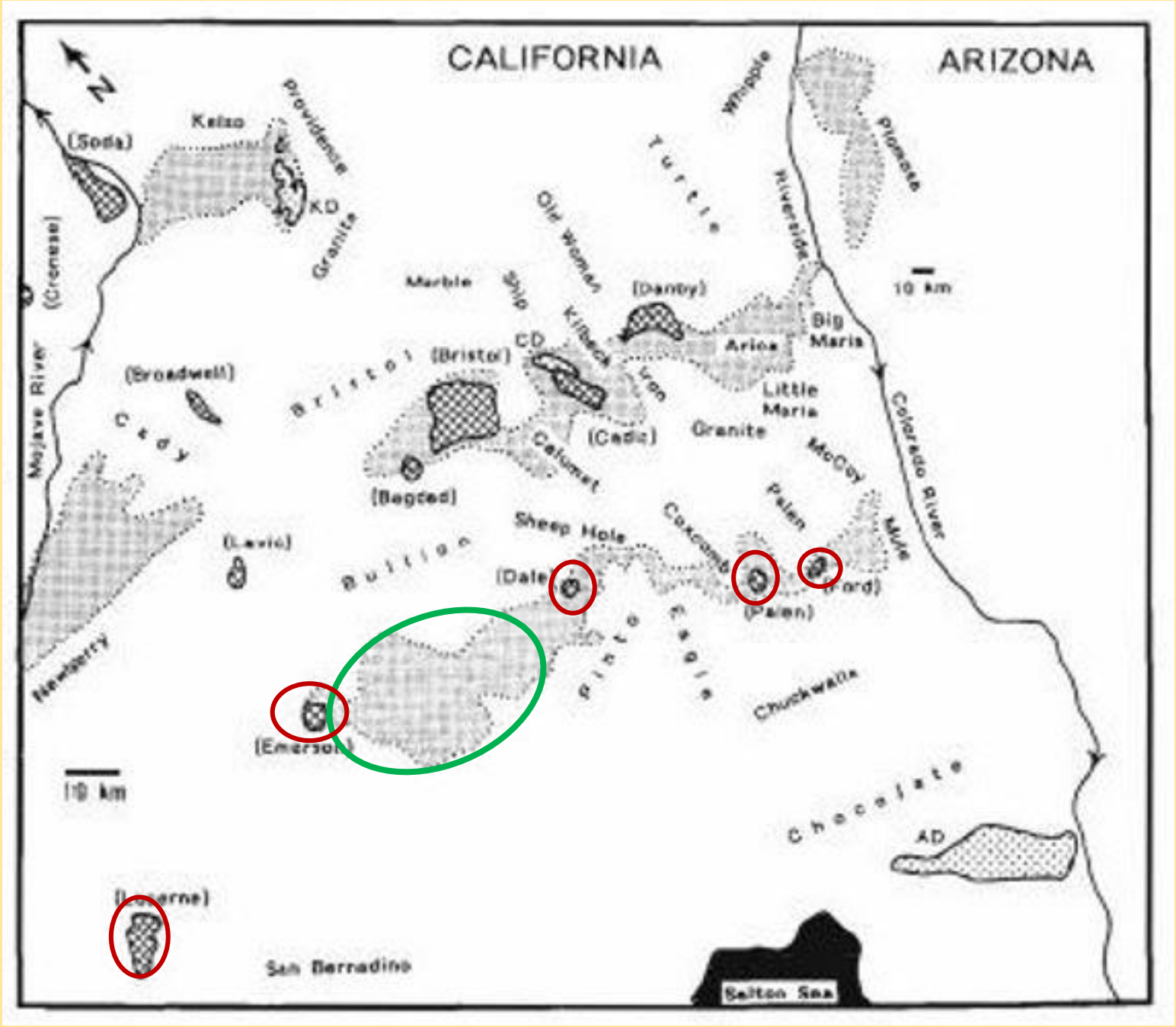
The Green Circle - Us **Clark's Pass** **Sand Transport Path**

WITHIN the Green Circle
Dust sources include **3 solar facilities** (350 acres), **Copper Mountain College**, **Coyote Dry Lake, dirt roads** and **<u>where vegetation has been removed</u>**.

Active Sand Sources – red circles
Emerson Dry Lake
Lucerne Dry Lake

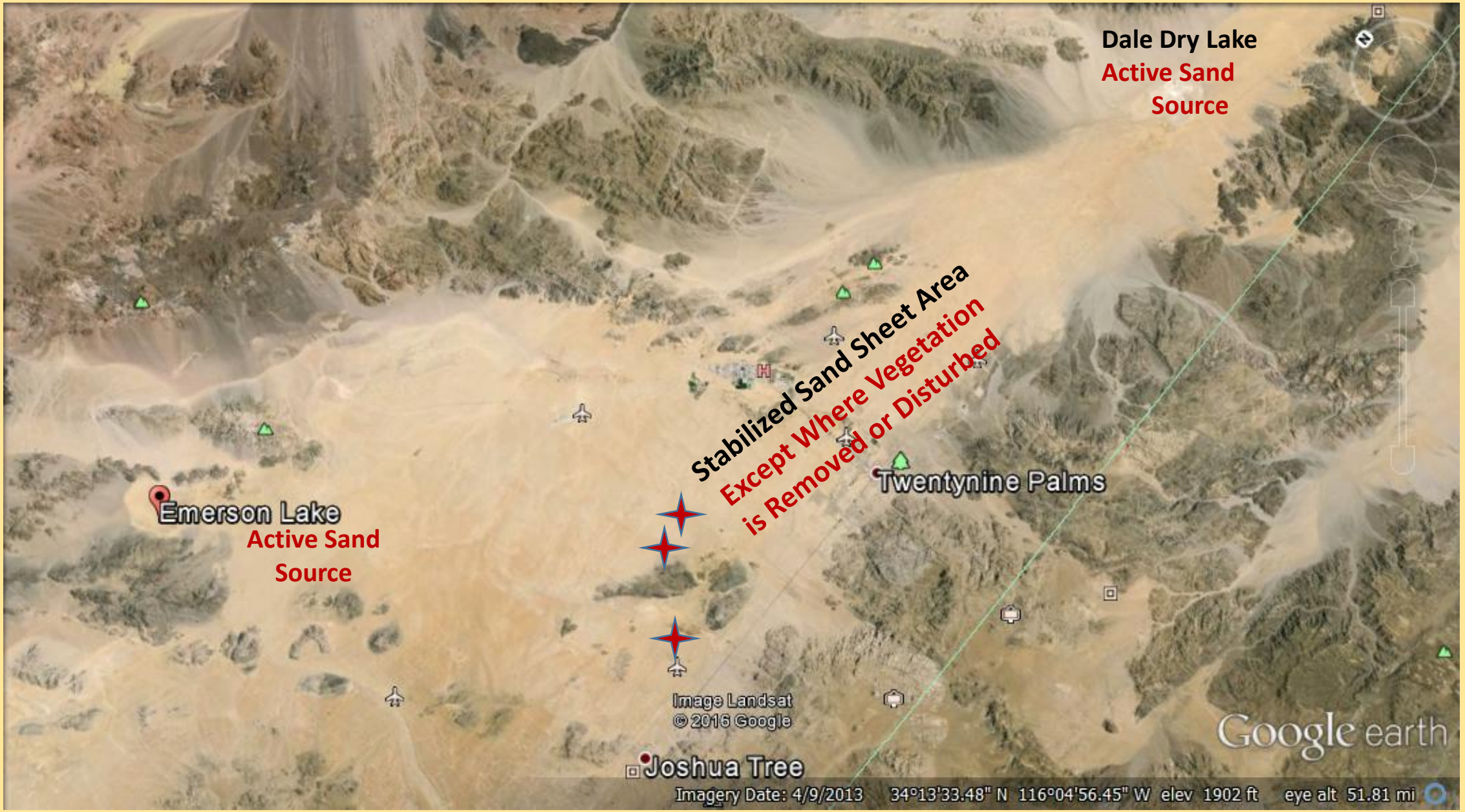
OUTSIDE the green circle
Dust flows through the pass from **Lucerne Valley** and **Johnson Valley OHV** area, also active sources.

Newberry Springs Daggett Triangle is targeted with 2 Solar PV projects on 5,333 acres of private lands.



Sand Transport Paths in the Mojave Desert, Southwestern United States. J.R. Zimbelman, S.H. Williams, V.P. Tchakerian. In ***Desert Aeolian Processes*.** Edited by J.R. Tchakerian. 1995.

The Green Circle on Google Earth



Inside the Green Circle

Cascade Solar – Joshua Tree Basin west side of Copper Mtn.

Both Solar Projects were approved for construction on sand sheets. County projects rely on AQMD approved **Dust Control Plans** based on Fugitive Dust **Rule 403.2 (1996**). **The 2 year baseline for PM 10 is from Victorville**.

Lear Avenue Solar on east side of Copper Mtn.

Dust rising off Cascade Solar in the Joshua Basin 3/28/20**16**

24 MW, 150 acre facility went online in 4/20**14**

What was the site like before disturbance?

Joshua Tree Solar Project Site

What stabilizes the Site?

It is Neither *Rare* nor *Endangered*

Its Value is its **Function**

"The plant community is strongly dominated by perennial grasses. ***Big galleta is the dominant species****; big galleta is a highly drought tolerant C4 grass that occurs on a range of soil types, but is dominant only on sandy soils where soil moisture is most readily available.* ***Big galleta colonizes and stabilizes semi-stabilized eolian habitats with rhizomatous growth****, and* ***dominance by big galleta on these habitats is an indicator of eolian stability****."*

HIGH WINDS AFFECT VISIBILITY, 15-CAR CRASH INJURES 28 IN LUCERNE VALLEY

By Z107.7 News, on March 29th, 2016

Blowing dust and sand driven by winds of up to 50 miles per hour buffeted our **Morongo Basin** yesterday. High winds made driving a struggle.

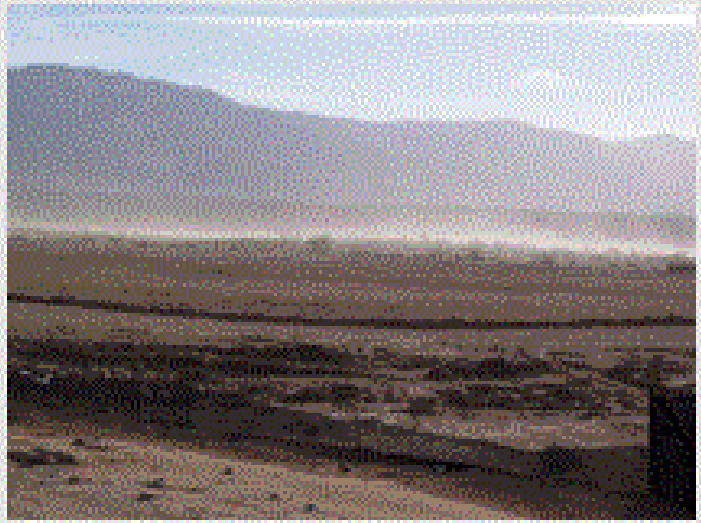
To our immediate north, a pile up involving more than 15 cars in **Lucerne Valley** on Monday left 28 people injured and Barstow Road/Highway 247 at rabbit Spring Road.

Photos: Z107.7 online newscast

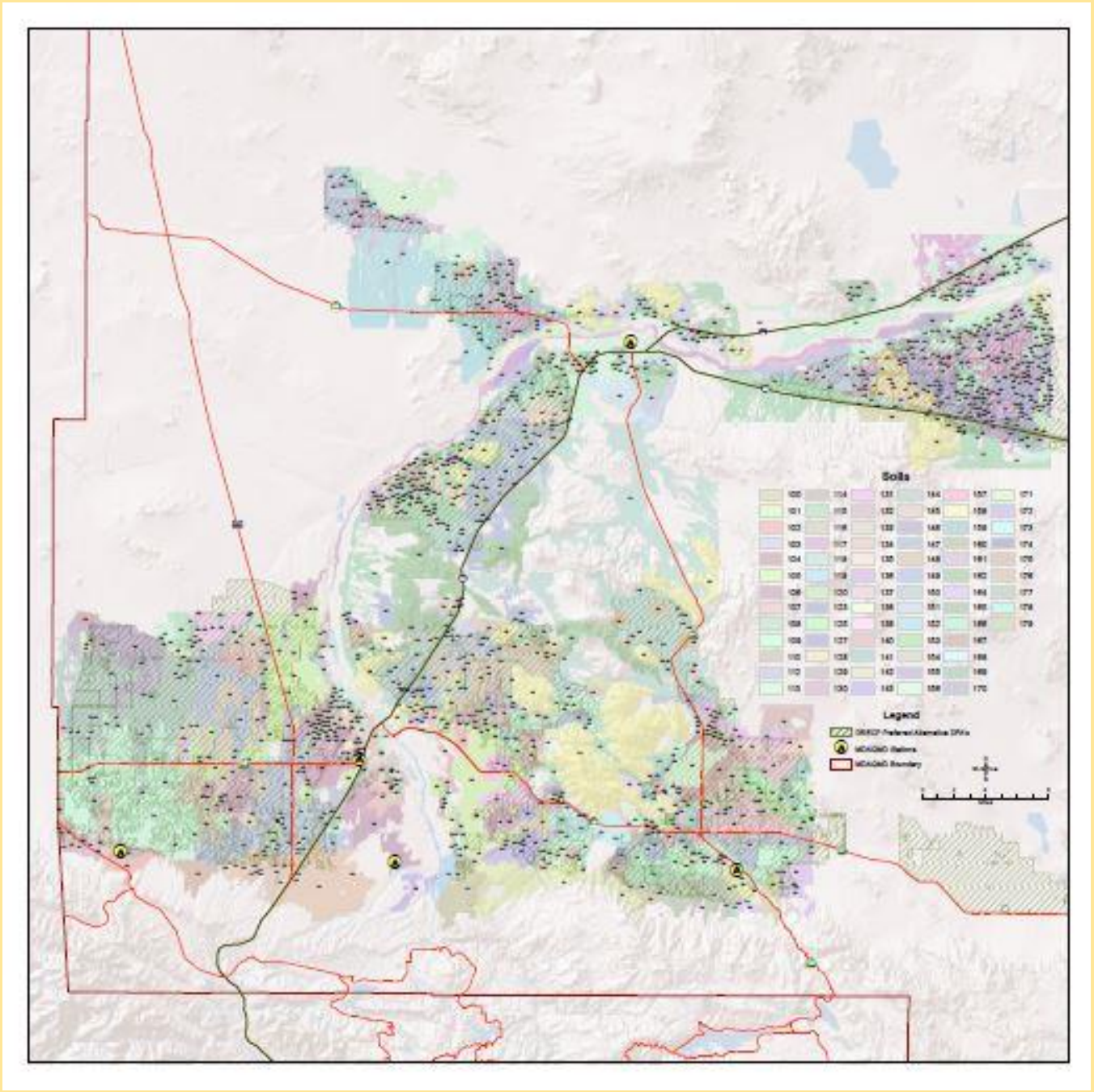
2015 Lucerne Valley grading for 100 acre solar project

Soil units:
#112 Cajon Sand, 0-2% slope
#113 Cajon Sand, 2-9% slope
#137 Kimberlina loamy find sand, 0-2% slope

All have are rated as high for wind erosion and descriptions call for leaving as much existing natural vegetation in place as possible to provide protection from the wind and reduce soil blowing.



USDA SCS Soil Survey of San Bernardino County California Mojave River Area. 1976-1978



Analysis of Soil Map Units

	A	B	C	D	E
1	Soil Type	Name	Hazard of blowing	Water Erosion	Rooting depth
2	100	Arizo gravelly loamy sand, 2 - 9% slopes	slight	slight	60 in.
3	101	Arrastre-Rock outcrop, 20-30% slopes	moderate	moderate	20-40 in
4	102	Avawatz - Oak GlenAssoc. Gently sloping	moderate	slight	60 in.
5	103	Badland			
6	104	Bousic Clay	slight	slight	60 in.
7	105	Bryman loamy fine sand, 0-2% slopes	high	sllight	60 in.
8	106	Bryman loamy fine sand, 0-5% slopes	high	slight	60 in.
9	107	Bryman loamy fine sand, 6-9% slopes	high	slight to moderate	60 in.
10	108	Bryman loamy fine sand, 9-15% slopes	high	moderate	60 in.
11	109	Bryman sandy clay loam, 0-2% slopes	slight	slight	60 in.
12	110	Bryman-Cajon Assoc., rolling	slight	slight	60 in.
13	112	Cajon Sand, 0-2% slopes	high	slight	60 in.
14	113	Cajon Sand, 2-9% slopes	high	slight to moderate	60 in.
15	114	Cajon Sand, 29-15% slopes	high	slight to moderate	60 in.
16	115	Cajon gravelly sand, 2-15% slopes	slight	slght	60 in.
17	116	Cajon loamy sand, 5-9% slopes	high	moderate to high	60 in.
18	117	Cajon loamy sand, loamy sebstr 0-2% slopes	high	slight	60 in.
19	118	Cajon-Arizo Complex, 2-15% slopes	slight	slight to moderate	60 in.
20	119	Cajon-Wasco, cool, complex, 2-9% slopes	high	slight to moderate	60 in.
21	120	Cave loam, dry, 0-2% slopes	moderate	slight	14-20 in.
22	123	Dune land	very high	slight	

Ord Mountain Solar Energy and Substation Project

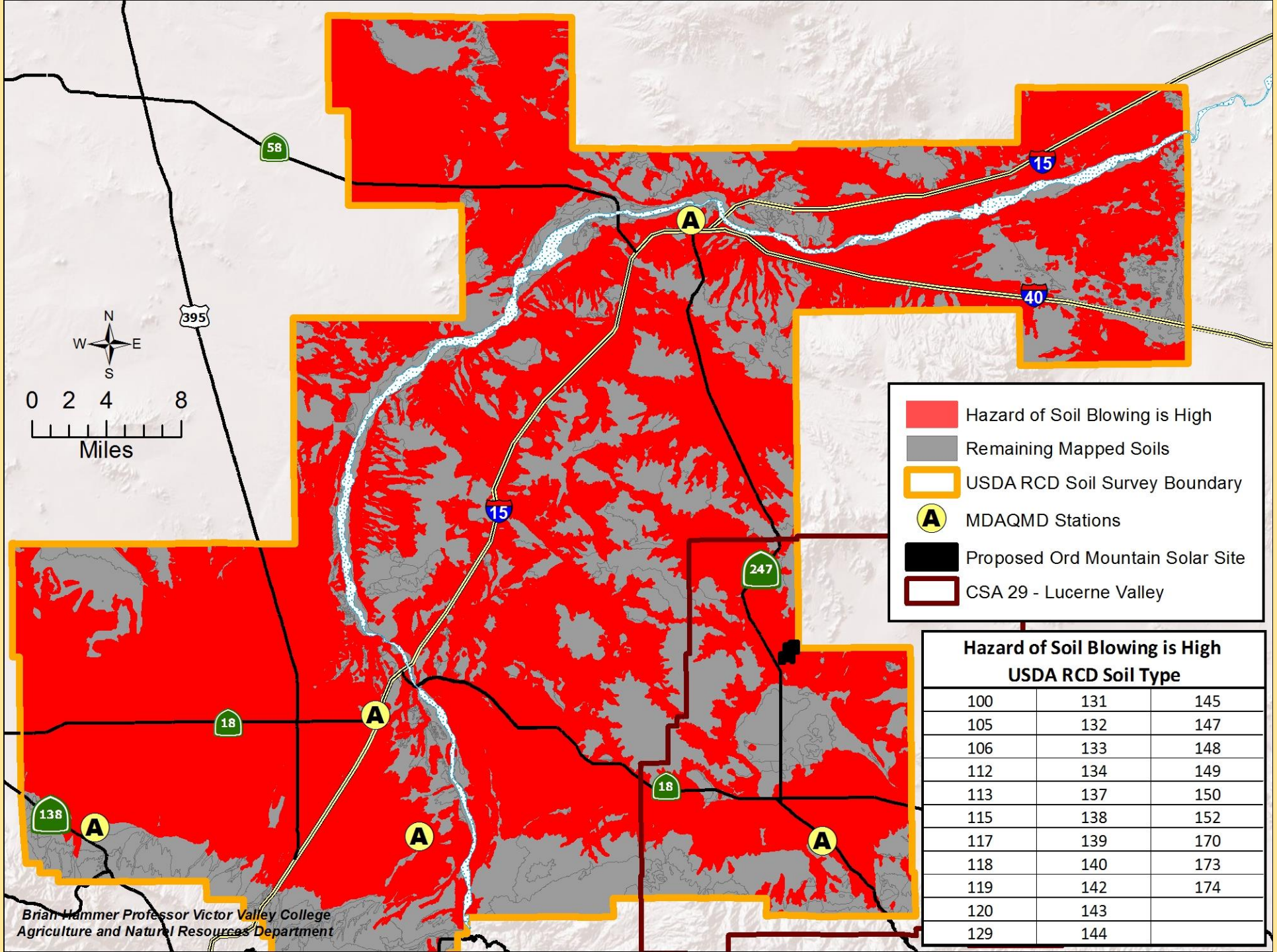
1.Map all soils within the USDA RCD Soil Survey Boundary. (Map to left)

2. Analyze the 77 Soil Map Units (Types) for Hazard of Blowing Soil (mostly dust) and Hazard of Water Erosion

3. Map all areas with the Hazard of Blowing Soil

4. Locate Ord Mountain Solar Site

5. Locate MDAQMD PM 10 dust monitoring Stations



Hazard of Soil Blowing is High USDA RCD Soil Type		
100	131	145
105	132	147
106	133	148
112	134	149
113	137	150
115	138	152
117	139	170
118	140	173
119	142	174
120	143	
129	144	

Ord Mountain Solar Energy and Substation Project

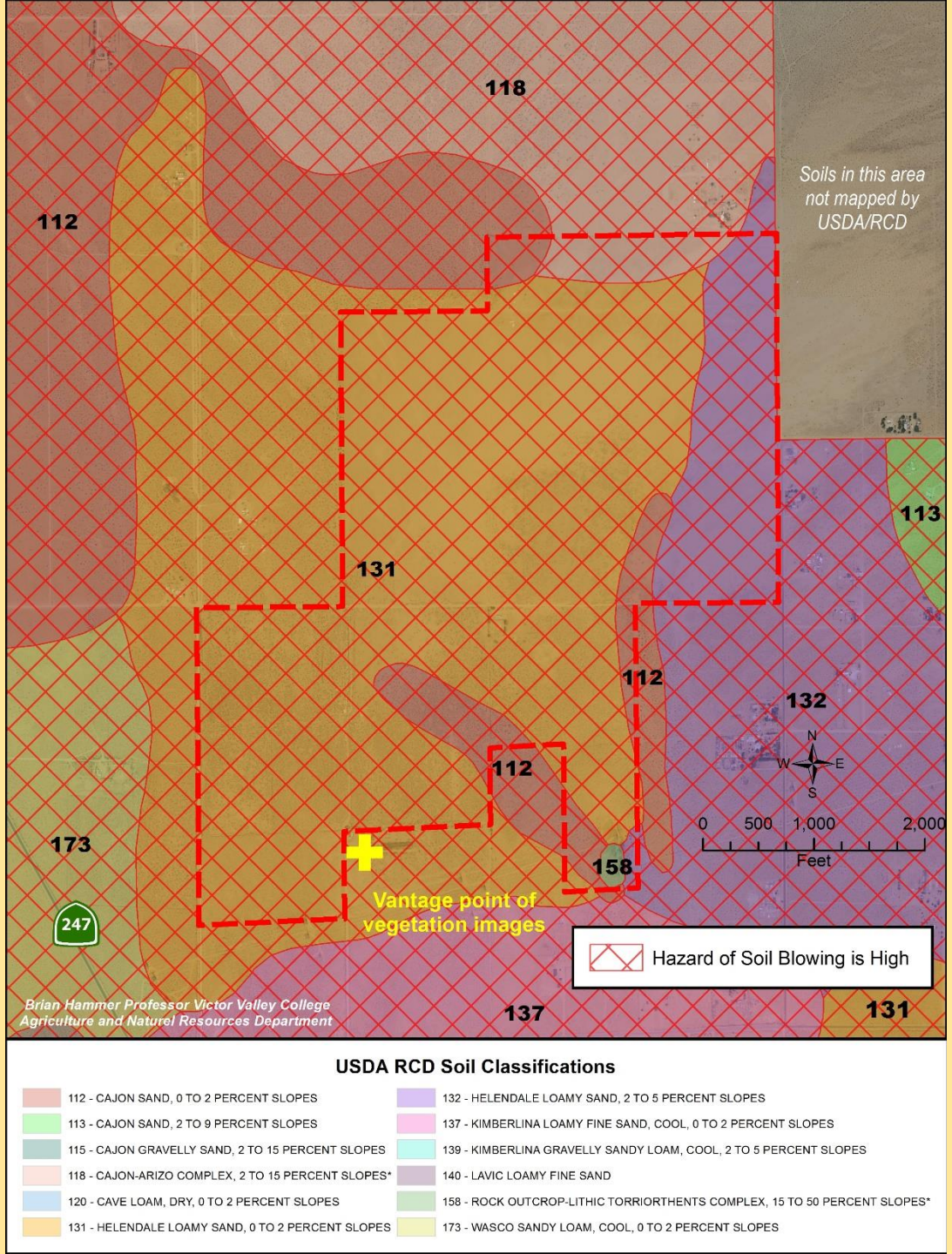
Showing USDA RCD Soil Classifications

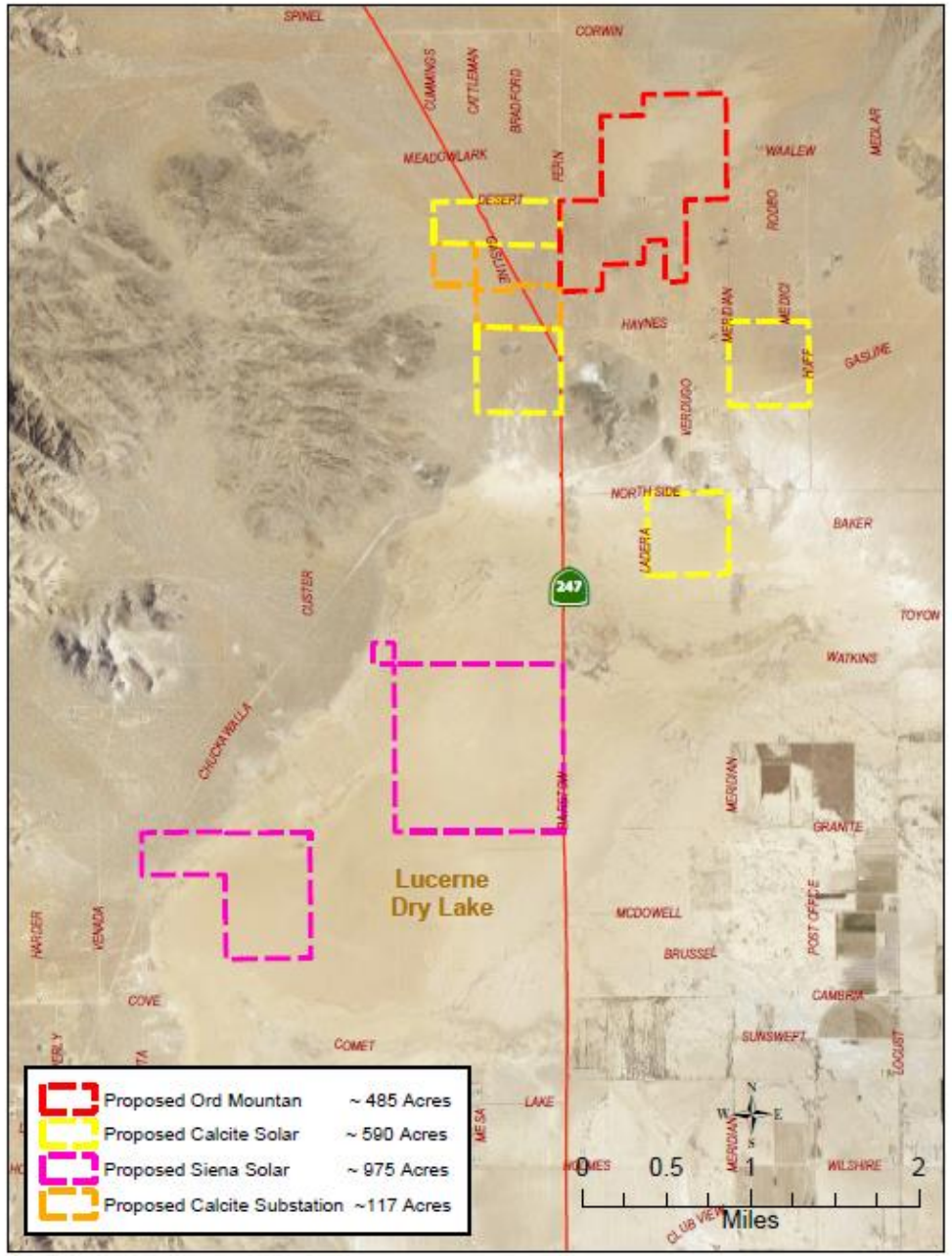
Cross hatching indicates Hazard of Blowing Soils

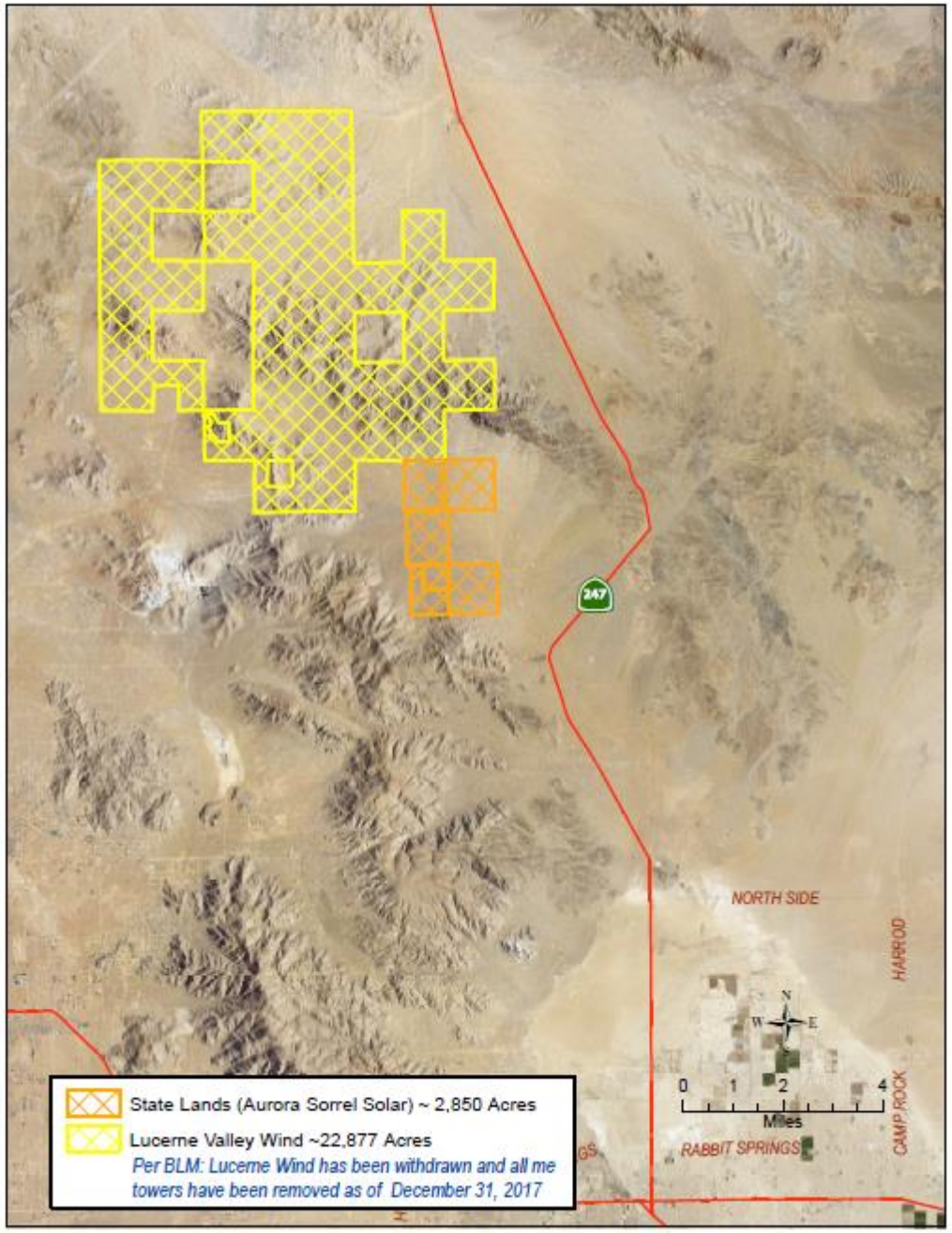
131 Helendale loamy sand, 0-2% slope
…**Available water capacity is low or moderate**. **Runoff is medium**, **and the hazard of soil blowing is high.** Effective rooting depth is 60 inches or more.

*"This unit is suited to irrigated crops…The **unit is limited by the hazard of soil blowing**, high water intake rate, low or moderate available capacity, and low fertility."*

Analysis: USDA SCS Soil Survey of San Bernardino County California Mojave River Area. 1976-1978
Also on line at USDA Web Soil Survey




SPINEL
CORWIN
CUMMINGS
CATTLEMAN
BRADFORD
MEADOWLARK
DESERT
KERN
WAALEW
MEDLAR
RODEO
GASLINE
HAYNES
MERIDIAN
MEDICI
HUFF
VERDUGO
NORTH SIDE
LADERA
BAKER
247
CUSTER
TOYON
WATKINS
CHUCKWALLA
HARPER
GRANITE
Lucerne
Dry Lake
MCDOWELL
POST OFFICE
BRUSSEL
CAMBRIA
VENADA
COVE
COMET
SUNSWEPT
LOCUST
LAKE
MESA
WILSHIRE
CLUB VIEW
Proposed Ord Mountan ~ 485 Acres
Proposed Calcite Solar ~ 590 Acres
Proposed Siena Solar ~ 975 Acres
Proposed Calcite Substation ~117 Acres
0 0.5 1 2
Miles


247
NORTH SIDE
HARROD
CAMP ROCK
RABBIT SPRINGS
State Lands (Aurora Sorrel Solar) ~ 2,850 Acres
Lucerne Valley Wind ~22,877 Acres
Per BLM: Lucerne Wind has been withdrawn and all me towers have been removed as of December 31, 2017
0 1 2 4
Miles

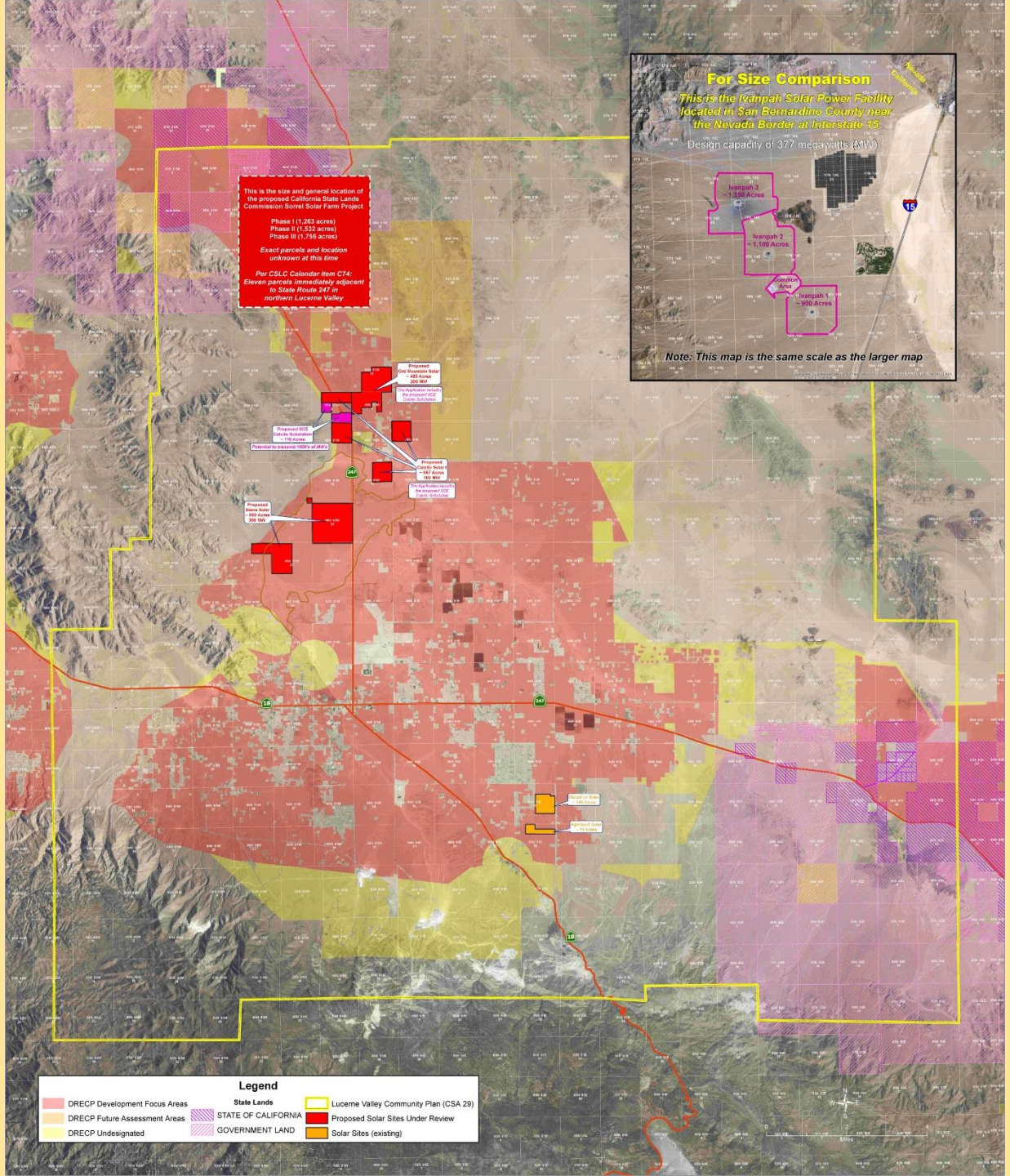
Color Code

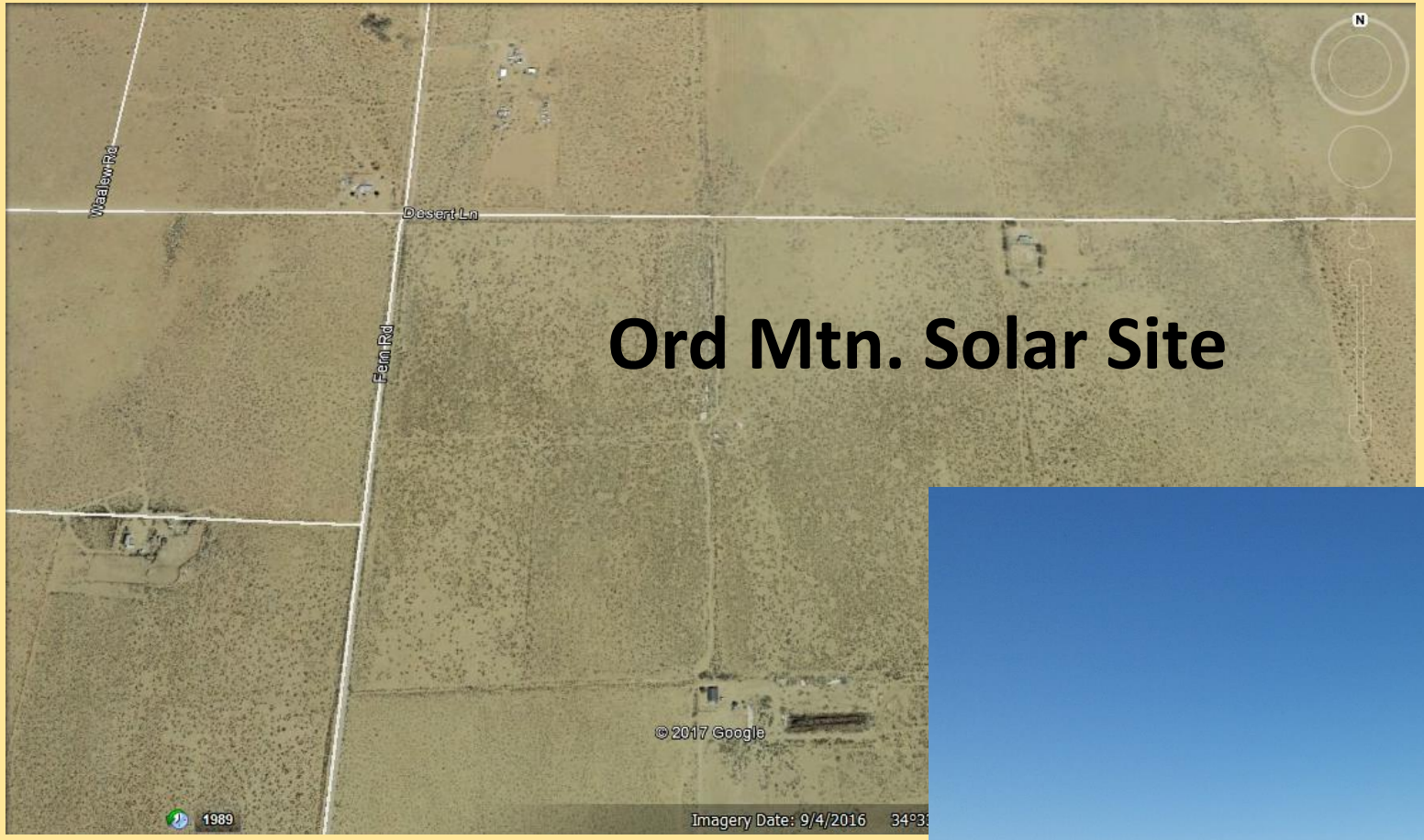
Pale red = DRECP DFA in the CSA 29 (County Service Area)

Yellow = DRECP Undesignated Areas

Light Orange = DRECP Future Assessment Areas

Dark Red = Proposed Solar PV Projects 5,666 acres





Ord Mtn. Solar Site

What keeps the soil down on the ground?

Saltbush Scrub Plant Community

It is Neither *Rare* Nor *Endangered*

Function is its value

Soil Surface Susceptibility to Wind Erosion

Jayne Belnap, Sue Phillips, David M. Miller, David Bedford, Geoffrey Phelps Alan Flint, Lorraine Flint, Joseph Hevesi, Susan Benjamin

USGS
science for a changing world

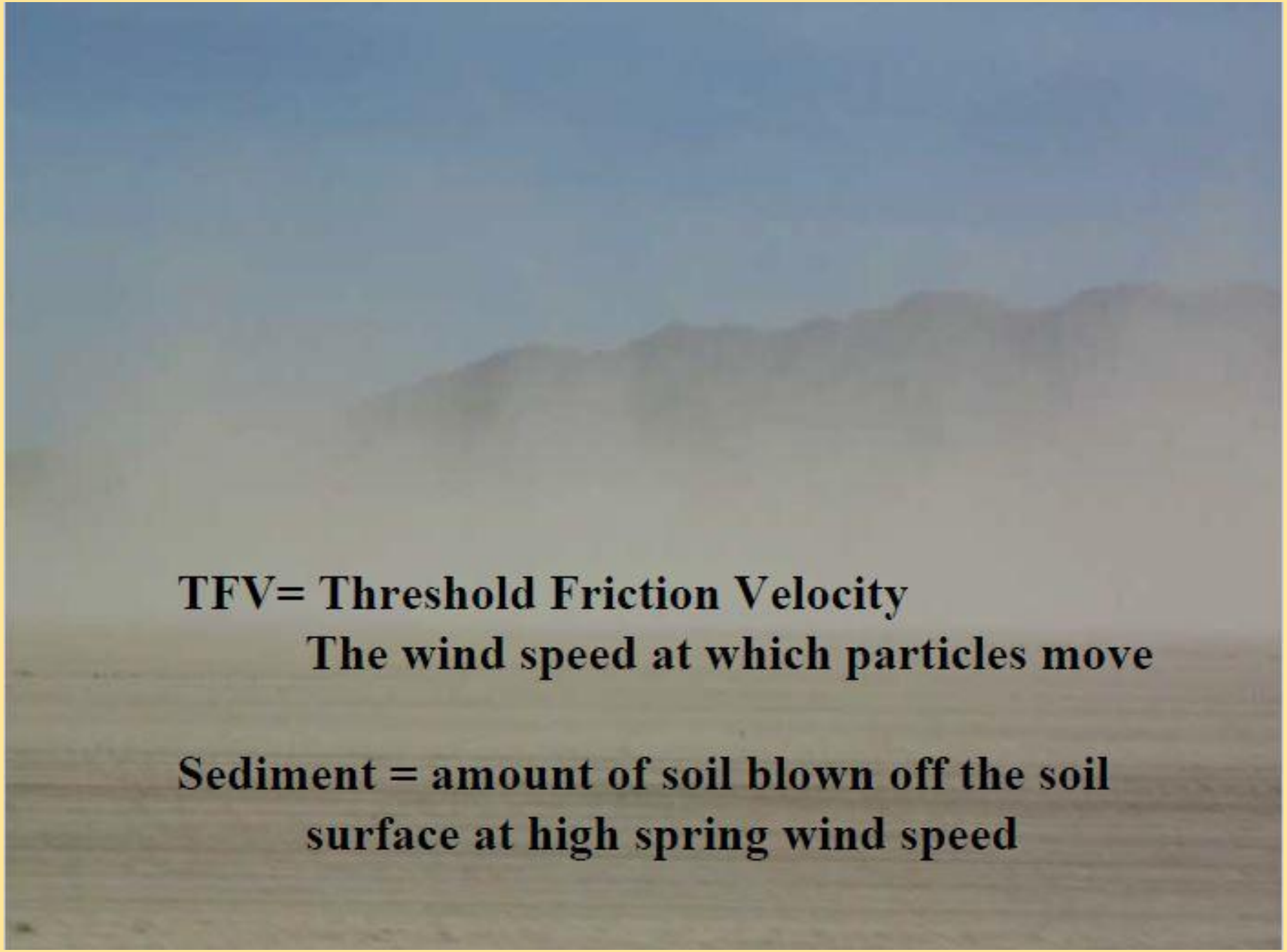
Vulnerability to wind erosion

Soil Surface Characteristics

- Disturbance
- Particle size distributions (med.+fine/silt)
- Surface rockiness
- Salt
- Biological and physical crusts

Climate

- Hours when soils are dry and winds exceed TFV


TFV= Threshold Friction Velocity
The wind speed at which particles move
Sediment = amount of soil blown off the soil surface at high spring wind speed

% time per month that a Threshold Friction Velocity (TFV)* is exceeded

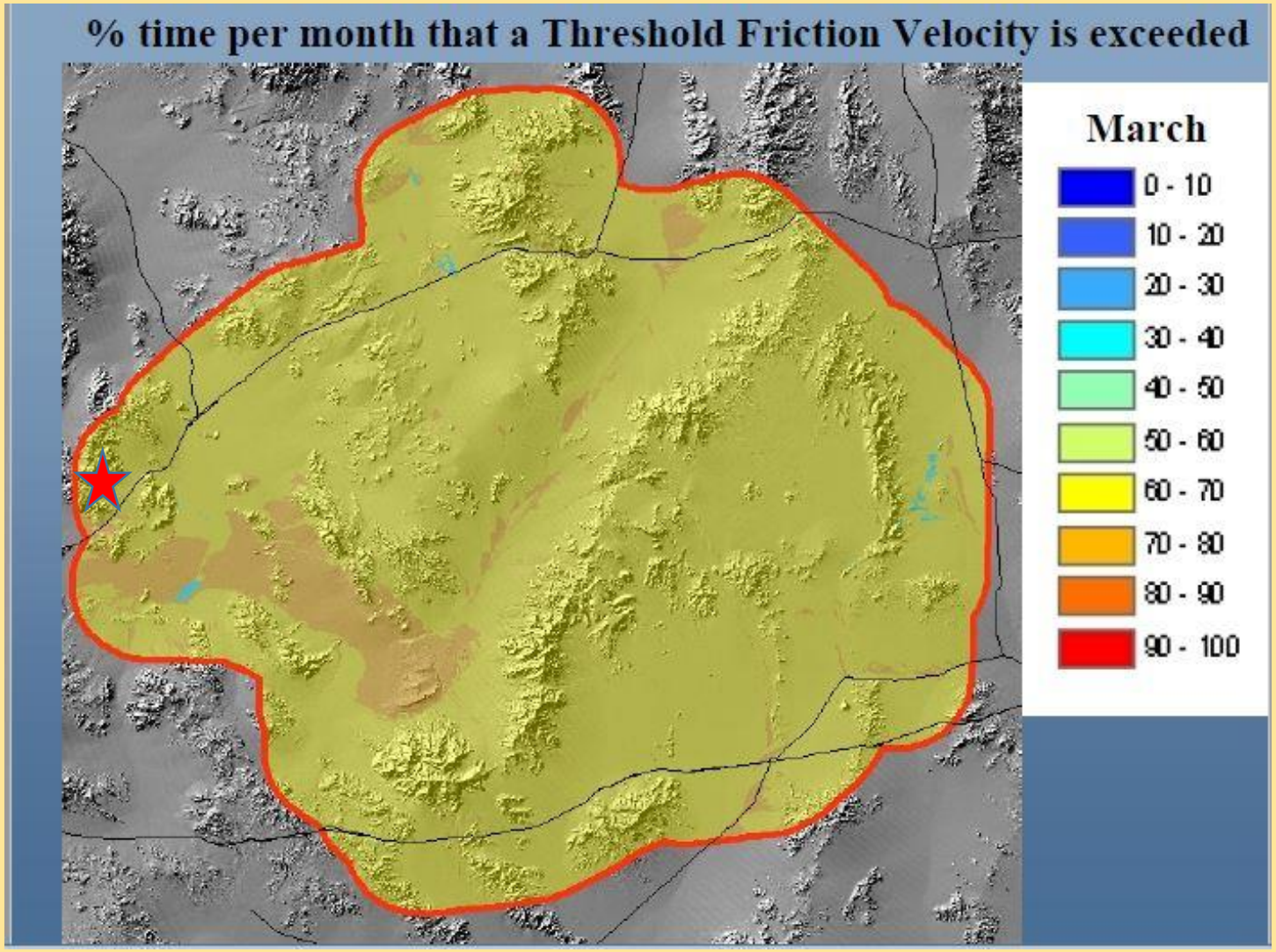
SMSP = Soda Mountain Solar Project ★

The proposed site is on the edge of a **sand transport path.**

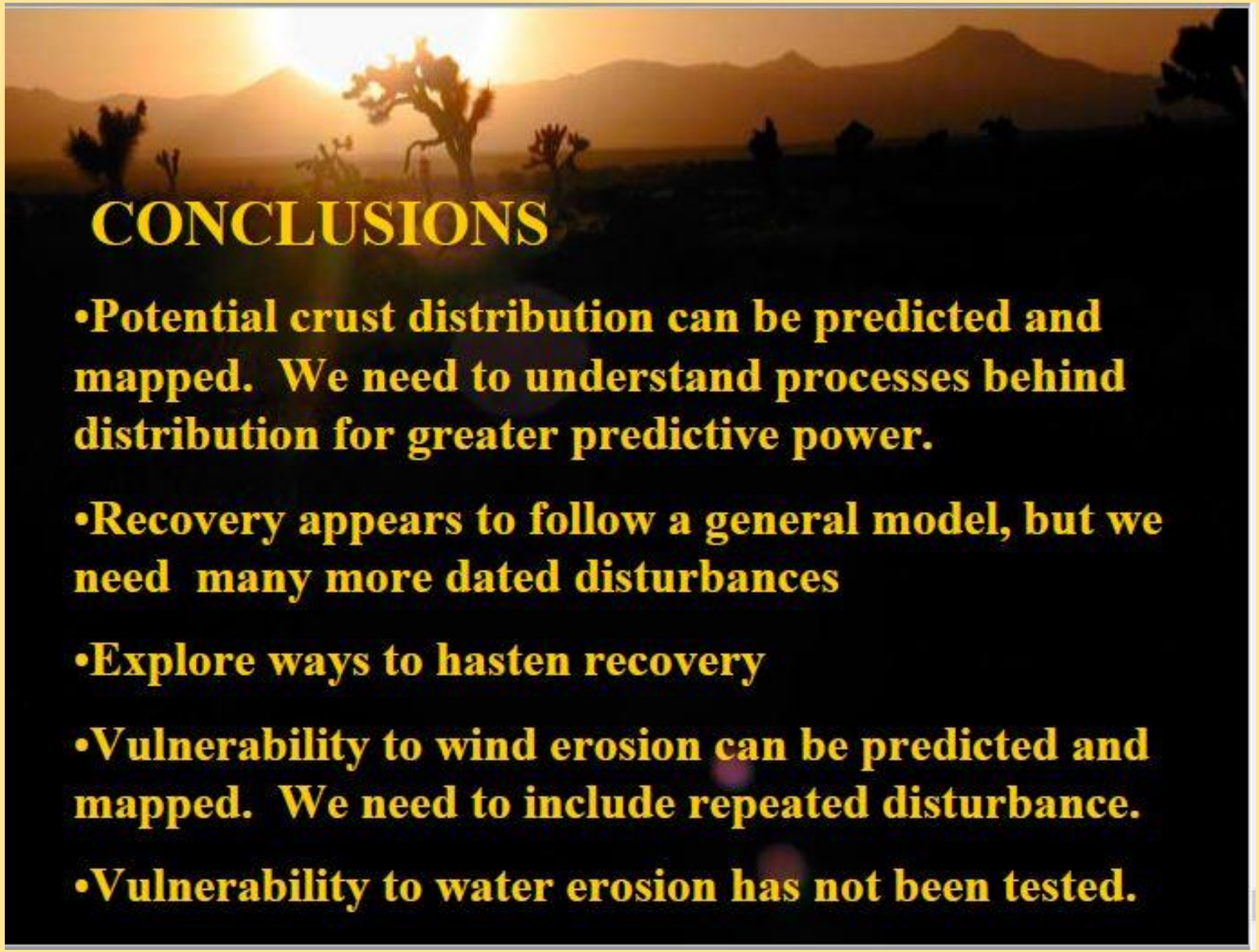
According to USGS

Month	SMSP site	Month	SMSP site
January	30-40%	July	60-70%
February	40-50%	August	50-60%
March	60-70%	September	50-60%
April	60-70%	October	40-50%
Map	70-80%	November	30-40%
June	70-80%	December	30-40%

A **soil survey** would alert for fugitive dust in high winds during construction and the years of operation. A realistic amount of water use could also be calculated.



The baseline monitoring for **PM 10 was Victorville,** approximately 90 miles to the west as the crow flies, but not as the wind blows**..**


CONCLUSIONS
•Potential crust distribution can be predicted and mapped. We need to understand processes behind distribution for greater predictive power.
•Recovery appears to follow a general model, but we need many more dated disturbances
•Explore ways to hasten recovery
•Vulnerability to wind erosion can be predicted and mapped. We need to include repeated disturbance.
•Vulnerability to water erosion has not been tested.

Vulnerability to wind erosion can be predicted and mapped. We need to include repeated disturbances.

We are operating in the unknown but with scientific data we have the potential to plan where we are going.

Current Conditions – data poor

MDPA- Mojave Desert Planning Area

-The MDPA is in nonattainment for PM10 and PM 2.5

-The MDPA lacks monitoring stations to collect ambient fugitive dust data east of Victorville.

-The Mojave Desert Planning Area relies on Victorville for the required 2 years of baseline emissions data.

- Solar projects are approved and built without adequate dust controls to our, and the environment's, detriment.

Current Planning – without data

- The MDAQMD Federal PM 10 Attainment Plan and Rule 403.2 Fugitive Dust Control are outdated. The categories and controls reflect construction conditions of the 1990s.

- Soil units (types) and susceptibility to the hazard of blowing soil are not included in Planning Area calculations. Soils are generalized to reflect urban area conditions.

- The baseline emissions for fugitive dust do not reflect current Planning Area conditions.

- Project approved Control Plans, in coordination with S.B. County, lack monitoring protocols and enforcement.

Get Data

The current level of individual project disturbance is without precedence. There is no historical data to guide monitoring and mitigation standards and practices. Update Rules and develop monitoring protocols.

Require developers complete a soil survey and unit (type) analysis for County CUP and for AQMD approved Dust Control Plan. AQMD and County must acquire soils reference files/maps.

Locate SLAM monitoring stations in communities with large-footprint energy installations (to be defined) to monitor for fugitive dust. This is important for understanding health effects and water use. All data is publically available.

Require installation of meteorological and air monitoring stations on private lands and federal DFAs when Solar Energy project applications are accepted. This should be a condition of application. They must remain in place for the life of the project and beyond to assess conditions during construction, operation, decommissioning, and beyond.

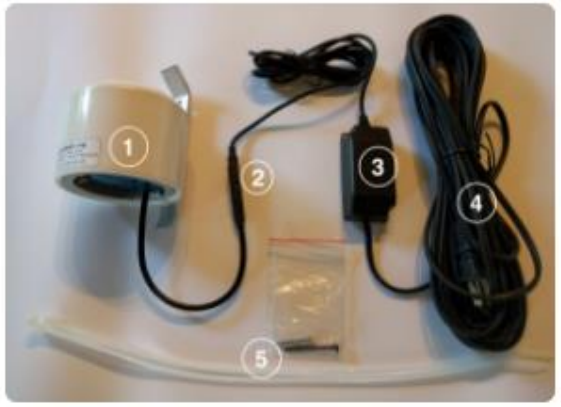
PurpleAir: Air Quality Monitoring

An air quality monitoring network built on a new generation of "Internet of Things" sensors.

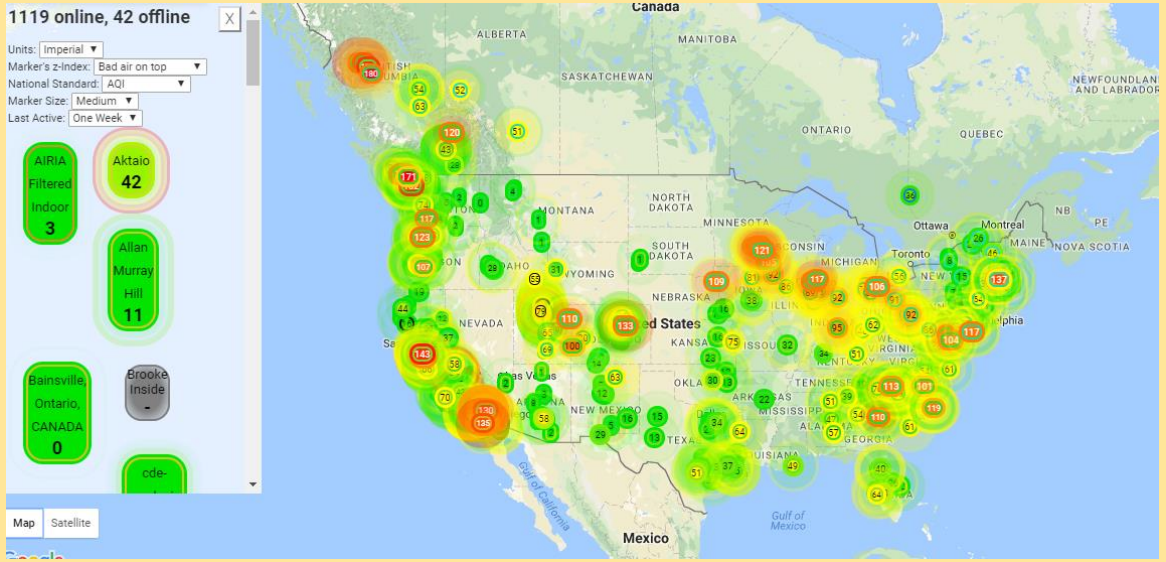
PA-II: Dual Laser Air Sensor

1) Built in WiFi for logging to "the cloud".
2) Dual laser counters provide reliable particulate readings.
3) BME280 temperature, humidity and pressure sensor.
4) Automatic updates: Your sensor will update over WiFi when new firmware is available.

In The Box



1) PA-II Dual Laser Sensor.
2) Micro USB connector.
3) 5V 2A USB Outdoor Power Supply.
4) 17 foot power cable.
5) Zip Ties for mounting.



Buy Now

Quantity	PA-II	PA-II-SD	PA-I-Indoor
1-2	$229	$259	$179
3-8	$219	$249	$169
9-25	$199	$229	$149
26+	$189	$219	$139

UPDATE Federal Register February 2, 2018

Notice of Intent To Amend the California Desert Conservation Area, Bakersfield, and Bishop Resource Management Plans and Prepare Associated Environmental Impact Statements or Environmental Assessments

Executive Order 13783, "Promoting Energy Independence and Economic Growth," which directs all Federal agencies to review all actions that could "potentially burden the development or use of domestically produced energy resources." In recognition of these goals and direction, BLM seeks comment on the potential impacts that land use designations contained in the amended RMPs will have on commercial-scale renewable energy projects, including wind, solar and geothermal. **In particular, the BLM seeks comment on the Areas of Critical Environmental Concern that were designated, including where private lands lie within the external boundaries of such designations, as well as comments on increasing opportunities for increased renewable energy development, recreational and off-highway vehicle (OHV) access, mining access, and grazing.**

The Voice of the Unions Will be Heard

U.S. solar industry lost nearly 10,000 jobs in 2017

Reuters – Nicola Green February 7, 2018

The U.S. solar industry lost nearly 10,000 jobs last year, led by steep losses in mature markets like California and Massachusetts where installation growth has slowed, according to a new report published on Wednesday.

HISTORY

Renewable Energy and Conservation Element (RECE)

Resolution No. 2017-167 Adopted by the SB BOS on August 8, 2017

And amending the **County General Plan** with the addition of a REC Element

"The REC Element is amended to **eliminate Section 4.10 and its subsections**, and to **remove reference to section 5.2**, and elsewhere in the document, **to the 10 MW or greater criteria for utility scale projects** and **refer those two issues back to the Planning Commission for further study**."

So, the County adopted

RE Goal 4: The County will establish a new era of sustainable energy production and consumption in the context of sound resource conservation and renewable energy development practices that reduce greenhouse gases and dependency on fossil fuels.

- **RE Objective 4.1**: The County will continue its efforts to meet or exceed State Greenhouse Gas reduction goals, by encouraging renewable energy development that will be compatible with the natural environment and the integrity of unincorporated communities. (Red indicates addition to April 2017 draft)

But, the BOS also directed that the following Policy be sent back to the Planning Commission for further study. The BOS will adopt the Findings as recommended by the Planning Commission.

RE Policy 4.10: Prohibit utility-oriented RE project development on sites that would create adverse impacts on the quality of life or economic development opportunities in existing unincorporated communities.

- **RE 4.10.1**: Prohibit development of utility-oriented RE projects in the Rural Living land use districts throughout the County.
- **RE 4.10.2**: Prohibit development of utility-oriented RE projects within the boundaries of existing community plans, which at the time of adoption of this Element are the Bloomington, Muscoy, Bear Valley, Crest Forest, Hilltop, Lake Arrowhead, Lytle Creek, Oak Glen, Homestead Valley, Joshua Tree, Lucerne Valley, Morongo Valley, Oak Hills and Phelan/Pinon Hills Community Plans.
- **RE 4.10.3**: Establish exclusion areas in the Development Code regulations for renewable energy development, beginning with the prohibitions in Policies 4.10.1 and 4.10.2 and provide for additional exclusion areas, such as new community plan areas, to be designated by amendment to the Development Code.

RE Policy 5.2: Large utility-scale RE generation projects – **10 megawatts or more** – on private land in the unincorporated County will be limited to the site-types below, in addition to meeting criteria established herein and in the Development Code in the unincorporated County:

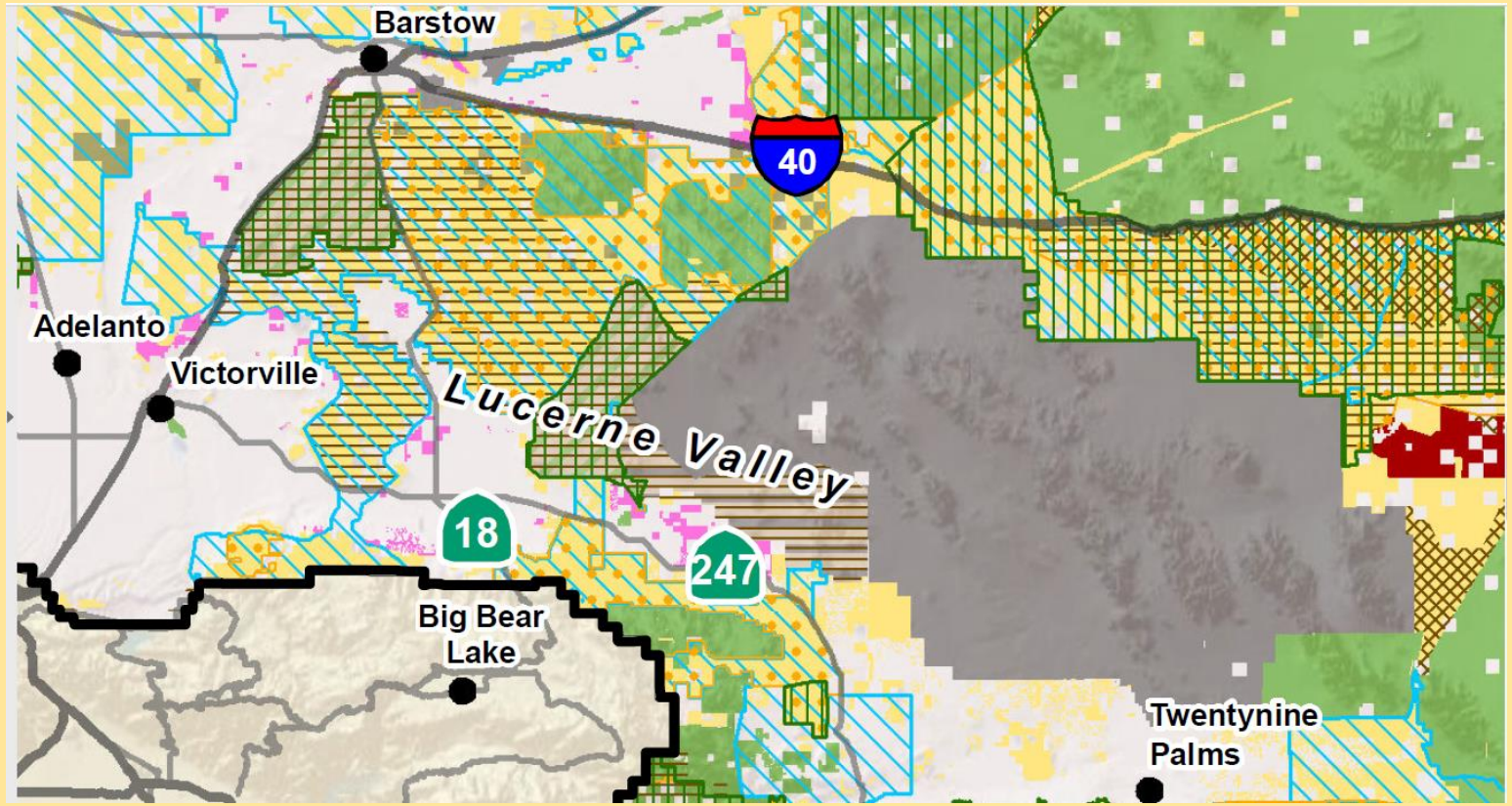
i. Private lands adjacent to the federal Development Focus Areas supported by the Board of Supervisors that meet siting criteria and development standards

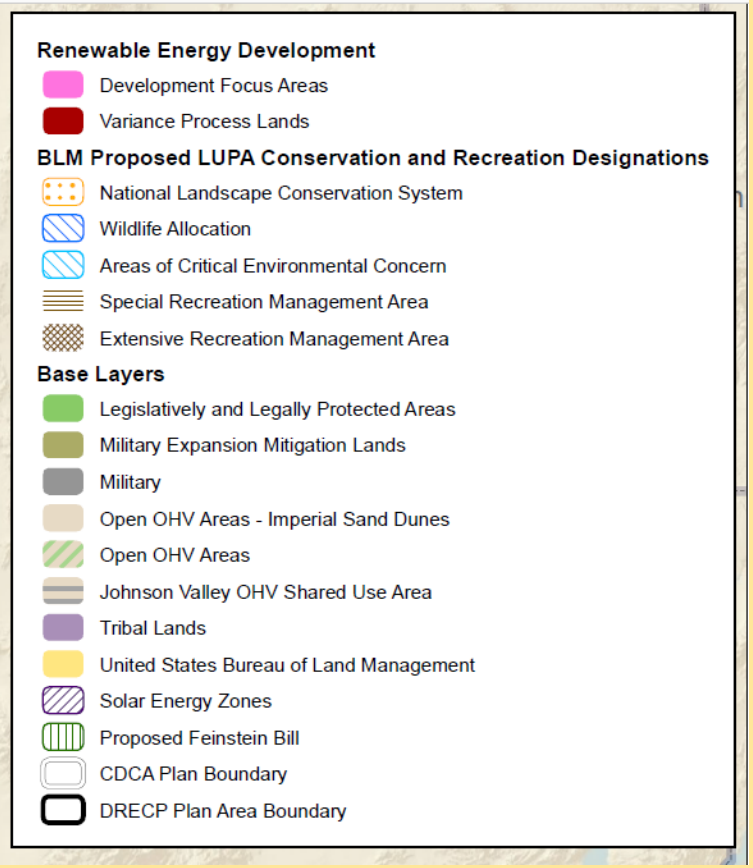
ix. Sites within or adjacent to electric transmission and utility distribution corridors

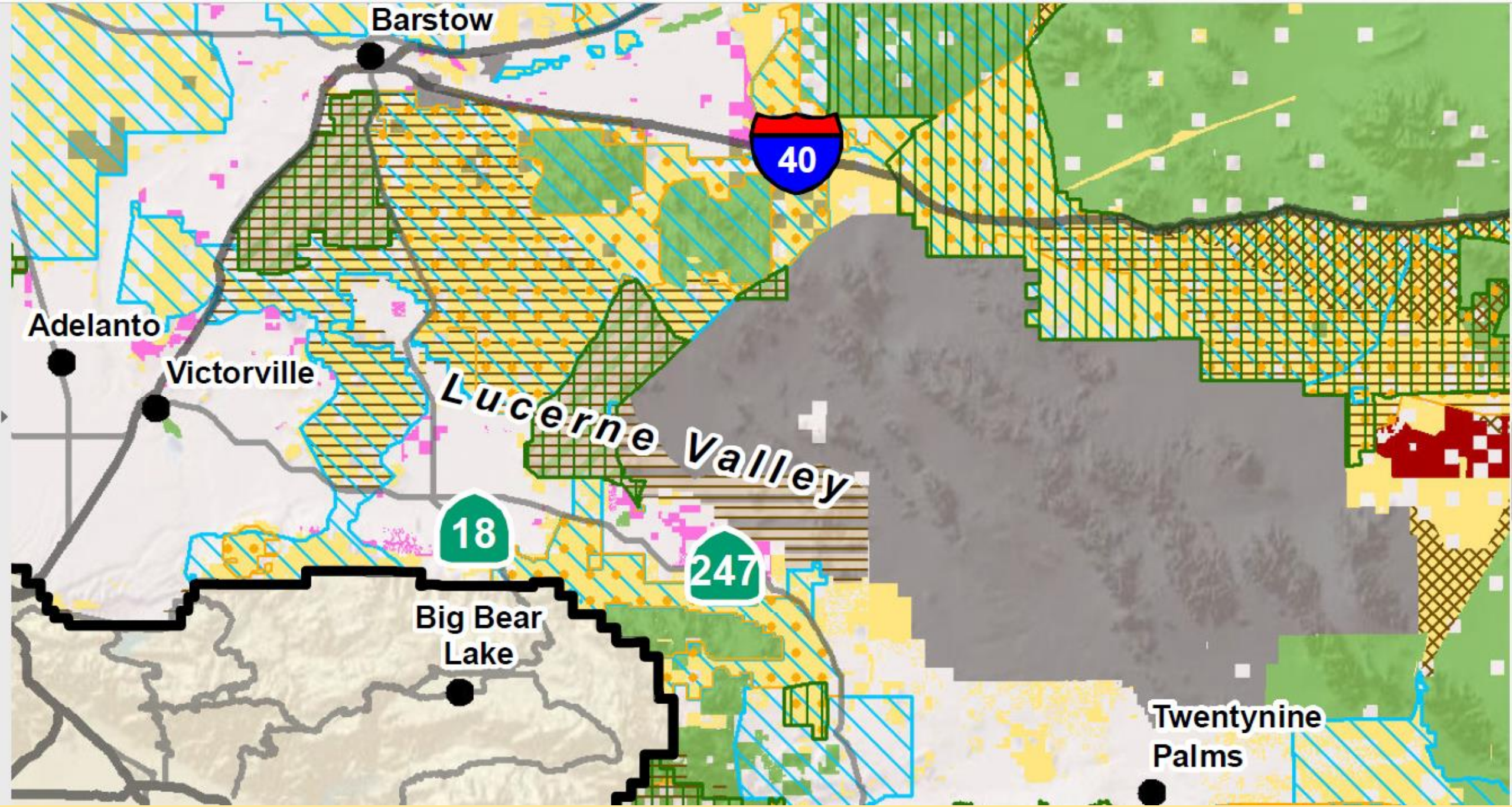
NOW

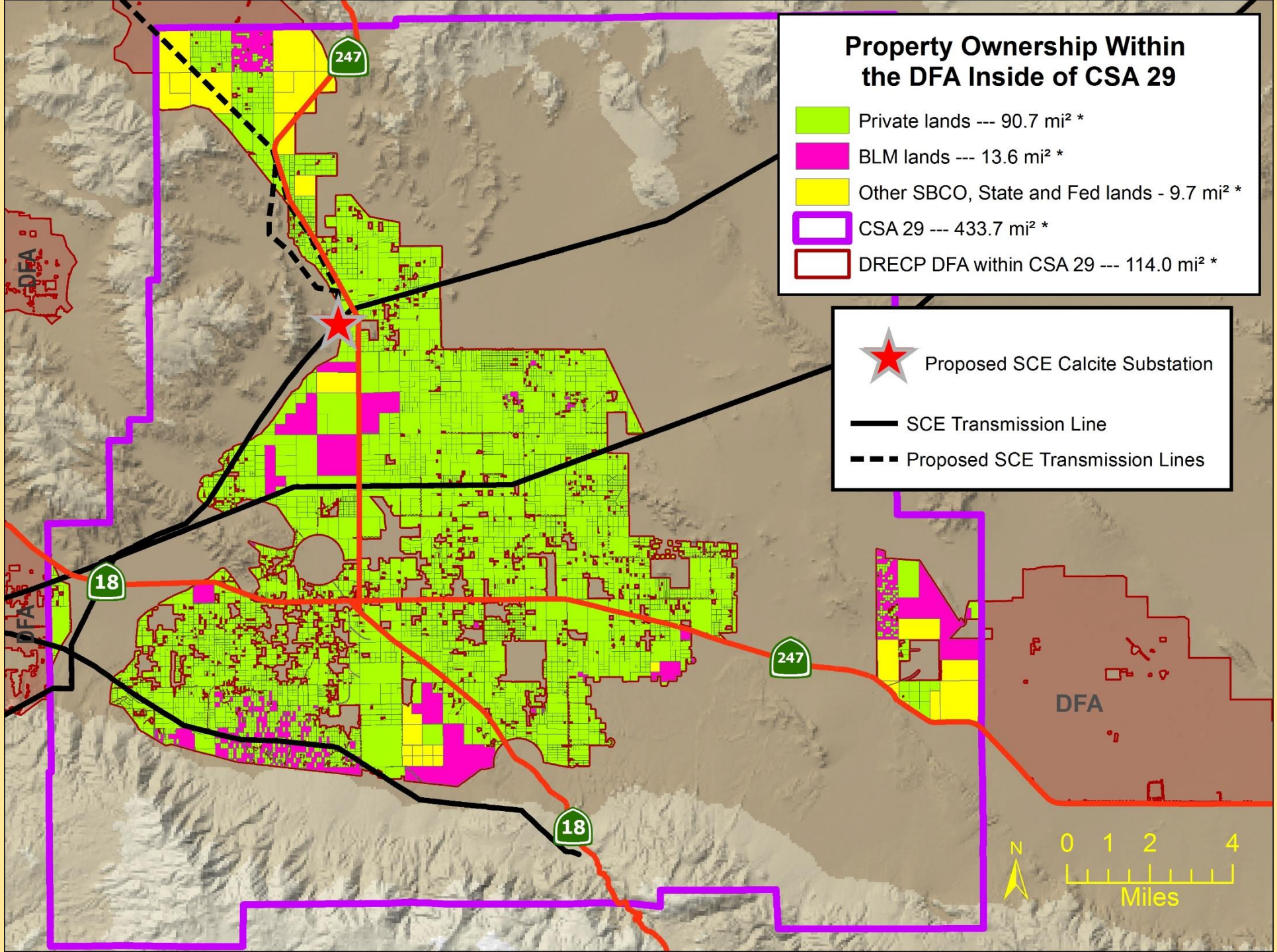
- 6 months ago the BOS requested that Policy 4.10 be brought to the PC for further study. Still waiting.
- When LUS staff is asked directly when Policy 4.10 will appear on the PC agenda, the answer is routinely "*a couple of months*". The last request of staff was at the MWA Board Meeting on February 1, 2018.
- While we have been waiting projects are appearing on the LUS Renewable Energy Projects list that we will have to research, comment on, and possibly live with
- Lucerne Valley has 3 projects with a substation = 2,817 acres straddling Hwy 247 plus projects on State Lands = 2,850. Total 5,666 acres of Proposed Solar Projects.
- Newberry Springs has 2 proposed projects = 5,533 acres.
- Meanwhile, on February 2, 2018 the Federal Register announces that the Federal Agencies *will be review all actions that could "potentially burden the development or use of domestically produced energy resources* in the DRECP.

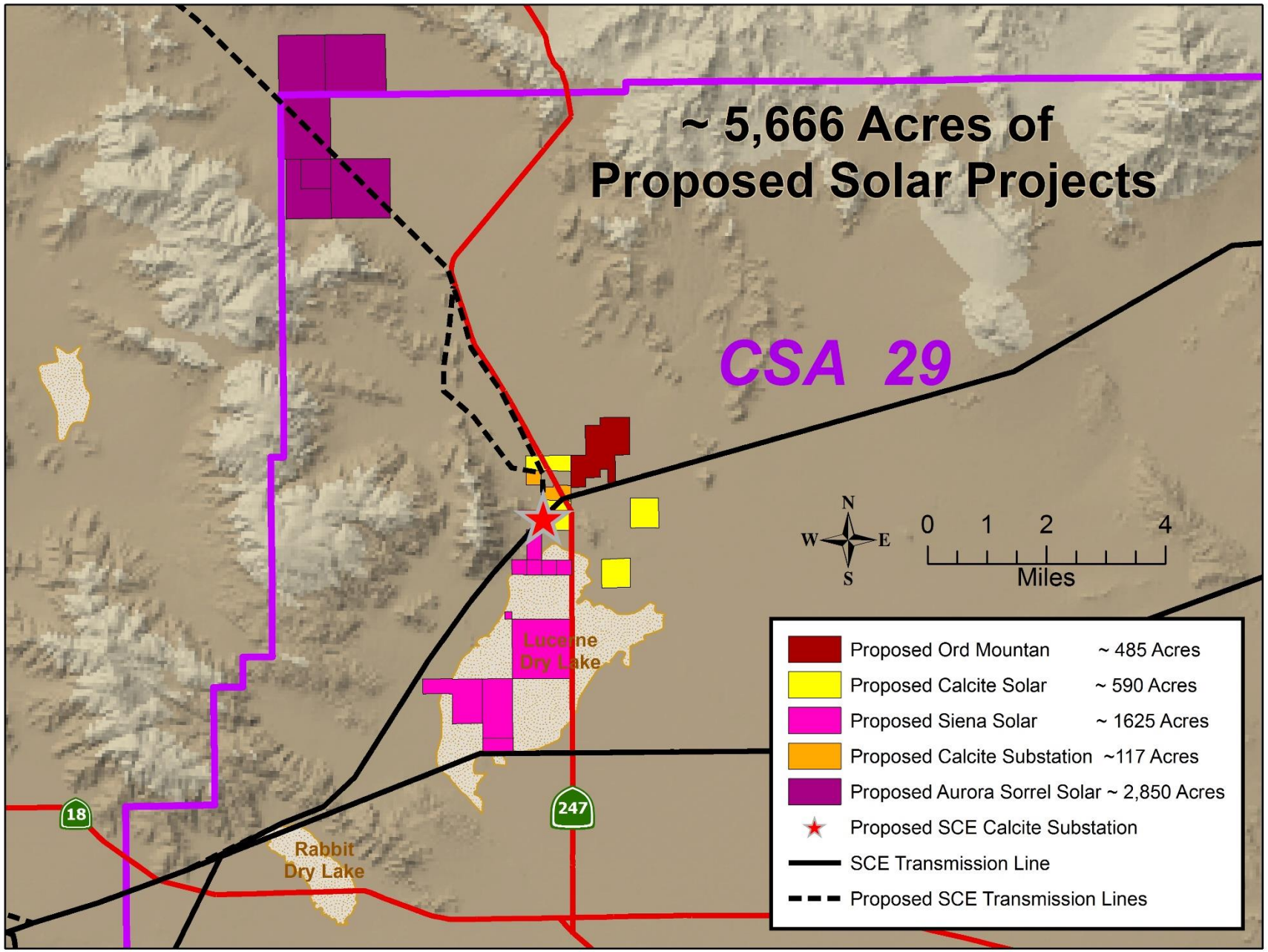
In particular, the BLM seeks comment on the Areas of Critical Environmental Concern that were designated, including *where private lands lie within the external boundaries of such designations*, as well as comments on increasing opportunities for increased renewable energy development, recreational and off-highway vehicle (OHV) access, mining access, and grazing.

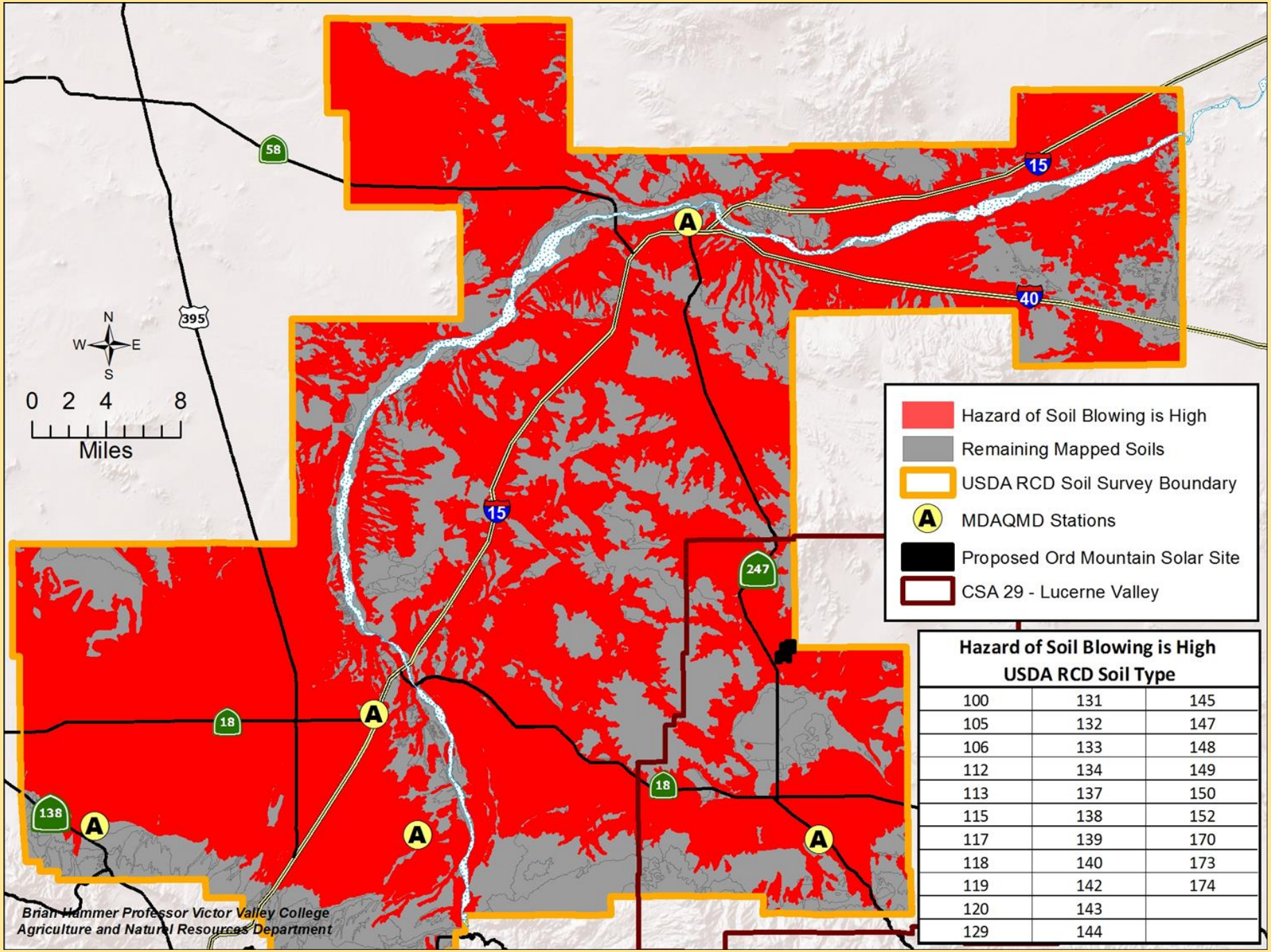





Barstow
40
Adelanto
Victorville
Lucerne Valley
18
247
Big Bear
Lake
Twentynine
Palms

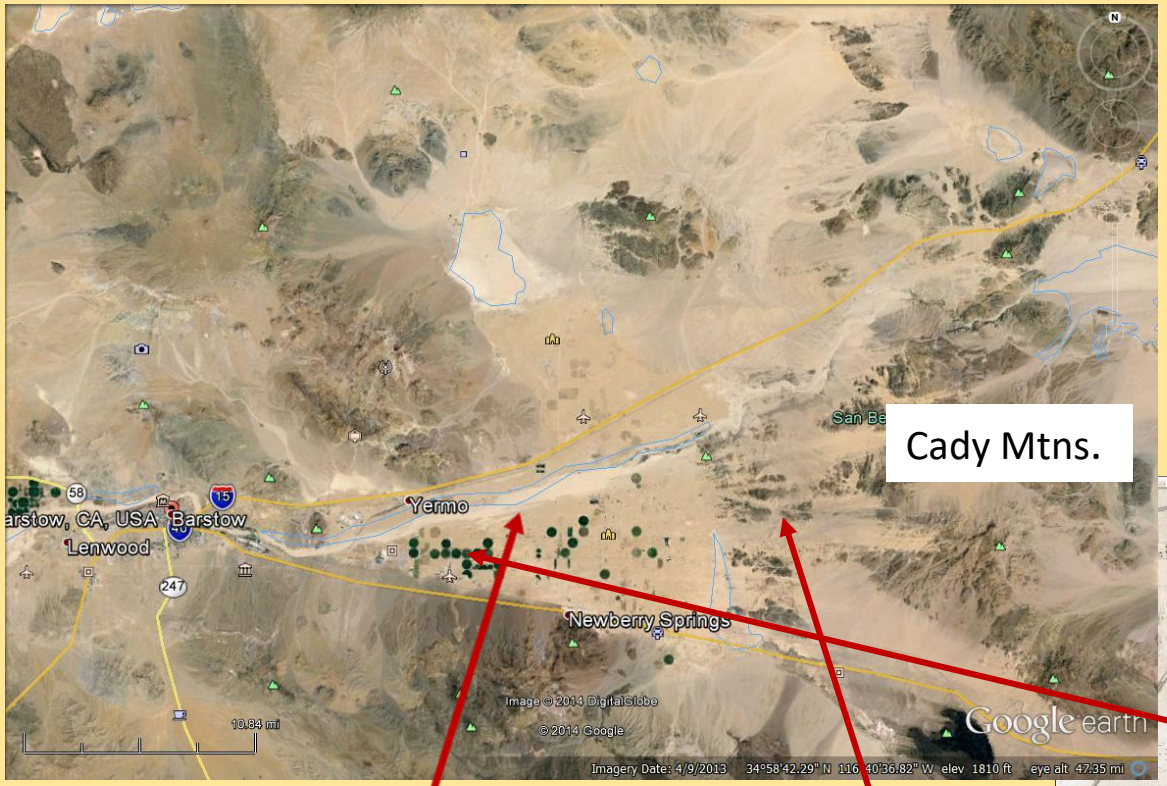

Property Ownership Within the DFA Inside of CSA 29
Private lands --- 90.7 mi² *
BLM lands --- 13.6 mi² *
Other SBCO, State and Fed lands - 9.7 mi² *
CSA 29 --- 433.7 mi² *
DRECP DFA within CSA 29 --- 114.0 mi² *
Proposed SCE Calcite Substation
SCE Transmission Line
Proposed SCE Transmission Lines
247
18
DFA
N
0 1 2 4
Miles


~ 5,666 Acres of
Proposed Solar Projects
CSA 29
N
W
E
S
0 1 2 4
Miles
Lucerne
Dry Lake
Rabbit
Dry Lake
18
247
Proposed Ord Mountan ~ 485 Acres
Proposed Calcite Solar ~ 590 Acres
Proposed Siena Solar ~ 1625 Acres
Proposed Calcite Substation ~117 Acres
Proposed Aurora Sorrel Solar ~ 2,850 Acres
Proposed SCE Calcite Substation
SCE Transmission Line
Proposed SCE Transmission Lines


58
395
15
40
247
18
138
A
N
W
E
S
0 2 4 8
Miles
Hazard of Soil Blowing is High
Remaining Mapped Soils
USDA RCD Soil Survey Boundary
MDAQMD Stations
Proposed Ord Mountain Solar Site
CSA 29 - Lucerne Valley
Hazard of Soil Blowing is High
USDA RCD Soil Type
100 131 145
105 132 147
106 133 148
112 134 149
113 137 150
115 138 152
117 139 170
118 140 173
119 142 174
120 143
129 144
Brian Hammer Professor Victor Valley College
Agriculture and Natural Resources Department

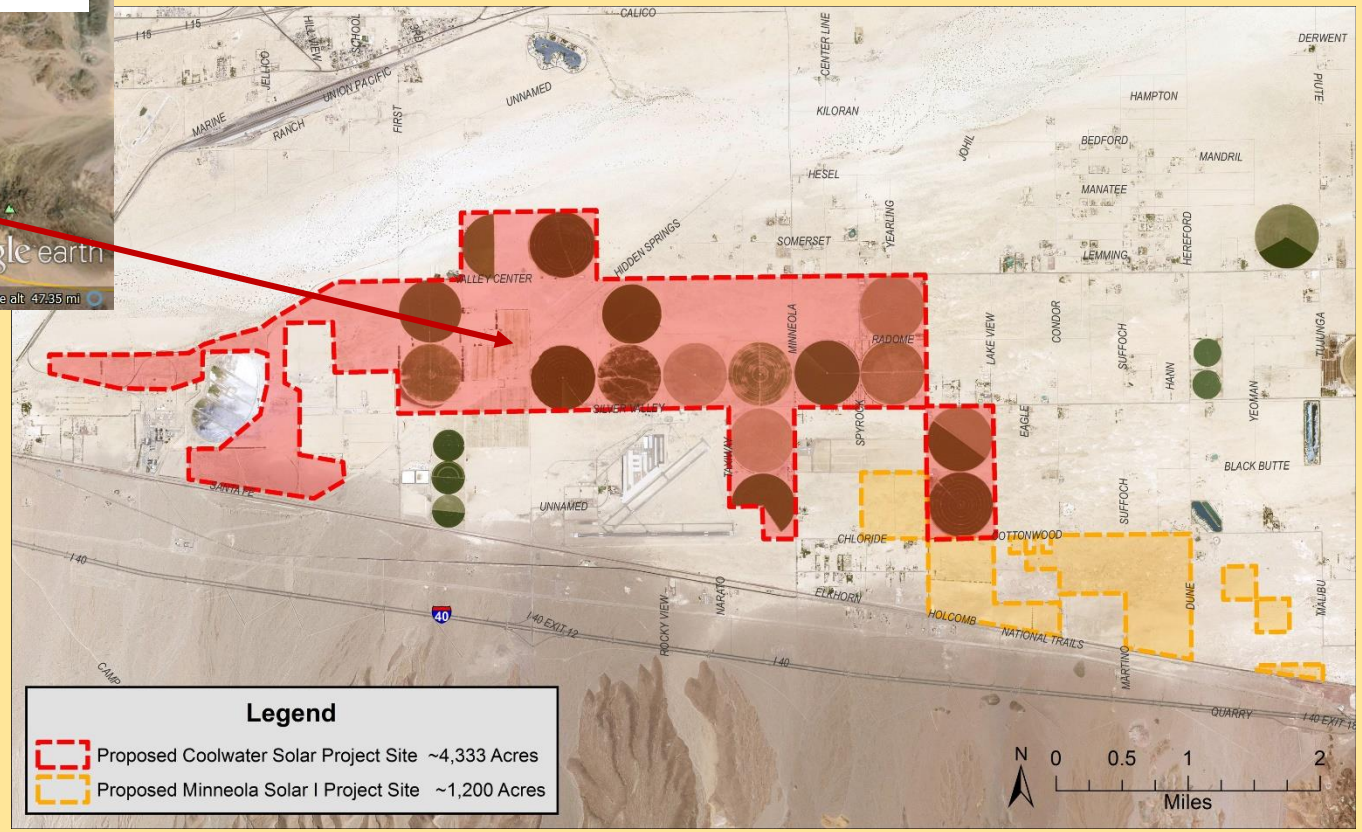
Newberry Springs

Proposed Solar Projects = 5,533 acres



Sand Source

Linear Dunes



ACTION TIME

1. Sign the petition

The petition urges the S.B. Board of Supervisors to insist that Policy 4.10 and RE 4.10.2, 4.10.2, 4.10.3 be sent to the Planning Commission as they stand for review and passage thus allowing the BOS to adopt the measure for the General Plan. This suite of policies is essential in prohibiting utility scale renewable energy projects under the County's jurisdiction that would create adverse impacts on our unincorporated communities' quality of live, or economic development.

The petition also requests that the BOS submit a comment during the DRECP scoping period that reflects the values of their constituents that the Department of Interior's 2016 DRECP LUPA Record of Decision should stand as is.

2. Attend a Scoping Meeting to have your position heard

There is a 45 day scoping on the DRECP which ends on March 22, 2018

"The public is encouraged to provide input on how land designations identified as part of the DERECP process might affect development of solar, wind or other renewable energy resources. The comments will be used to help set the parameters, or scope of the review of the land use plans.