APPENDIX D-2
DUST CONTROL TECHNICAL MEMORANDUM

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TETRA TECH

Administrative Draft

Technical Memorandum

Date: July 10, 2018

To: Aarty Joshi, Senior Manager, Environmental Permitting
Erika Brosz, PE, PMP
NRG Renewables

From: Derrick Coleman, Geomorphologist, Tetra Tech, Inc.

Re: Dust Control and Mitigation Measures for the Daggett Solar Power Facility Project
San Bernardino County, California

INTRODUCTION

The Daggett Solar Power Facility (HDR 2018a) is located in an area where the wind-blown transport of sands and silts (aeolian processes) is common (Zimbelman et al. 1995). This memorandum describes the site's soils, current wind erosion conditions and the potential for the project to change wind erosion. In addition, based on a review of the project proposal and the site's current wind erosion conditions, mitigation measures are described that will minimize impacts on natural sand movement and thus avoid significant impacts to neighboring properties. Dust control measures will be implemented not only during construction, but also during operations and decommissioning. The site and project area are shown in Figure 1 (Attachment 1).

REGULATORY BACKGROUND

San Bernardino County General Plan

The Conservation Element of the San Bernardino County General Plan establishes specific goals for preservation of natural resources in the desert region of the county, including Goal D/CO 1 (San Bernardino Planning Department 2014):

"Preserve the unique environmental features and natural resources of the Desert Region, including native wildlife, vegetation, water and scenic vistas."

To help insure this goal is met, the Conservation Element also establishes several policies, including the following two policies that are relevant to this Plan:

<u>Policy D/CO 1.4</u>

"Reduce disturbances to fragile desert soils as much as practicable in order to reduce fugitive dust. The County shall consider the following in the development of provisions to limit clearing.

a. *Parcels of one acre or larger shall not be disturbed or cleared of natural vegetation unless for the installation of building pads, driveways, landscaping, agriculture or other reasonable uses associated with the primary use of the land, including fire clearance areas.*

b. *Fire abatement or local clean-up efforts shall be accomplished by mowing or means other than land scraping whenever possible to minimize fugitive dust and windblown sand. When de-*

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brushing or blading is considered the most feasible alternative, additional methods shall be required for erosion control.

c. The County Office of Building and Safety may issue permits for further grading or clearance of vegetation subject to proper review."

<u>Policy D/CO 1.7</u>

"Encourage and educate the public to maintain properties in a manner to minimize fugitive dust."

San Bernardino County Development Code

Chapter 84.29.035 of the San Bernardino County Development Code (Required Findings for Approval of a Commercial Solar Energy Facility) includes the following requirements relevant to fugitive dust emissions (San Bernardino County Land Use Services Division 2018).

"(20) The proposed commercial solar energy generation facility will be designed, constructed, and operated so as to minimize dust generation, including provision of sufficient watering of excavated or graded soil during construction to prevent excessive dust. Watering will occur at a minimum of three (3) times daily on disturbed soil areas with active operations, unless dust is otherwise controlled by rainfall or use of a dust palliative, or other approved dust control measure.

(21) All clearing, grading, earth moving, and excavation activities will cease during period of winds greater than 20 miles per hour (averaged over one hour), or when dust plumes of 20 percent or greater opacity impact public roads, occupied structures, or neighboring property, and in conformance with Air Quality Management District (AQMD) regulations.

(22) For sites where the boundary of a new commercial solar energy generation facility will be located within one-quarter mile of a primary residential structure, an adequate wind barrier will be provided to reduce potentially blowing dust in the direction of the residence during construction and ongoing operation of the commercial solar energy generation facility.

(23) Any unpaved roads and access ways will be treated and maintained with a dust palliative or graveled or treated by another approved dust control Chapter 83.09 of the Development Code.

(24) On-site vehicle speed will be limited to 15 miles per hour."

The Mojave Desert Air Quality Management District

The Mojave Desert Air Quality Management District (MDAQMD) has established rules to reduce contaminants in the air so that attainment, and the future maintenance of ambient air quality standards can be achieved. Two specific rules, Rule 403 (Fugitive Dust, re-adopted 07/25/1977) and Rule 403.2 (Fugitive Dust Control in the Mojave Desert Planning Area, adopted 07/22/1996) are applicable to this project.

The purposes of Rule 403.2 are:

"(a) To ensure that the National Ambient Air Quality Standards for PM10 will not be exceeded due to anthropogenic sources of fugitive dust within the MDPA (Mojave Desert Planning Area); and

(b) To implement the control measures contained in the MDPA Federal PM10 Attainment Plan."

Among other things, Rule 403.2 requires that the owner/operator of a construction project disturbing more than 100 acres must:

"Prepare and submit to the MDAQMD, prior to commencing Earth-Moving Activity, a dust control plan that describes all applicable dust control measures to be implemented at the project"

The MDAQMD recently provided to developers a form to be completed as part of a Dust Control Plan (DCP; MDAQMD 2017).

Conditional Use Permit[1]

The County has included dust control measures in conditional use permits for other, similar projects. One example is from the Longboat Conditional Use Permit (CUP); specific condition no. 106 of the Project's CUP requires the following:

"106. Dust Control – Operation. Prior to final inspection, the Applicant shall develop an Operational Dust Control Plan that shall be approved and implemented prior to energization of the solar facility. The Operational Dust Control Plan shall include Dust Control Strategies sufficient to ensure that areas within the Project site shall not generate visible fugitive dust (as defined in Mojave Desert Air Quality Management District's [MDAQMD's] Rule 403.2) such that dust remains visible in the atmosphere beyond the property boundary. During high wind events, Dust Control Strategies shall be implemented so as to minimize the Project site's contribution to visible fugitive dust beyond that observed at the upwind boundary."

PROJECT AREA CONDITIONS

Aeolian processes at the project site and in the area occur as a result of its location, topography, climate (particularly wind and precipitation), soils and vegetation. The project site is located in a rural area with industrial, energy, agricultural and residential uses and these are described in this section.

Location and Topography

The project site is located east of Barstow where the Mojave River emerges from a constricted portion of its course and has historically spread deposits across a broad plain stretching between the locations of U.S. Highway 15 to the north and U.S. Highway 40 on the south. The width of alluvial deposition associated with the active Mojave River expands from less than 1,000 feet (possibly closer to 500 feet within the constriction) to over 4 miles near the project boundaries. Within the constriction, topographic relief extends upward a little over 600 feet from river bottom to adjacent ridgetop. On the broad alluvial plain where the project site is situated, relief is no more than about 40 feet from the Barstow-Daggett Airport on the south to U.S. Highway 15 on the north. Thus, the physical barriers to the wind in the project area are primarily limited to human-built structures.

Climate and Wind Conditions

Climatic conditions for the project area are very arid, with an average annual rainfall of 4.1 inches and no month with an average of more than 1.0 inch, a warm to hot Spring through Fall, and a mild Winter (see Attachment 2). The combination of warm temperatures for most of the year, and limited rainfall amounts, can leave soil moisture in the surface layers (0–6 inches) at low levels, and therefore subject to entrainment by high winds.

[1] San Bernardino County is in the process of issuing a Conditional Use Permit for Project #201700679, the Daggett Solar Project.

Wind direction remains very consistent throughout the year, blowing essentially from the west to the east, with speed (averaged by month) that ranges from about 9 miles per hour (mph) to 15 mph over the year (Attachment 2). The probability for higher speed winds (more than 13 mph to 17 mph) is greatest in April, May, and June, when they are likely to occur slightly more than half the time. The rest of the year this decreases to a likelihood of higher winds on one day out of every three or four days. The relatively high potential for high winds throughout the year, and the consistency of its direction explains the accumulation of aeolian deposits on the eastern edge of the project as well as further east of the project.

Local Soils

The soils in the project area have been classified by the Natural Resources Conservation Service into soil series and other miscellaneous areas (Tugel and Woodruff 1986; Terracon 2018). In total, six soil series are represented in the project vicinity (half of these with multiple mappable units) and another five mapped units representing other features not classified as soils, including such items as dunes, pits, and river bottom (Table 1, Figure 2). The soils have developed on parent material of unconsolidated sediments that are either alluvial in nature (water transported and deposited) or aeolian in nature (wind transported and deposited). In general, the land surface is very flat with low relief; almost half of the area near the project site has a surface slope of 0–2 percent. The areas with steepest relief (up to 15 percent slopes) are on dune lands to the east of the project or on alluvial fans south of the project. Only a very minor amount of these steepest areas intersects with the project footprint.

Table 1. Soils in the Project Area

Soil Series/ Other Land	Map Symbol	Description	Surface Slope
Arizo	100	Gravelly loamy sand	2 – 9%
Cajon	112	Sand	0 – 2%
	113	Sand	2 – 9%
	115	Gravelly sand	2 – 15%
	117	Loamy sand, loamy substratum	0 – 2%
Halloran	127	Sandy loam	0 – 2%
	128	Dune land complex	0 – 15 %
Kimberlina	137	Loamy fine sand	0 – 2%
	138	Loamy fine sand	2 – 5%
	139	Gravelly sandy loam	2 – 5%
Nebona	151	Cuddeback complex (sandy loams)	2 – 9%
Vliia	171	Loamy sand	0 – 2%
Dune	123	Dune land	5 – 15%
Pits	155	Excavated areas	--
River Bed	157	Riverwash (Mojave River bed)	0 – 2%
Water	178	Surface water	--
	179	Miscellaneous water feature	--

Except for the Halloran Dune Land Complex (128) all of the identified soil series mapped in the vicinity of the project formed on alluvial sediment, either channel deposits or fan deposits. Within the project boundaries, this consists primarily of Cajon Sands (112 and 113) with minor occurrences of Kimberlina Loamy Fine Sands (137 and 138) and Halloran Sandy Loams (127). The entire southeastern sector of the project site, and much of the area east of the project, is located on Halloran Dune Land Complex (128) soils that formed on aeolian-modified alluvial deposits. There are scattered occurrences of true Dune Land (123) north and south of the project footprint, but none within the project boundaries.

The primary conclusion to be drawn from the soils identified within the project boundary is that they tend to be sandy without a significant amount of clay. This combined with the arid conditions of the area, and the prevalence for windy conditions, provide opportunity for aeolian activity.

Existing and Native Vegetation

Currently, throughout most of the project site, the existing vegetation is irrigated agriculture, which has thoroughly modified the native vegetation. Use of modern agricultural processes has both enhanced and limited the potential for wind erosion and particle entrainment. On one hand, it creates an improved condition for wind erosion to occur by loosening the ground surface with mechanized tillage. But on the other hand, it suppresses that potential by using center pivot irrigation (to moisten soil surfaces) and by growing crops (to provide shelter and protection from winds).

The existing natural vegetation communities within the project area include Creosote Bush Scrub and Desert Saltbush Scrub, and the other existing land cover types include Disturbed Saltbush Scrub, Agriculture, Tamarisk Windrows, and Disturbed/Developed/Ruderal (HDR 2018b). Of the two native communities, Creosote Bush Scrub would be the most likely type, and this could include Creosote bush, white bursage (*Ambrosia dumosa*), common burrobrush (*Ambrosia salsola*), various saltbush (*Atriplex*) species, and California jointfir (*Ephedra californica*). Grasses could include Desert needlegrass, Desert sand verbena, Indian ricegrass, and Saltgrass. Based on the presence of any of these species a determination could be made regarding the potential for re-establishment of specific native species as part of the long-term program for limiting wind erosion from the constructed facility. A more thorough description of the project area vegetation communities is provided in the Daggett Solar Biological Resources Technical Report (HDR 2017).

Surrounding Land Uses and Adjacent Properties

In addition to the existing gas fired Coolwater Generating Station (located west of Areas 12 and 13), the surrounding area includes transportation infrastructure, agricultural lands, undeveloped land, the 44-megawatt photovoltaic Sunray Solar Project, and the Barstow-Daggett Airport, a county owned general aviation airport (Barstow-Daggett Airport), located directly south of the project. Route 66, the National Trails Highway, is located south of the project site and Interstate 15 is located to the north. Route 66 is located between Interstate 40 and the project site. The Burlington Northern Railroad is located south of the project site and the Santa Fe and Union Pacific Railroad is located north of the project site.

A Los Angeles Department of Water high voltage transmission corridor, approximately 1,000 feet wide, traverses the project site. In addition, high voltage transmission lines and electrical substations owned by Southern California Edison and the Sunray project, a 44-megawatt photovoltaic solar project built in 2016, are located west of Areas 9 and 12 of the project area.

Several single-family residences associated with adjacent agricultural land are located adjacent to the project site. At least three single-family residences appear along the eastern side of Mineloa Road, east of Area 2, while a tract of single-family residences appear further southeast of the southeast corner of Area 2, located immediately southeast of the Mineloa Road and Chloride Road intersection. At least two additional single-family residences appear on the southern side of Silver Valley Road, south of Area 4. Barstow Koi Farm and an additional single-family residence appear north of Area 1, across Silver Valley Road, while at least four additional single-family residences appear further east of Area 1 along Silver Valley Road. At least four single-family residences appear north of Areas 3 to 6, across Valley Center Road. A larger single-family compound, composed of several residential buildings and small pond, appear immediately northeast of the Valley Center Road and Power Line Road intersection, north of Area 12 and east of Area 9.

SITE-SPECIFIC AEOLIAN PROCESSES

Based on the local conditions, both physical and climatic, some general interpretations can be made about the aeolian processes occurring at the project site near Daggett. This includes consideration of the source of wind transported materials, the nature of materials traversing the site, and the likely areas where wind-blown materials might accumulate.

Likely Source Areas

One of the primary natural source areas adjacent to the project where materials could be picked up by winds and moved significant distances, is the Mojave River bed. Though the watershed is of significant size, at this location, the channel is still ephemeral, and is dry for most of the year, so bed materials are available to winds of a certain velocity for movement. The river bed traverses the project area from west to east across the north of the site boundary. Detachment of materials from the river bed located west of the project site could blow into the project boundary with a westerly or west northwesterly wind direction. However, it is unlikely that materials detached from the river bed where it is immediately adjacent to the project boundary to the north would reach the project area itself, or be impacted by development of the project.

Additional source areas could include the agricultural lands located between the Coolwater Power Plant and the western edge of the project boundary. During certain periods of the year, and depending on the actual agricultural practices employed on these lands, potential does exist for wind erosion and wind transport of materials to occur. And of course, under its current configuration (for the same reasons described above) much of the existing project site would serve as a potential source area. Once project development begins, these areas could continue to serve as a source area by virtue of the construction activities that are likely to occur.

Expected Movement/Transport Routes

The general, and very consistent, direction of the wind in this vicinity is blowing from the west, to the east. There is a slight possibility that wind direction could shift slightly to be from the northwesterly side or southwesterly side of west; but for most of the time wind blows from the west. This limits the potential direction of wind-transported sediment toward the east. This is the primary reason why most of the Dune Land and Halloran Dune Land Complex locations are east of the project, and those locations found within the project boundary are on the far east side of the project. Except where temporary or limited barriers to wind flow exist, and minor accumulations of wind-blown sediment are trapped, most wind-blown sediment will be transported across the project boundaries. This is the case under current conditions, with any major facilities constructed to divert or obstruct wind flow. The location of all structures and facilities to be installed as part of this development will have to be carefully considered in the context of their potential effects on wind flow velocity and wind-blown sediment transport.

Deposition/Accumulation Areas

The most likely area for deposition of wind-blown sediment is on the east side of the broad alluvial plain that formed south of the Mojave River near Daggett. As noted earlier, this area where historic deposition of wind-blown sediment has occurred near the project boundary is on the very eastern-most part of the project site or further to the east outside of the project boundary. Smaller-scale, or temporary accumulation can occur where windbreaks are encountered or installed (the latter either intentionally or unintentionally). Such areas have not been investigated or documented as part of this initial assessment of wind and dust concerns, but they would be useful as part of the development of a long-term plan for the mitigation of aeolian and dust impacts from project development. Additional consideration will be given to the design of the solar facility, the location of various components of the facility, and how they could potentially affect accumulation of wind-blown sediment.

AEOLIAN IMPACTS

There are two primary concerns from aeolian impacts; first is the potential for air quality degradation and second is physical impacts, including the covering (burial) of facilities and equipment.

Airborne Dust/Air Quality Issues

Due to the local soil types with high sand texture content, and the common occurrence of windy conditions, airborne particles of a very fine size, also known as particulate material (PM), are a frequent occurrence under natural or disturbed conditions in the area. These pose a human health hazard due to the ease with which they can be inhaled. PM10 and PM2.5, consisting of particles no more than 10 microns in diameter or 2.5 microns in diameter respectively (toward the finer end of the silt particle size range) are given special consideration in air quality regulations for this region. While the greatest concern over particles comprising airborne PM10 or PM2.5 is for those generated by some type of combustive activity, the regulatory requirements do not differentiate. The purpose of the air quality discussion in this memo is not to fully explain its background or the scientific development of the regulations that apply here, because that will be covered in the air quality impact assessment. The purpose is to note that such air quality regulations exist and their requirements will apply to any dust generated through the combined effects of construction activity, facility operation, or decommissioning activities, and the expected, naturally occurring wind conditions.

Physical Impacts from Sand and Silt

The other cause for concern over potential impacts from winds and the materials they carry, are the physical results from blowing sands primarily, but also from smaller sized particles as well. Damage can occur from the impact of particles on surfaces, in effect a form of sand-blasting. Also, deposition of wind-transported materials can cause problems through burial of equipment or facilities (like roads), or even just with deposition of a coating of dust on a photovoltaic cell.

DUST CONTROL PLAN

To avoid significant impacts to the project and project area, the Applicant will develop a DCP as required by MDAQMD Rule 403.2 to limit the generation of pollutants. The DCP will comply with MDAQMD Rules 403 and 403.2 to control fugitive dust, including PM10, by addressing (a) Objectives,

(b) Key Contacts, (c) Roles and Responsibilities, (d) Dust Sources, (e) Control Measures, and (f) Plan Applicability (throughout the various stages of the project, e.g. construction, operation, and decommissioning). The following paragraphs discuss mitigation measures that will be developed in more specific detail in the final DCP that will accompany the building permit application. The DCP will be reviewed by the County.

Project Created Dust Sources

A number of potential sources can produce fugitive dust emissions from a multi-phase Project of this scale and duration, and these can vary over the life-cycle of the Project. However, they can be categorized into five general categories (1) disturbed surfaces, (2) unstable surfaces, (3) unpaved roads, (4) paved roads, and (5) in-transit particles (unspecified sources).

Disturbed Surfaces. Ground surfaces become disturbed when they are excavated, graded, scarified, bulldozed, drilled, or even just traversed by vehicles or equipment. This generally happens when land development is initiated, vegetation is removed, and the ground surface is broken in preparation for building roads, parking lots, foundations, or other infrastructure, including subsurface lines (pipelines, cables, etc.) or points (poles, posts, or even wells). Disturbed surfaces, especially in the desert, are more susceptible to detachment and movement of individual particles by winds than is the pre-disturbed ground surface.

Unstable Surfaces. Some ground surfaces can become, or in certain situations already are, unstable even without being disturbed by the activities noted above. This could be a result of some historic (but not recent) disturbance that has not stabilized, or perhaps as a result of long-term changes in the vegetative cover, or even as a result of active or recent aeolian or alluvial deposition. Whatever the cause, if a ground surface has not developed some type of cohesion or protection, individual particles are susceptible to detachment and movement caused by wind.

Unpaved Roads. Road creation can occur in a variety of ways from simple repetition of traffic to designed and engineered transport routes. Depending on their history, use, and the materials of which they are made, unpaved roads can prove to be a significant source of airborne particles. If they are well-designed, well-constructed, and well-maintained, they will provide far less material that can become airborne particles.

Paved Roads. Although they are considered the least susceptible as a source for airborne particulate material among roadways, paved roads can also accumulate loose particles on their surface, particularly where traffic from unpaved roads can “track” mud or dirt onto the paved surface. Loose particles can also accumulate where trucks carrying uncovered loads lose dirt and dust onto the paved road surface.

Unspecified Sources. In-transit particles will be present even when effective source controls are in place, and it’s not always clear (nor even necessarily important to discern) from what source they came. Never-the-less control measures are available to limit the transport of these materials and their impacts either during transport or upon deposition.

Reasonably Available Control Measures

To mitigate or limit each of the “sources” identified above during construction, facility operation, de-commissioning, or post-closure of a facility, there are often multiple mitigation measures available (see Table 2). These include measures to address the supply or the transport of wind-blown materials. In Rule 403.2 the MDAQMD refers to these as "Reasonably Available Control Measures" (RACMs). Specific RACMs that are appropriate for each source should be used throughout the operation of the Project. Implementation of these measures in conjunction with specific air quality mitigation measures, should limit the emission of PM10 air pollutants during construction to acceptable levels.

The solar equipment on site will slow the wind and wind-blown sand moving across the site. The piles supporting the solar panels will particularly contribute to blocking some of the wind-blown dust as will other facilities including the inverters and substations.

Wind Fencing. Temporary or permanent wind barrier fencing is designed to be incorporated into standard chain-link fencing (the same fencing as will secure the facility boundaries). It does not completely block the wind but slows it to allow some of the wind-carried sediment to drop out. Wind barrier fencing should be erected to minimize off-site wind-blown dust accumulation at adjacent residences, or other locations with sensitive receptors. Strategically placed wind barrier fencing, to be constructed as part of the construction phase and operation phase (in locations shown in Figure 3) would be maintained to minimize dust blowing in the direction of the adjacent residences or the Barstow-Daggett Airport. Wind barrier fencing should be inspected by the Dust Control Coordinator (DCC) no less than once quarterly, and repaired or replaced as needed to maintain full functionality. Any accumulated sediment would be removed and either re-distributed onsite or transferred off-site for use or disposal elsewhere.

Table 2. Reasonably Available Control Measures

Source	Wind Fencing	Wind Screens	Vegetation	Surface Cover	Treatment	Compaction	Vehicle Speed Limits	Limiting Traffic	Street Sweeping
Disturbed Surfaces			●	●	●	●			
Unstable Surfaces			●	●	●	●			
Unpaved Roads					●	●	●	●	
Paved Roads									●
Unspecified Sources	●	●							

Wind Screens. Temporary or permanent wind screens are used to block or shield highly sensitive facilities or high-traffic paved roadways from wind and wind-blown deposits by providing a solid barrier. These are generally shorter than a standard fence height and do not allow wind (or particles) to flow through the barrier; an example being the familiar concrete K-rail. Wind screens can be deployed where wind barrier fencing proves inadequate to mitigate specific particle transport pathways.

Vegetation. Use of natural vegetation to stabilize ground surfaces will always be the most desirable option, and primary effort to stabilize disturbed or otherwise unstable surfaces. To the extent feasible, the development of areas of the Project site will employ mowing and rolling techniques to maintain plant root systems for long term soil stability of the vegetative cover. Where removal of vegetation and root systems cannot be avoided, reseeding will be used to re-establish a viable plant community (see Attachment 3).

Surface Cover. Both temporary and longer-term protection or covering of disturbed ground surfaces, stockpiled top soil, or stored bulk materials can help prevent wind erosion and transport of fine particles. Such cover can include plastic sheeting, geotextile fabric, biodegradable mattresses, and gravel. Even the use of asphalt on actively used roads to reduce dust from traffic, is an example of a cover that would limit dust particle detachment.

Surface Treatment. Water trucks will apply water and/or other controls to minimize the production of airborne dust, and limit emissions to 20 percent opacity in areas where grading occurs, within the staging areas, and on any unpaved roads used during project construction. Other controls could include application of hydromulch (with seed for re-establishment of vegetation), application of soil binders, or even the use of soil cement for particularly unstable areas.

Compaction. Unpaved roads inside the solar arrays should be compacted. At the discretion of the DCC, additional stabilizing methods (e.g., application of gravel, soil stabilizers, or even a paved cover may be used). However, to date, these compacted roads have not been a significant source of fugitive dust and no additional stabilizing methods are anticipated.

Vehicle Speed Limits. Limiting vehicle speed is one way to reduce the potential for vehicle-mobilized airborne particles. The Renewable Energy Action Team (REAT) recommends limiting vehicle speeds to 25 mph on stabilized, unpaved roads, or to as little as 11 mph on roads within active construction sites (REAT 2010). It is further recommended that speed limit signs be displayed prominently at all project/facility entrances.

Limiting Traffic. Where and when possible, vehicle travel distances and total traffic amounts on roads at the Daggett Solar Project construction site should be minimized through efficient planning and management. Special consideration must be given to minimizing the travel distances of heavy or heavily laden vehicles, particularly during the construction period.

Street Sweeping. Sealed roads should be swept as needed and track out opportunities limited through the use of stabilized construction/facility entrances or, if necessary, with one or more entrance/exit vehicle tire wash apparatuses. The REAT recommends a minimum of 500 feet of paved road surface be swept from the construction site or facility entrance, and that sweeping occur at least twice on days without precipitation (REAT 2010). It is further recommended that the second sweeping operation occur as close to the end of the day as feasible.

Limiting Ground Disturbance

Managing and limiting disturbance of ground surfaces from vehicle traffic, excavation, grading, vegetation removal, or other activities will also be implemented to reduce dust transport by wind. Thus, by carefully planning and staging where and when ground disturbing activity needs to occur, the amount of disturbed and unprotected ground surface can be minimized for any given point in time during the construction process. Also, careful planning can reduce the total amount of area that will need to be disturbed during the construction process to the minimum amount necessary.

Such planning could include using a less-disturbing activity to lower the potential for soil detachment. An example would be to only trim vegetation (mow and roll) in areas where solar panels will be installed, rather than to remove vegetation entirely (clear and grub) followed by excavation or grading. Not only does this process lessen the level of ground disturbance, but it leaves the root system in place for a quicker regeneration of a vegetative cover.

CONCLUSION

Wind erosion is currently occurring at the project site. The existing wind-blown sand conditions have been described here and have been taken into account in the project design. Site grading will be minimized and mitigation measures will be implemented to control wind-blown dust at the site during construction, operations and decommissioning. Implementation of the measures described here will minimize the project’s impact on current aeolian processes and therefore wind-blown sand and dust from the project will be temporary and less than significant.

Attachments:

1. Figures
2. Meteorological Data
3. Vegetation – Revegetation Management Details

REFERENCES

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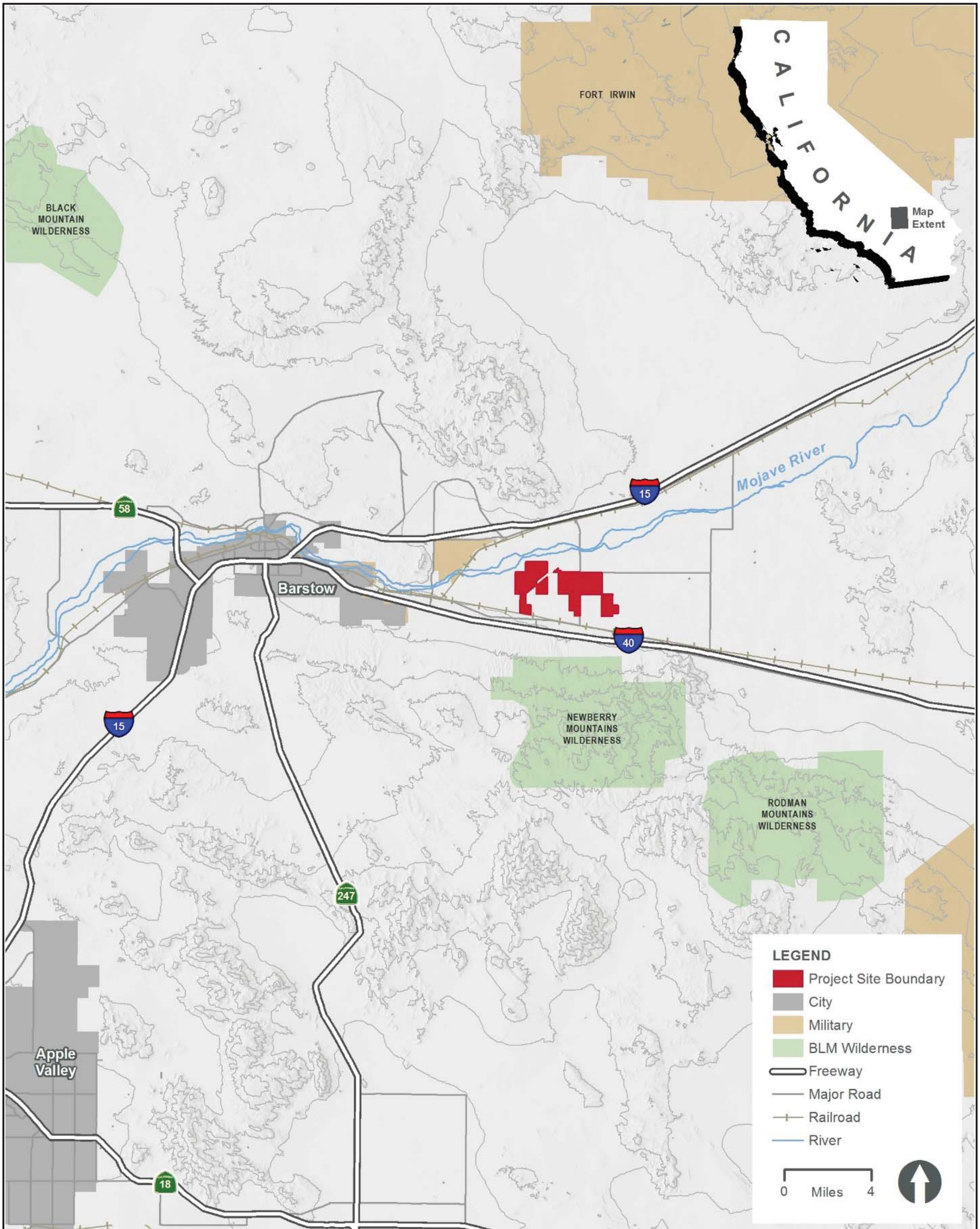
ATTACHMENT 1
FIGURES

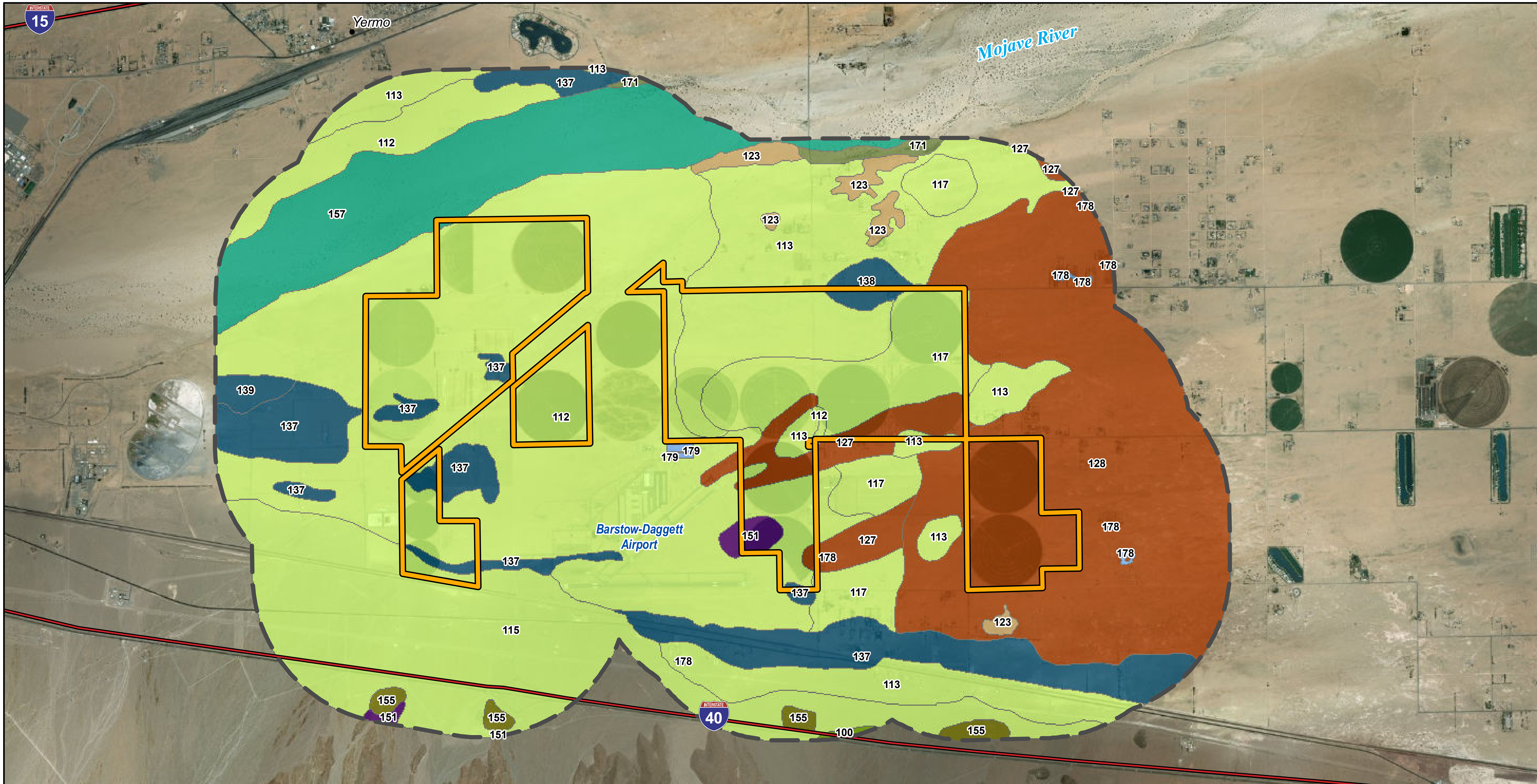


Daggett Solar Power Facility

Figure 1

Project Area

San Bernardino County, CA



Daggett Solar

Figure 2
Soils Map
San Bernardino County, CA

N

0 2,000 4,000
Feet

1-mile Buffer
Project Boundary

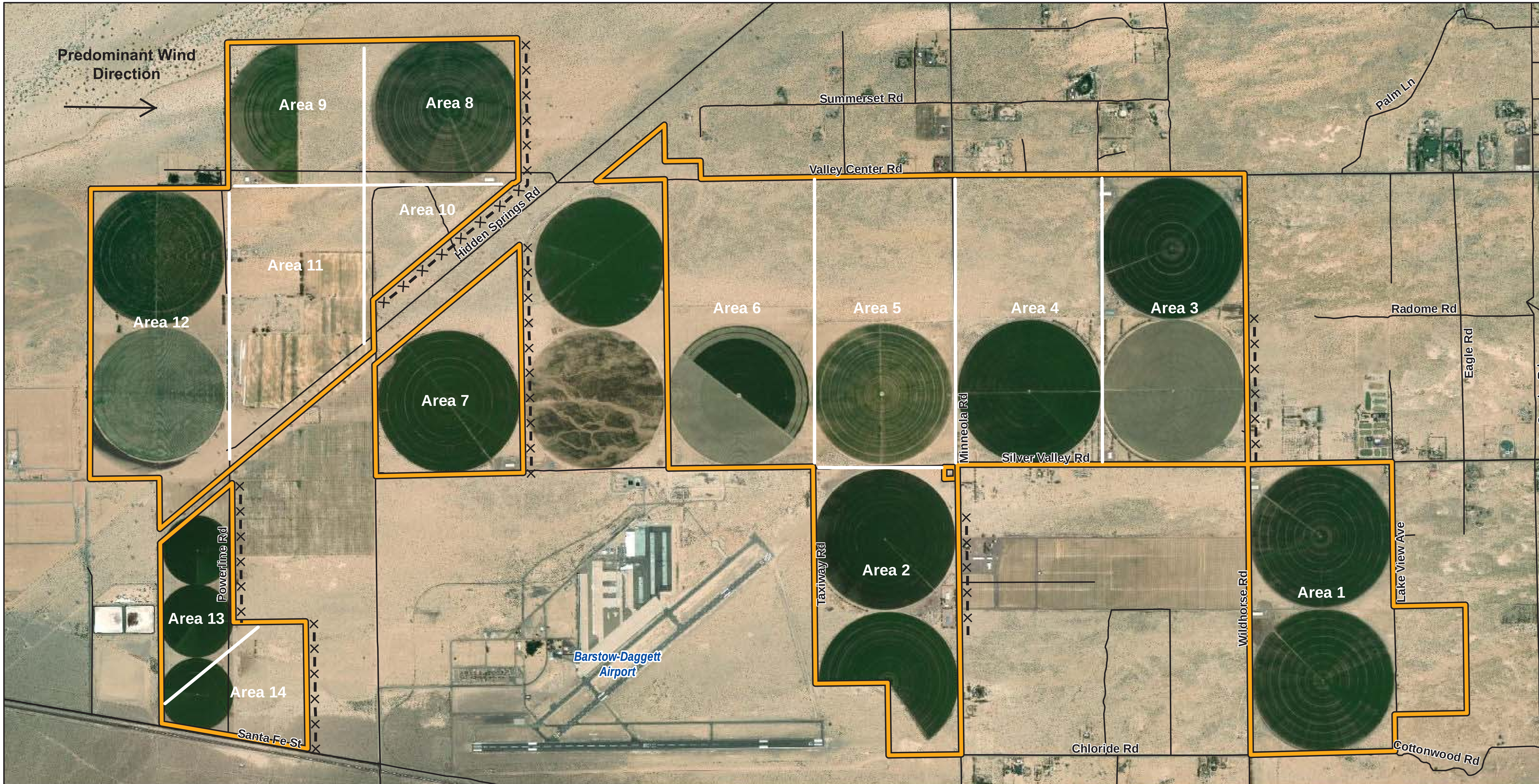
Soil Map Units

Soil Series:

- Arizo [100]
- Cajon [112, 113, 115, 117]
- Halloran [127, 128]
- Kimberlina [137, 138, 139]
- Nebona [151]
- Villa [171]

Other Lands:

- Dune [123]
- Pits [155]
- River Bed [157]
- Water [178, 179]



Daggett Solar

Figure 3
Site Plan – Dust Control Measures
San Bernardino County, CA

N

0 1,050 2,100
Feet

Project Boundary

Wind Fencing

Wind Fencing Lengths

PROJECT AREA	FENCE LENGTH (ft)
Area 1	0
Area 2	2,280
Area 3	2,695
Area 4	0
Area 5	0

PROJECT AREA	FENCE LENGTH (ft)
Area 6	0
Area 7	4,160
Area 8	2,585
Area 9	0
Area 10	3,420

PROJECT AREA	FENCE LENGTH (ft)
Area 11	0
Area 12	0
Area 13	2,530
Area 14	2,320

ATTACHMENT 2
METEOROLOGICAL DATA

Barstow-Daggett Airport

https://www.windfinder.com/windstatistics/barstow-daggett_airport
https://www.usclimatedata.com/climate/daggett/california/united-states/usca0277

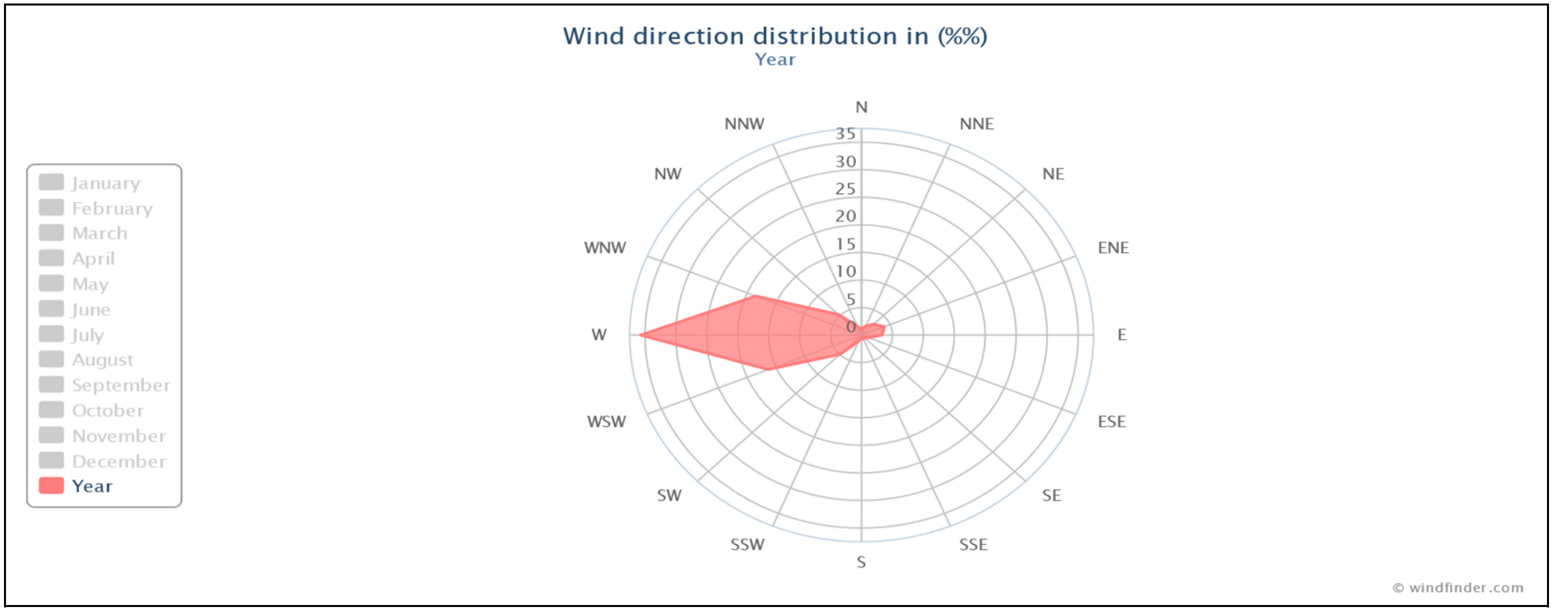
	1	2	3	4	5	6	7	8	9	10	11	12
Month	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Dominant wind direction \1	W	W	W	W	W	W	W	W	W	W	W	W
Wind Speed Probability \2	17	31	40	53	54	56	35	29	27	29	25	24
Ave. Wind Speed (mph)	9.2	11.5	12.7	15.0	15.0	13.8	11.5	11.5	11.5	10.4	10.4	10.4
Average high temp. (°F)	61	65	72	79	89	98	104	103	95	82	69	60
Average low temp. (°F)	36	40	45	51	59	67	73	72	65	54	42	35
Average precipitation (in)	0.59	0.67	0.51	0.16	0.04	0.08	0.47	0.28	0.20	0.20	0.35	0.55

Statistics based on observations taken between 09/2012 - 05/2018 daily from 7am to 7pm local time.

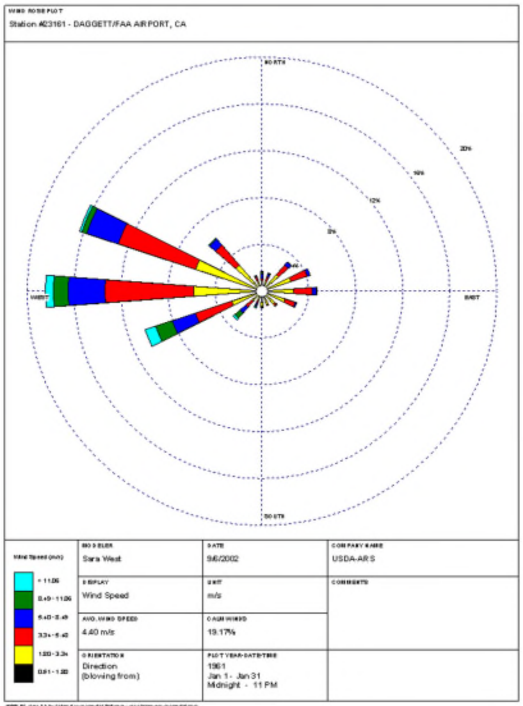
\1 Direction from which wind is blowing.

\2 Probability that wind speed will be stronger than a moderate breeze of 13-17 mph

mph miles per hour



JANUARY 1961



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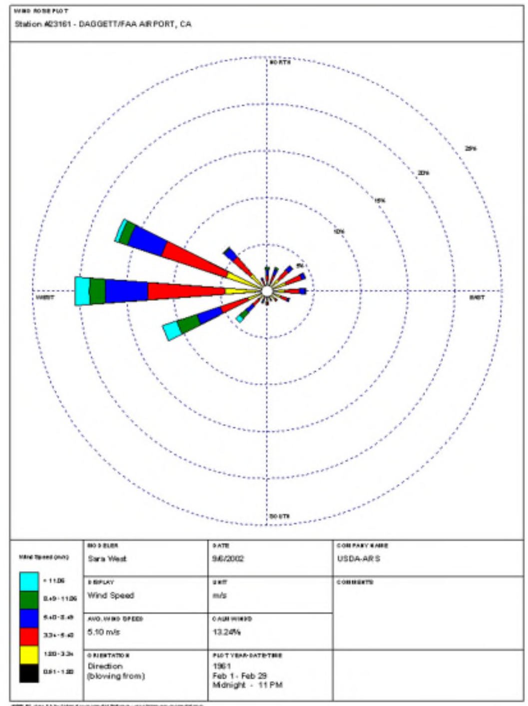
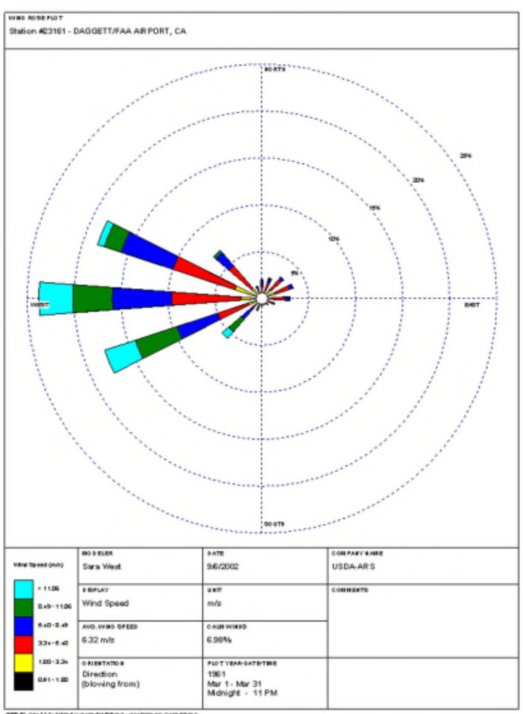


MARCH 1961



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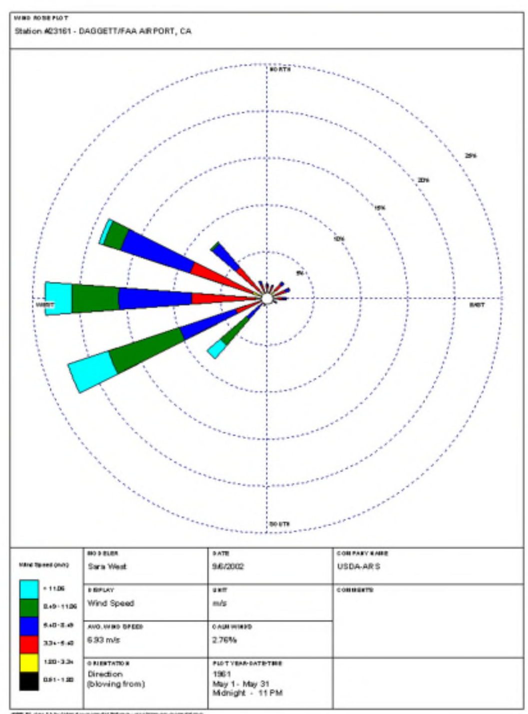

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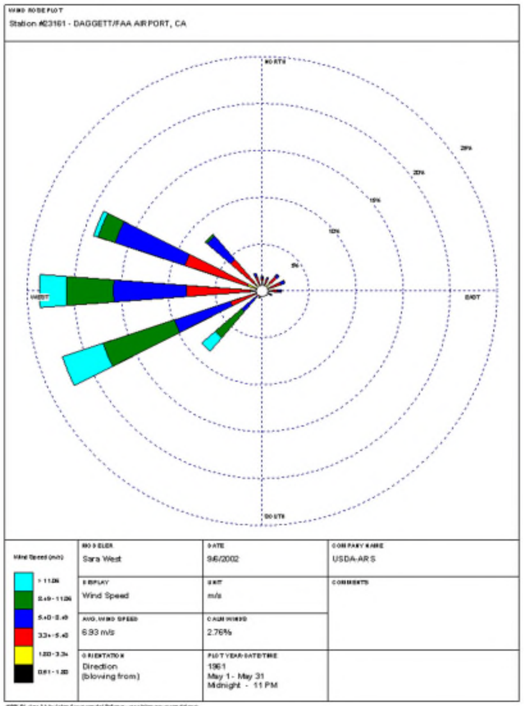

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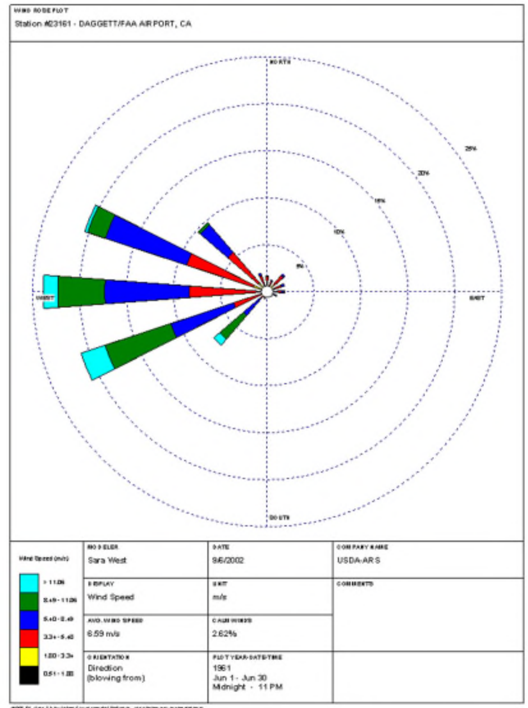

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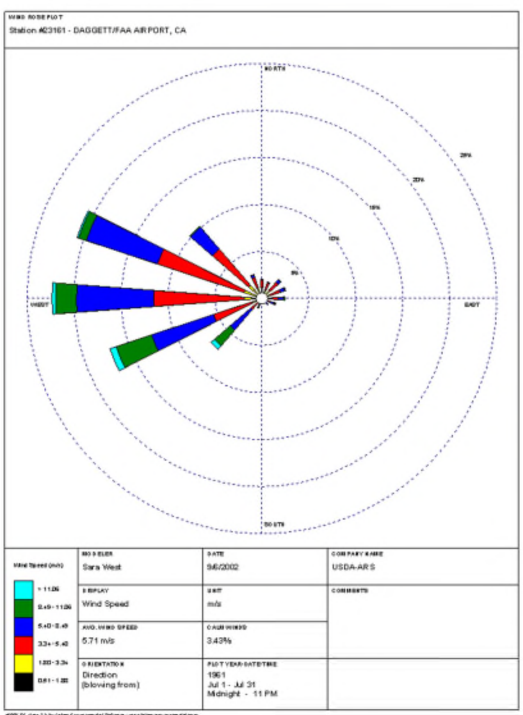
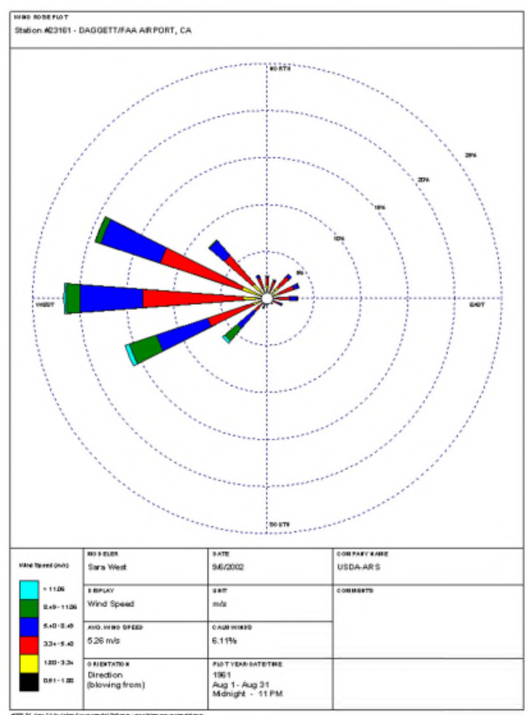
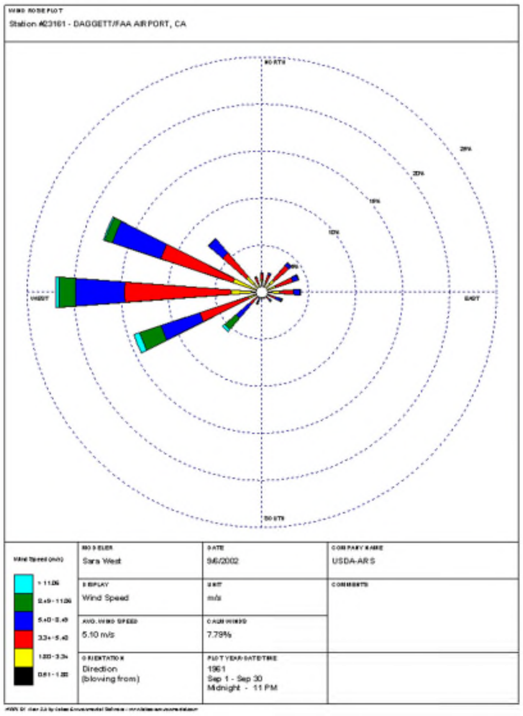


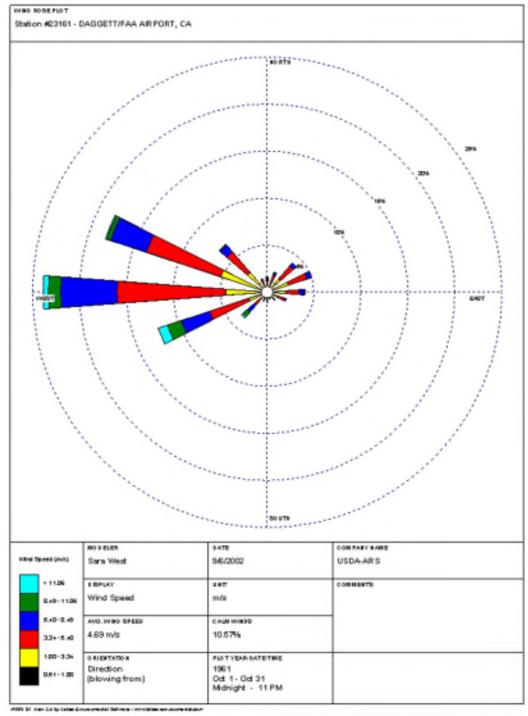
AUGUST 1961



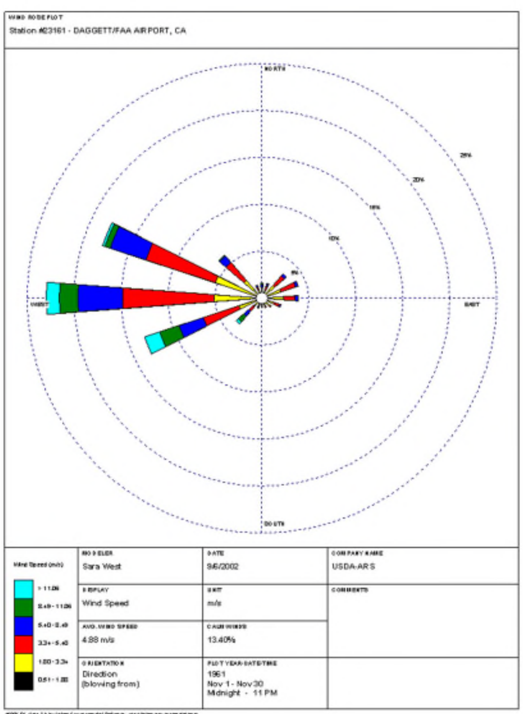
SEPTEMBER 1961



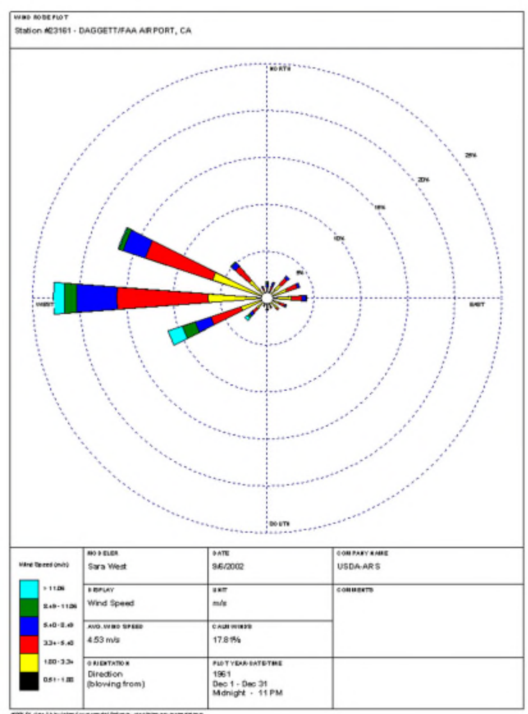
OCTOBER 1961



NOVEMBER 1961



DECEMBER 1961



ATTACHMENT 3
VEGETATION – REVEGETATION MANAGEMENT DETAILS

ATTACHMENT 3

DRAFT STANDARD

VEGETATION – REVEGETATION MANAGEMENT DETAILS

An important part of stabilizing the ground surface at the Daggett Solar Project site during all phases of the project will be the management of existing site vegetation and also the revegetated surfaces. For disturbed areas where vegetation and root systems had to be removed, as appropriate and practical, timely replenishment of seedbanks is critical. This replenishment will be accomplished using hydro-mulch augmented by hand broadcast. Specific application processes used (hydromulch versus hand broadcast) will be dictated by the DCC and based on accessibility, soil-contouring needs, and the ability to incorporate imprinting or hand raking techniques to increase seed to soil contact as well as germination rates.

If areas are inaccessible, or for other reasons are difficult to reseed, alternative but equivalent measures may be used to stabilize surfaces (at the direction of the DCC). Such measures may include use of blankets, fiber matrices, geotextiles or other erosion resistant soil coverings or treatments.

SEED MIX

For areas where hydromulch applications or hand broadcasting are feasible, it is recommended that the seed mixture provided here be used. The proposed seed mixture includes primarily native species characteristic of the Mojave Desert area. The mixture includes seeds of fast growing species to initially provide a cover crop (of native annual forbs) to keep weeds down. It also includes intermediate annual and perennial plants for longer-term coverage, and finally prostrate semi-woody and woody plants to eventually co-dominate. All of these species are diminutive, so at maturity will be less than three feet tall, so they will not interfere with photovoltaic panels, access, or safety. Seeding should be done just in advance of winter rains, and may be repeated as necessary depending on germination success. The recommended species to be included in the seed mixture, and their application rates, are provided below.

PROPOSED SEED MIXTURE AND APPLICATION

Common name	Species	Estimated Seeding Rate (lbs./acre)
Browneyes	*Chylismia claviformis* ssp. *claviformis*	0.5
California buckwheat	*Eriogonum fasciulatum* var. *polifoilum*	0.5
Chia	*Salvia columbariae*	0.2
Desert bluebells	*Phacelia campanularia*	1.0
Desert dandelion	*Malacothrix glabrata*	0.5
Desert globemallow	*Sphaeralcea ambigua*	1.5
Desert poppy	*Eschscholzia gylptosperma*	0.5
Desert sunflower	*Geraea canescens*	1.5
Fremont's pincushion	*Chaenactis fremontii*	0.5
Saltgrass	*Distichlis spicata* var. *stricta*	0.5
Sand rice grass	*Stipa hymenoides*	2.0
Sand verbena	*Abronia villosa*	3.0
Woolly desert marigold	*Baileya pleniradiata*	1.5

As is the case for native plant seed stock, availability of supplies is subject to change, so adjustment of this seed mixture may be necessary over time.

SUPPLEMENTAL SEEDING

Should germination rates fail to yield the established goal for the project, supplemental seeding may be used at the discretion of the DCC. All supplemental seeding will occur within fall and winter months (typically, October to January) when germination conditions are favorable.

IRRIGATION MANAGEMENT

No Irrigation after the initial watering from the hydroseeding process, is recommended here. Never-the-less, should conditions warrant additional irrigation (such as unseasonal heat or extended dry periods), it can be provided at the discretion of the DCC using direct application from a water truck. In this type of situation, a qualified biologist should be on-site during such irrigation events to watch for, and prevent any overwatering, sedimentation, or erosion.

VEGETATION MANAGEMENT

Based upon germination rates and growth rates, vegetation management may be necessary. While all species listed within the seed mix are diminutive, trimming, mowing, or other treatments may be needed to allow safe and efficient access to Project facilities for maintenance, fire safety, or other needs. All management efforts should adhere to any other requirements for the Daggett Solar Project established in other Plans or mitigation agreements.