#6

ATTACHMENT

For Item

#1

Wednesday, August 18, 2021

PUBLIC COMMUNICATION RECEIVED BY THE CLERK OF THE BOARD

DISTRIBUTED 08/17/2021

From: Wier, Emily
Sent: Monday, August 16, 2021 5:04 PM
To: FGG, Public Comment
Subject: FW: [External] Jacumba Solar Project

Follow Up Flag: Follow up
Flag Status: Flagged

From: Barbara Jaffe-Rose <barbarajaffe-rose@sbcglobal.net>
Sent: Monday, August 16, 2021 5:00 PM
To: Wier, Emily <Emily.Wier@sdcounty.ca.gov>
Subject: [External] Jacumba Solar Project

Please forward to Nathan Fletcher

To: Nathan Fletcher, San Diego Board of Supervisors

From: Barbara Jaffe-Rose, member Public Power San Diego

I reside in the city of San Diego. I am very disturbed that San Diego Community Power (SDCP) is requesting approval of a huge, 650-acre, solar project in Jacumba. This project will supply solar energy to the cities of San Diego, Chula Vista, La Mesa, and Imperial Beach, but none to the local Jacumba residents. This project runs contrary to SDCP initial stated goals of local power and local control.

Solar energy is clean and cheap. Its beauty is that it can be placed locally on rooftops, over parking lots and more – consider possibilities of shaded areas in parks, over sidewalks and more. Rooftop solar is the first required step toward energy independent local grids (the second being reliable storage options). Not all homes and apartment buildings are perfect for solar panels but we have the unexplored rooftops of big box stores, flat roofed malls throughout the SDCP area and parking lot covering (becoming more vital as temperature rises). All the aforementioned options could support the many Jacumba proposed panels locally. SDCP could also rent residential roofs in underserved communities for additional space while the rental income assists low-income folks with utility bills.

Small independent grids improve energy security. By removing reliance on long distance trunks of wires we help prevent massive blackouts. Remove long distance power lines we decrease the number of live power lines in our fire prone areas that have been the cause of wild fires and the ensuing loss of lives and property.

We can have more secure energy, more secure local grids and decreased financial costs with local energy sourcing. Long distance transmission should be seen as the energy choice of LAST resort.

Please vote against this poorly conceived project.

Respectfully,

Barbara Jaffe-Rose

From: jacumbakirk@hotmail.com
Sent: Monday, August 16, 2021 9:17 PM
To: Fletcher, Nathan (BOS)
Cc: Wier, Emily; FGG, Public Comment; Slovick, Mark
Subject: [External] No JVR energy park August 18

Follow Up Flag: Follow up
Flag Status: Flagged

Dear supervisor Fletcher, I have lived in Jacumba for more than 30 years, I am a senior citizen and I am an electrician, I work in San Diego but I choose to live here even though it is a long drive.. the beauty is incredible and I've simply love this place. Many people have written you elegant letters, I've seen them. I only want to add my opinion. I can only imagine how's busy you all are, whoever reads this. It would be an absolutely tremendous tragedy to place this industrial solar field in this location. Thank you for taking the time to read our letters. Sincerely, Kirk Gilliam, Lightconnector, 44555 Old Highway 80, Jacumba, CA 91934 (619) 884-9465

Sent from Yahoo Mail for iPhone

From: DV <Vilett@cox.net>
Sent: Monday, August 16, 2021 7:52 PM
To: Desmond, Jim
Cc: Mills, Benjamin; FGG, Public Comment; Slovick, Mark
Subject: [External] Solar project in Jacumba, please vote NO

Follow Up Flag: Follow up
Flag Status: Flagged

Dear Mr. Desmond and others,
Please register my vote to oppose the Jacumba Solar project..
It is amazing to me that we sell off our heritage to the first person to throw money our way, regardless if they live in the US or not.
Why are we letting foreigners take our valueable land and use it for monetary gain at the expense of Jucumba town residents?
On top of the environmental damage this will create, it will ruin the ambiance of a historic town and irreversibly damage it.
We have already let this happen with windmills everywhere, the Sunrise Power link, and now solar panels are ruining our deserts,
(which are one of natures most unique parts for people who understand their ecosystem).
I urge you to not falter from a NO vote on this important vote.

Sincerely,
David R. Vilett
A San Diego Resident

From: Potter, Andrew
Sent: Tuesday, August 17, 2021 7:32 AM
To: FGG, Public Comment
Subject: FW: [External] JVR solar park opposition petitions, agenda item 1
Attachments: JVR Opposition petitions A to D.pdf

Follow Up Flag: Follow up
Flag Status: Flagged

From: Cherry Diefenbach <csdiefenbach@sbcglobal.net>
Sent: Monday, August 16, 2021 8:35 PM
To: Potter, Andrew <Andrew.Potter@sdcounty.ca.gov>
Subject: [External] JVR solar park opposition petitions, agenda item 1

Hi Andrew,

Attached are another batch of JVR opposition petitions.

Cherry Diefenbach

WE, THE UNDERSIGNED, OPPOSE THE 600-ACRE JACUMBA VALLEY RANCH (JVR) SOLAR PARK which would place 280,000 photovoltaic modules, batteries/inverters/transformers immediately adjacent to the town of Jacumba, along both sides of scenic Hwy 80, and around three sides of the Jacumba Airport runway. A solar project of this scale will: destroy scenic vistas; displace wildlife; introduce mechanical noise into a quiet, rural landscape; drive away tourism, demolish historic resources (c.1928 dairy farm), and squander Jacumba's ability to thrive by consuming the best available land in perpetuity. (Left is a visual simulation of the 600-acre JVR Park.)

We know the 600-acre JVR solar project is not fair to a town that already supports a 100-acre solar farm. This project would never be proposed or approved next to a wealthier community. The Board of Supervisors (BOS) must protect Jacumba's future by requiring the developer to compromise on a smaller, 300-acre solar project alternative called the Equity for Jacumba Alternative! *SAVE JACUMBA!!!*

PRINT NAME	SIGNATURE	MAILING ADDRESS	EMAIL/OTHER COMMENTS	DATE
Dorothy Hawkins		PO Box 593 Pinevalley 91962	theoz5225@gmail	8.14.21
ROBERT E. TURNER	R. E. Turner	P.O. Box 743 PINE VALLEY CA 91962	LIONBROWN@YAHOO.COM	8-14-21
Diana Baker	Diana Baker	PO. Box 951 Pine Valley CA 91962		8-14-21
GLORIA PUCKETT		P.O BOX 14 PINE VALLEY		8/14/21
Steve Braswell		po Box 1031 Pine Valley		8-14-21
Joyce Zonzolino		P.O Box 1482 PV		8-14-21
THOM HARRIS SR.		P.O. BOX 1125 PV		8-14-21

(A)

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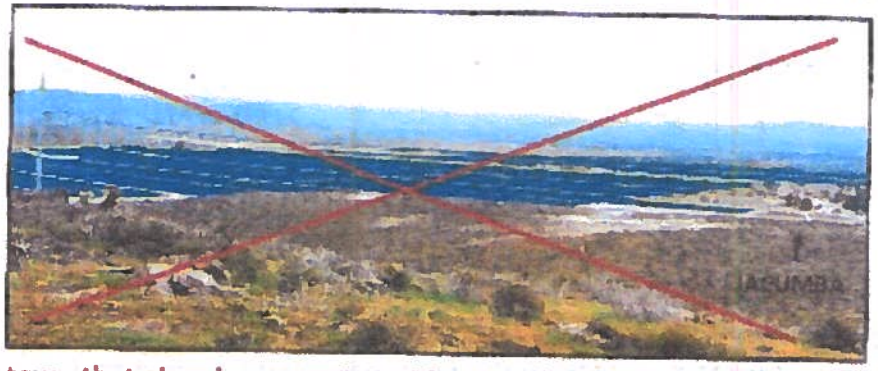
PRINT NAME	SIGNATURE	MAILING ADDRESS	EMAIL/OTHER COMMENTS	DATE
Janet Peterson		P.O Box 1083 PV		8/14/21
Mandie Bullock		PO Box 1006 PV	mandie@mandiebullock.com	8/14/21
[illegible]		Box 408 PV		8/14/21
E. Cornick		Box 1107 PV		8-14-21
Daphne Cooper		Bx 1104 PV		8-14-21
Vern Sorgen		Bx 1416 PV		8-14-2021
Sara Cutler		PO Box 841 PV		8/14/21

(3)

WE, THE UNDERSIGNED, OPPOSE THE 600-ACRE JACUMBA VALLEY RANCH (JVR) SOLAR PARK which would place 280,000 photovoltaic modules, batteries/inverters/transformers immediately adjacent to the town of Jacumba, along both sides of scenic Hwy 80, and around three sides of the Jacumba Airport runway. A solar project of this scale will: destroy scenic vistas; displace wildlife; introduce mechanical noise into a quiet, rural landscape; drive away tourism, demolish historic resources (c.1928 dairy farm), and squander Jacumba's ability to thrive by consuming the best available land in perpetuity. (Left is a visual simulation of the 600-acre JVR Park.)



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PRINT NAME	SIGNATURE	MAILING ADDRESS	EMAIL/OTHER COMMENTS	DATE
Anne Stundahl	Anne Stundahl	902 Normandy Way 92019		09 Aug 2021
Jacqueline Finch	Jacqueline Finch	953 St George Dr El Cajon CA 92019		8/9/21
Jenny Murrell	Jenny Murrell	8631 Pine Valley, Ca 91962		8/14/21
Allen Baker	Allen E Baker	8121 Pine Valley CA		8/14/21
Janet Parcebaker	Janet Parcebaker	PO Box 42, Pine Valley Ca		8/14/21
RICHARD EDGAR	Richard Edgar	PO Box 365 " "		8/14/21
Mary Rajknecht	Mary Rajknecht	POB 795, PINE VALLEY		8-14-21

(C)

WE, THE UNDERSIGNED, OPPOSE THE 600-ACRE JACUMBA VALLEY RANCH (JVR) SOLAR PARK which would place 280,000 photovoltaic modules, batteries/inverters/transformers immediately adjacent to the town of Jacumba, along both sides of scenic Hwy 80, and around three sides of the Jacumba Airport runway. A solar project of this scale will: destroy scenic vistas; displace wildlife; introduce mechanical noise into a quiet, rural landscape; drive away tourism, demolish historic resources (c.1928 dairy farm), and squander Jacumba's ability to thrive by consuming the best available land in perpetuity. (Left is a visual simulation of the 600-acre JVR Park.)

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PRINT NAME	SIGNATURE	MAILING ADDRESS	EMAIL/OTHER COMMENTS	DATE
Joe Connolly	[signature]	7723 Posso Encantado PV		8-14-21
Dan Dutt	[signature]	Box 253 PV		8-14-21

(D)

From: Paula Whisenant <paulapm2000@hotmail.com>
Sent: Tuesday, August 17, 2021 7:36 AM
To: Anderson, Joel; Desmond, Jim; gregory.kazmer@sdcounty.ca.gove; Mills, Benjamin; Vargas, Nora; Flores, David; Fletcher, Nathan (BOS); Wier, Emily; Lawson-Remer, Terra; Andrade, Evlyn; FGG, Public Comment; Slovick, Mark; Petterson, Cody
Subject: [External] VOTE NO TO JVR ENERGY PARK AUGUST 18, 2021

Follow Up Flag: Follow up
Flag Status: Flagged

I am coming to you ALL on behalf of the town of Jacumba. Please do not let our town by destroyed (literally) by the proposed solar project. Please do what you were elected to do: Protect and advocate for us, ESPECIALLY the smaller communities. Do what is right for US, not for a large developer who has no regard whatsoever for the survival of Jacumba.

STOP and take time to examine the FACTS not just push this through. This project is entirely too big and will choke out our very existence.

Respectfully,

Paula Whisenant
Jacumba Postmaster (Retired)
Resident since 1975

From: Thenoname largo <williamlargo1995@gmail.com>
Sent: Tuesday, August 17, 2021 8:49 AM
To: FGG, Public Comment
Subject: [External] Important

Follow Up Flag: Follow up
Flag Status: Flagged

"I will make sure to Opt-Out of SDCP when it is released in my community until you promise to only source ETHICAL POWER and remove JVR Energy Park from your power sources. I will not support the destruction of an entire community when there are plenty of other ethical renewable energy projects to choose from."

From:	Cherry Diefenbach <csdiefenbach@sbcglobal.net>
Sent:	Tuesday, August 17, 2021 9:17 AM
To:	FGG, Public Comment
Cc:	Vargas, Nora; Desmond, Jim; Fletcher, Nathan (BOS); Anderson, Joel; Lawson-Remer, Terra
Subject:	[External] Jacumba Sponsor Group presentation for BOS meeting on Aug 18th: Agenda item 1, JVR Energy Park
Attachments:	PLEASE SAVE JACUMBA HOT SPRINGS! (Final).pdf

Hello,

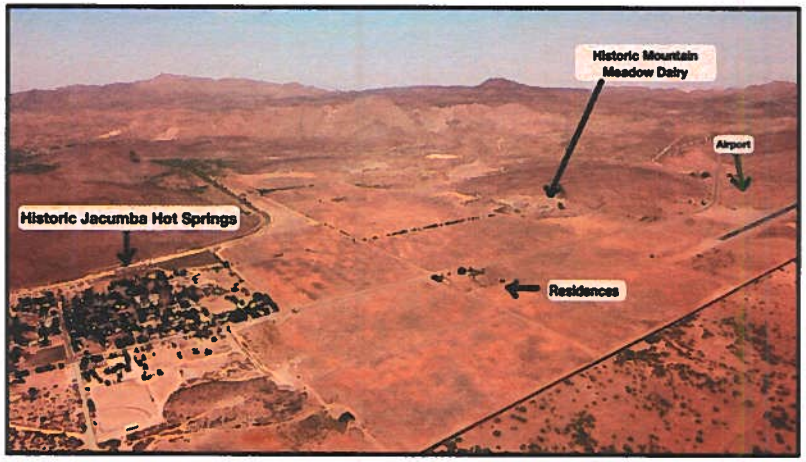
I am the chair of the Jacumba Sponsor Group. Attached my "Please Save Jacumba" presentation that I will be making at tomorrow's BOS hearing. It is in a PDF format.

Clerk of the Board: Please confirm its receipt and include a copy in Supervisors' hearing packets.

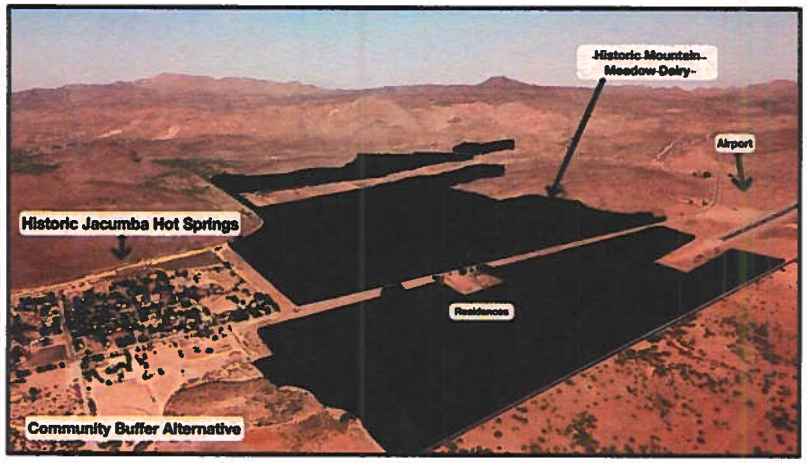
Cherry Diefenbach
Chair, Jacumba Sponsor
619-743-5224

PLEASE SAVE JACUMBA HOT SPRINGS...

A poor underserved community in search of a sustainable future.



Below: Blackened areas show the visual blight of the proposed project.



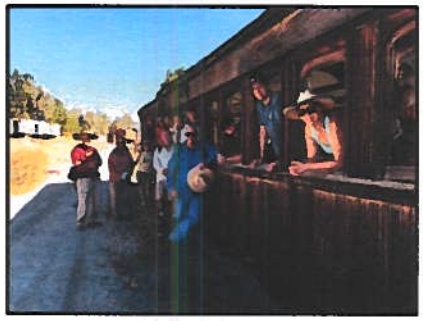
Please deny the 600-acre JVR solar facility because it will:

- Destroy scenic vistas and historic farm buildings.
- Cover the best farmland in the county with 280,000 PV modules, etc.
- Add mechanical noise into an extremely quiet natural landscape.
- Impact safety of flight operations at the Jacumba airport by wrapping the runway with solar components as tall as 15 feet.
- Impact future tourism and the sustainability of the town.
- Provide no permanent local jobs.

Where else in the County would an industrial solar complex be considered an "okay" land use within a defined village area? *No where.*

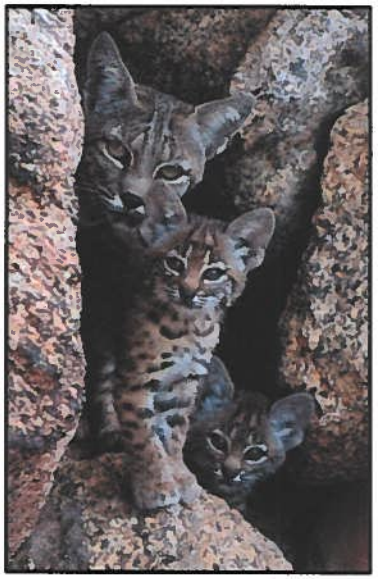
Please deny the 600-acre JVR solar facility for its impacts on Jacumba's residents...

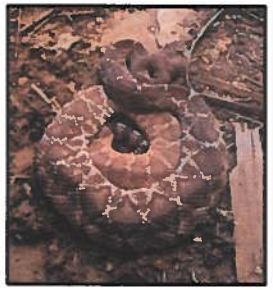
Families, people of color, seniors, retirees, and disabled veterans come to Jacumba for its scenic beauty, affordable homes, and quiet rural landscapes.



Please deny the 600-acre JVR solar facility for the diverse wildlife it will permanently displace...

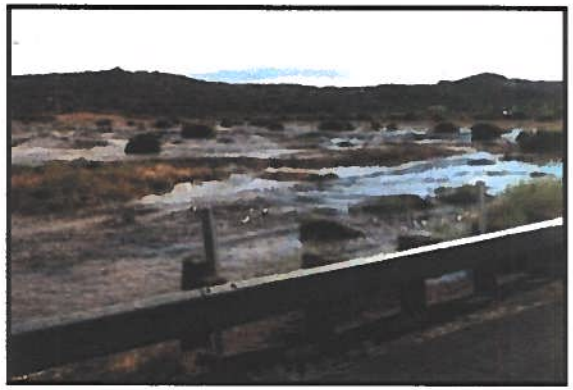
Left, a Golden Eagle perches in a pine tree at the historic Mountain Meadow Dairy farm. Right, a bobcat with her kittens. Bottom left, a coachwhip snake. Bottom middle, Borrego sheep in the In-Ko-Pah mountains near Jacumba. Bottom right, a rattlesnake shelters in an abandoned dairy building.





Please deny the 600-acre JVR solar facility due to project misrepresentations...

- That the Community supports this land-use. *NO!!*
- The notion this is an "Interim" project, placed in an ideal location. (Right is a 2014 photo showing seasonal flooding south of Hwy 80.)
- The required minimum footprint to generate 90MW.
- The safety of lithium vs iron flow batteries.
- That an individual switchyard is essential.



and the developer's questionable business tactics.

- No real community outreach during project development.
- Attempting to purchase the community's goodwill with miniscule "one-time" community benefits.
- The premature signing of a PPA and a PLA before the final EIR was released, before the Planning Commission Hearing, and before this BOS hearing, in order to pressure you decision makers.

Jacumba already supports the County's renewable energy goals...We have 108 acres of solar panels, a 58-acre switchyard, and three high-voltage transmission lines in our area.

We have tried unsuccessfully to strike a compromise with BayWa on a smaller solar project, which would provide for green energy generation and a viable future for our residents.

"Infeasible," was BayWa's one word response when a planning commissioner asked whether their project could be done on a smaller footprint.

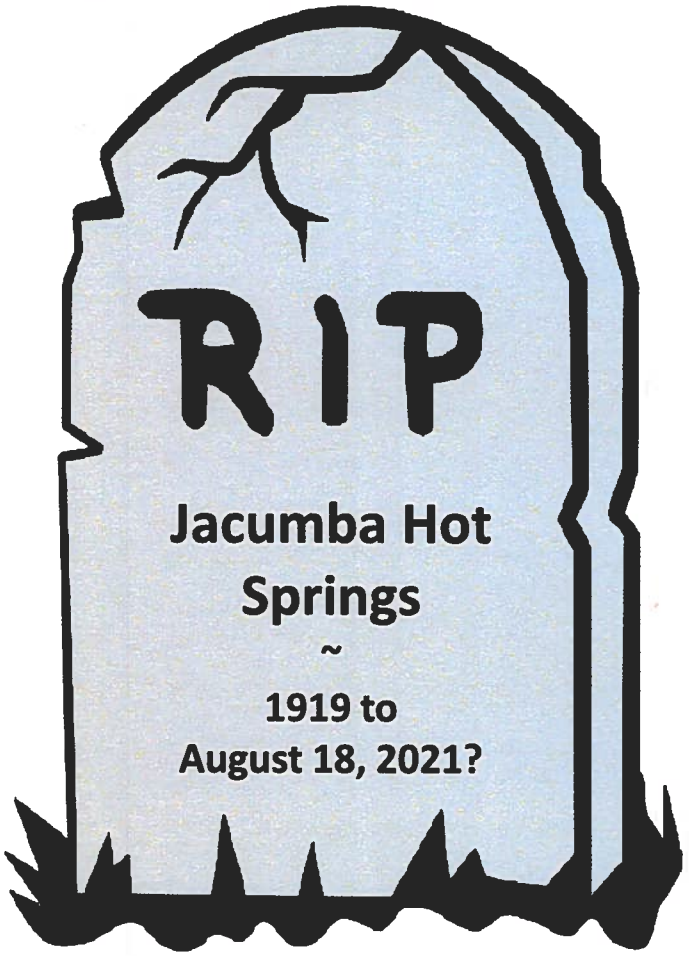
"This project has its hands around the throat of Jacumba."

Planning Commissioner Douglas Barnhart 7/9/21

Where is the social equity and environmental justice for Jacumba, or do those concerns only apply to urban communities?

Please vote to deny a 600-acre, poorly planned solar facility that will destroy the future of Jacumba Hot Springs!

What are these turkey vultures near Jacumba Peak waiting for???



From:	Waterman, Ryan R. <rwaterman@bhfs.com>
Sent:	Monday, August 16, 2021 10:34 PM
To:	FGG, Public Comment; Potter, Andrew; Fletcher, Nathan (BOS); BOS, District1Community; Anderson, Joel; Lawson-Remer, Terra; Desmond, Jim
Cc:	Guillen, Christopher R.; Geoff Fallon
Subject:	[External] Comment letter in support of JVR Energy Project, Aug. 18, 2021, Item No. 1
Attachments:	2021.08.16 Letter to Board of Supervisors re Responses to Comments.pdf
Follow Up Flag:	Follow up
Flag Status:	Flagged

Dear Chair Fletcher and Honorable Supervisors,

Our firm represents BayWa r.e. Solar Projects, LLC and the JVR Energy Park Project that will come before you on August 18, 2021. The attached letter and the included exhibits respond to comments raised about the Project. We hope that this information assists in your deliberations on the Project.

Best regards,

Ryan R. Waterman
Brownstein Hyatt Farber Schreck, LLP
225 Broadway, Suite 1670
San Diego, CA 92101
619.702.7569 tel
619.341.4651 cell
rwaterman@bhfs.com

Brownstein Hyatt Farber Schreck

Ryan R. Waterman
Attorney at Law
619.702.7569 tel
rwaterman@bhfs.com

August 16, 2021

VIA ELECTRONIC MAIL
(PublicComment@sdcounty.ca.gov;
Andrew.Potter@sdcounty.ca.gov;
nathan.fletcher@sdcounty.ca.gov;
District1community@sdcounty.ca.gov;
joel.anderson@sdcounty.ca.gov;
terra.lawsonremer@sdcounty.ca.gov;
jim.desmond@sdcounty.ca.gov)

County of San Diego Board of Supervisors
c/o Andrew Potter, Executive Officer/Clerk of the Board
1600 Pacific Highway
Fourth Floor, Room 402
San Diego, CA 92101

Re: August 18, 2021 Meeting Agenda Item No. 1, Major Use Permit for the JVR Energy Park Project (PDS2018-MUP-18-022)

Dear Chair Fletcher and Honorable Supervisors:

This firm represents JVR Energy Park, LLC ("BayWa") in its efforts to develop the JVR Energy Park Project ("Project"), a utility scale solar project with the capacity to generate 90 megawatts ("MW") of solar energy and store 90 MW of energy in battery storage containers. On July 9, 2021, the County of San Diego Planning Commission voted to recommend the Board of Supervisors approve the entitlements for the Project, and certify the Project's Final Environmental Impact Report ("EIR"). Prior to and during the Planning Commission's hearing on the Project, several written and oral comments were submitted expressing concerns about the Project and the EIR. This letter responds to these comments and explains how any concerns about the Project or its environmental review are unfounded.

I. THE PROJECT INCLUDES SIGNIFICANT BENEFITS TO THE STATE, COUNTY, AND JACUMBA HOT SPRINGS COMMUNITY

The Project offers significant benefits to the State, the County of San Diego, and the Jacumba Hot Springs Community ("Jacumba" or "Community"). It will generate 90 MW of clean, renewable energy with the capacity to store 90 MW of energy in battery storage containers. This energy is sufficient to power approximately 57,000 homes and will reduce greenhouse gas ("GHG") emissions by 540,721 metric tons of carbon dioxide equivalent over the life of the Project. The Project will also result in substantial tax benefits, job benefits, and broader economic benefits for the County and the region, with capital expenditures for the Project estimated at $237,000,000. More locally, the Project will include contributions that will benefit the local community, such as donations to the Jacumba Community Services District for improvements to Jacumba Community Park

and to the Imperial Valley Desert Museum Society, located in Imperial County, to enable new improvement projects at the Museum. These benefits are more fully described in the letter submitted to the Board of Supervisors by BayWa on August 16, 2021. (See Exhibit K.)

Most importantly, it will allow the County to take a meaningful step towards addressing our climate crisis. The Board has acknowledged the need for action—most recently in its direction to develop a framework for a regional zero carbon sustainability plan. (See Board of Supervisors, July 14, 2021 Minute Order No. 3, https://bosagenda.sandiegocounty.gov/cob/cosd/cob/doc?id=0901127e80d540fe.) Bold action is required to meet the moment. Indeed, on July 30, 2021, Governor Newsom issued a Proclamation of a State of Emergency that found extreme drought and wildfires in California have resulted in a 5,000 MW shortage of energy in the State. The Proclamation implements measures to expedite the development of renewable energy projects in order to meet this short fall. (See Exhibit A.)

Further, recent reports have found that, despite record growth, renewable development needs to increase at a quicker pace in order to meet increasing energy demands. (See Exhibit B.) And on August 9, 2021, the Intergovernmental Panel on Climate Change issued its 6th assessment report on the physical science basis of climate change ("6th Assessment Report"). (See Intergovernmental Panel on Climate Change, Climate Change 2021: The Physical Science Basis, Summary for Policymakers (Aug. 7, 2021), available at https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf.) The 6th Assessment Report estimates the remaining greenhouse gas budget left to humanity in order to limit global warming. Now is the time for the Board to invest in renewable projects, like the JVR Energy Park.

Finally, prior to the Planning Commission hearing, a commenter requested that the Project consider constructing a microgrid for the Community. As explained in Exhibit C, creating a microgrid to provide power directly to the town is infeasible as a result of technical and legal complications, such as the fact that San Diego Gas & Electric ("SDG&E") has franchise rights to provide retail power to the Community and owns the distribution system.

II. THE PROJECT HAS BEEN OPTIMIZED TO LIMIT ENVIRONMENTAL IMPACTS WHILE GENERATING CRITICAL RENEWABLE ENERGY WITHIN THE COUNTY

The Project has been designed to reduce environmental impacts to the extent feasible while maximizing renewable energy generation and storage capacity. The Project defined in the Draft EIR included development on less than half (i.e., 643 acres) of the 1,356 acre Project site, while avoiding impacts to Quino checkerspot butterfly, cultural resources, and jurisdictional waters. Other biological resource impacts were reduced to less than significant with mitigation. The development footprint was primarily located on flat, previously disturbed agricultural land surrounding Jacumba. Further, the Project avoided the need for a long interconnection line and its associated impacts by interconnecting with existing SDG&E infrastructure that transects the Project site.

During the public comment period on the Draft EIR, comments were submitted expressing concerns that the Project would be too close to Old Highway 80 and the Jacumba Community Park. While the EIR sufficiently analyzed the impacts as a result of the Project's development, BayWa redesigned the Project to setback the Project's fence line 300 feet from the Jacumba Community Park, 110 feet from the edge of the pavement on the north side of Old Highway 80, and 175-180 feet from the edge of the pavement on the south side of Old Highway 80. These revisions reduced the size of the Project by 20 acres and lessened the Project's impacts to views from Old Highway 80 and the Jacumba Community Park.

While the size of the Project has been reduced, the Project can still generate and store 90 MW of renewable energy. As explained in Appendix V to the EIR (Energy Generation Technical Memorandum), the use of bi-facial modules and improved module technology allow the Project to maintain its power generation capacity

despite the reduction in size. However, while it is possible to optimize design characteristics to maintain a project's power capacity with small reductions in acreage, the same is not true of more significant reductions. Indeed, as discussed in BayWa's June 30, 2021 letter to the Planning Commission, the Equity for Jacumba Alternative, which proposes development on 245 acres of the Project site, would produce approximately 35 MW of renewable energy, not the claimed 80 MW. Further, as explained in Exhibit C, site characteristics and the technology utilized dictate the necessary development footprint for a project. Here, the Project has been optimized to produce 90 MW of power on the smallest development footprint possible. (Exhibit C.)

In its deliberations on the Project, the Planning Commission questioned whether the Project could be reduced any further to increase buffers from the Community. BayWa responded that it could feasibly implement the Community Buffer Alternative, which proposes reducing the Project another 19 acres by setting the Project's fence line back 300 feet from residences north of Old Highway 80, but that any additional reductions in the size of the Project are infeasible. Reducing the Project any further will, among other things, prevent the Project from producing 90 MW and at least 260,000 megawatt hours ("MWh") of renewable energy generation to meet the power purchase agreement ("PPA") the Project has executed with San Diego Community Power ("SDCP"). (See June 30, 2021 BayWa Letter to Planning Commission re July 9, 2021 Hearing, p. 2; see also EIR, Appendix V.) Finally, reducing the Project size will limit the County's ability to assist the State in achieving its Renewables Portfolio Standard.

Aside from Project-specific goals and objectives, the Board should maintain the size of the Project to address the ever-worsening climate crisis, described above.

III. THE EIR ADEQUATELY ANALYZES THE PROJECT'S ENVIRONMENTAL IMPACTS

A. The Project Is Consistent with the Mountain Empire Subregional Plan and the Jacumba Vision Statement

Commenters' concerns about the EIR's analysis of aesthetic impacts focused on the Project's consistency with the County General Plan, Mountain Empire Subregional Plan, and Jacumba Vision Statement. These concerns are addressed in our discussion of the Project's consistency with the County's Land Use Regulations in Section IV, below.

B. There Is No Evidence the Project Will Materially Impact Property Values

One commenter expressed concern that the Project will negatively impact property values in Jacumba. This issue is discussed in detail in Global Response GR-1, Socioeconomic Impacts and Environmental Justice. As stated therein, CEQA requires an analysis of physical impacts to the environment; it does not require analysis of social and economic impacts. Further, there is no evidence that the Project would cause any material impact to property values. In fact, the Dore Group, an international real estate consultation and forensic valuation business, conducted a national survey of real estate transactions in the vicinity of solar projects and concluded that properties near the Project site would depreciate, at most, zero to one percent. (See Exhibit D.)

C. The EIR Adequately Analyzes the Project's Impacts on Biological Resources

Several commenters expressed concerns about the Project's potential impacts to biological resources. Each of these concerns has been addressed in the EIR as discussed in detail below.

1. The EIR Addresses Potential Impacts to Cougar and Wildlife Corridors

One commenter expressed concern about the EIR's analysis of potential impacts to cougars (mountain lions). Specifically, the commenter claimed that: "Although the FEIR states that the cougar habitat is unlikely to be in the development footprint, there is insufficient evidence supporting that conclusion." This is not the case. The EIR states that "cougar is not expected to travel through the areas directly impacted by the Project due to topography and cover" (EIR, p. 2.3-50), and states that "cougar prefers habitat that provide cover, such as thickets in brush and timber in woodland vegetation (Zeiner et al. 1990b[1]) . . . It requires extensive areas of riparian vegetation and brushy stages of various habitats with interspersions of irregular terrain, rocky outcrops, and tree/brush edges. Although the Project Area lacks extensive riparian habitat, there are suitable rocky outcrops, irregular terrain, and good connectivity to large open spaces in adjacent areas that may serve as suitable habitat for this species." (EIR, p. 2.3-30). More specifically, the EIR states that the Project's "development footprint does not feature riparian habitat or rocky outcrops. Cougar has potential to occasionally occur on site, particularly along the western edge where the terrain and vegetation provide more cover. However, this species has lower potential to occur in the flatter areas of the Project site due to lack of cover." (*Ibid.*) The EIR also states that mule deer are the cougar's primary prey and that mule deer "favor habitats such as riparian and oak woodland, and early growth chaparral (Tremor et al. 2007)" and "are not expected to utilize the flat open areas due to the lack of vegetative cover." (*Ibid.*) Based on this information, the EIR concludes that the Project will not impact cougar individuals. (EIR, p. 2.3-49.)

The commenter then expressed concern that the Project would impact cougar use of the Project site as a wildlife movement corridor, that a "focused wildlife corridor study" should have been prepared for the Project, and that the Project will create an unnatural movement corridor. These issues are analyzed in the EIR, which includes a detailed analysis of wildlife corridors "based on knowledge of the area, probable key wildlife species, and typical wildlife movement patterns." (EIR, p. 2.3-78.) The EIR then discloses that the Project could lead to potentially significant impacts to wildlife movement patterns (see Impact BI-WLC-1, BI-WLC-2, and BI-WLC-3). (EIR, pp. 2.3-49-50, 74-79.) For example, the EIR concludes that the Project "could disrupt the visual continuity of the Project site as a wildlife movement corridor." (EIR, p. 2.3-80.) However, the EIR imposes mitigation measures to reduce these impacts to less than significant. (See EIR, pp. 2.3-129, Mitigation Measures M-BI-1 (biological monitoring), M-BI-2 (temporary construction fencing), M-BI-3 (habitat preservation), M-BI-4 (Resource Management Plan), M-BI-5 (nesting bird survey), M-BI07 (biological monitoring of SWPPP), and M-BI-11 (noise reduction).)

The EIR also analyzes the wildlife movement. Small mammals and reptiles are expected to use the entire Project site. As explained on page 2.3-76 of the EIR, "Small wildlife species (e.g., lizards and small mammals) would be able to access the solar facility beneath the fence." Therefore, small mammals and reptiles can continue using the area for wildlife movement to the north, south, east and west.

Regarding larger wildlife species, the EIR states that species could still utilize the undeveloped western portion of the Project site and the SDG&E easement to access undeveloped lands surrounding the Project site, and that the Project will include a 50-100 foot wide opening in the Project fence north of the SDG&E easement to ensure species are not funneled towards the I-8. See pages 2.3-76 to 77 of the EIR, which state:

[1] Zeiner, D.C., W.F. Laudenslayer Jr., K.E. Mayer, and M. White, eds. 1990b. California's Wildlife: Volume III. Mammals. Sacramento, California: California Department of Fish and Game.

> Larger wildlife (e.g., coyotes, bobcats, cougars~~mountain lions~~) could still move along the mesquite-dominated floodplain and unvegetated portion of Boundary Creek to access undeveloped lands to the west as well as cross into Mexico at the open border to the west. Wildlife movement is more restricted along the eastern side since there are less topographic features for cover; however, there is the undeveloped SDG&E easement between the fence line that is approximately 700 to 1,100 feet wide and more than 4,000 feet long, which would allow uninterrupted movement from Boundary Creek to currently undeveloped land to the east, and the border crossing to the east. There is also land between Carrizo Gorge Road and I-8 that allows movement for some wildlife species, particularly nocturnal wildlife. Additionally, the Proposed Project design is consistent with the recommendations by the Las California Binational Conservation Initiative 2015, which recommends that renewable energy companies "site facilities on lands of lower ecological value, design road networks that minimize fragmentation, designate off-site conservation of land as mitigation for direct and indirect impacts of development, and establish conservation easements on the lands where facilities are sited" (Stallcup et al. 2015). The Proposed Project is primarily sited on the previously disturbed agricultural areas to reduce impacts to native vegetation and avoids unnecessary fragmentation of the landscape.
>
> . . . The location of the Proposed Project has the potential to create a "dead-end" for wildlife traveling west to east along the northern portion of the Project site. This could funnel wildlife toward I-8 and result in increased mortality of wildlife forced to cross at grade. However, to ensure that wildlife traversing that area are directed toward the SDG&E easement, the Proposed Project has been designed to provide a 50- to 100-foot opening in the fence north of the easement. This opening will allow for wildlife that may be moving along the northern portion of the Project site to enter into the easement corridor and move through the site to habitat located on either side of the Project site . . . ."

In sum, each of the commenter's concerns regarding cougars and wildlife movement are addressed in the EIR. There is no evidence supporting a claim that this analysis is insufficient.

2. The Project's Impact on Avian Species Have Been Analyzed in the EIR

One commenter expressed the concern that the Project's solar panels would cause avian fatalities. The commenter stated that: "Data from other solar projects in Southern California, including PV projects (Desert Sunlight, California Valley Solar Ranch, Blythe Solar Power, McCoy Solar Power, Solar Gen 2, Campo Verde, ISEC West and ISEC South) indicate that birds are susceptible to collisions with solar panels and structures as well as lines (Walston et al. 2016; Ironwood Consulting, Inc. 2014; Western Ecosystems Technology, Inc. 2018; Mortality Reporting 2014; Heritage Environmental Consultants, LLC 2014-2016; Dudek 2018 and 2010)." However, the EIR addresses this issue in detail and finds that risk of avian fatalities is low risk due a number of factors, including the Project design and site location, and a detailed discussion of potential for avian collision with the Project's solar panels is speculative based upon the scientific information currently available. (EIR, pp. 2.3-78-80.) Further, as explained in Exhibit E, the Project's biologist has reviewed the information presented in the comment, the referenced documents and studies, and additional research on the subject. Based upon the information available, the Project's biologist reaffirmed

the EIR's finding that a detailed discussion of potential for avian collision with the Project's infrastructure is speculative.[2] (See Exhibit E.)

3. The EIR Analyzes and Mitigates Impacts to Raptors

One commenter expressed the concern that the Project's demolition of the buildings on site will impact raptors that use the buildings and trees for perching, nesting, and roosting. However, these impacts are analyzed and mitigated in the EIR. Section 2.3 analyzes impacts to special-status species, including nesting and foraging habitat for raptors. Specifically, Impact BI-W-2 analyzes direct loss of foraging and nesting habitat for special-status raptors and is mitigated by M-BI-3 (Habitat Preservation), which requires preservation of 435 acres of suitable foraging and/or nesting habitat adjacent to the Project; and Impact BI-W-3 analyzes direct impacts to nesting birds (including raptors) and is mitigated by M-BI-5 (Nesting Bird Survey), which requires nesting bird surveys be conducted if activities occur between January 15 and August 31.

D. The Abandoned Buildings on the Project Site Are Not Historically Significant

One commenter expressed concerns that the former dairy buildings on the Project site should be considered historical resources. However, the EIR (Section 2.4) and the Historical Resources Technical Report (EIR, App. E, App. F) found that the complex is not historically significant. The Project's historical resources consultant prepared a supplemental memorandum analyzing the additional comments submitted on the historical significance of the dairy complex and found that the findings in the EIR and the Historical Resources Technical Report remain accurate. (See Exhibit F.)

E. Impacts to Cultural and Tribal Cultural Resources Are Analyzed in the EIR

One commenter expressed concerns that the Project would develop a site that is held sacred by Native American tribes and that Carmen Lucas of the Kwaaymii Laguna Band of Mission Indians stated that "not one inch" of the area does not have cultural significance. However, the EIR considered cultural resources inside and outside the Project development footprint and found that impacts would be less than significant after mitigation. (EIR, § 2.4.) With respect to cultural resources outside of the Project's development footprint, the EIR stated: "The Proposed Project ADI is contained largely within the footprint of previous agricultural activity. Dudek also reviewed the site records for all resources located along the foothills of the Jacumba Valley. If the viewshed from these archaeological sites contributed to their significance, the Proposed Project might have an impact on the resource. However, the site records showed that these resources largely consist of artifact scatters with only one feature, a trail segment." (EIR, p. 2.4-26.) These resources were determined not significant under CEQA, not eligible for listing in the California Register of Historic Resources or local register, are not significant under the County RPO, and do not contribute to the Jamul Valley Archaeological District. The commenter does not present any information showing that this conclusion is unsupported by evidence.

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[2] The commenter also claimed that a table listing recommended restricted activity dates for the bats should be added to the EIR similar to Table 2.3-6 for the Burrowing Owl restrictions. Table 2.3-6 provides CDFW-recommended restricted activity dates and setback distances around occupied burrowing owl nests for varying levels of disturbance. (CDFG 2012.) The EIR includes similar restricted activity dates for bats in Mitigation Measure M-BI-6, stating that "if a potential maternity roost is present, all demolition activities shall occur outside the general bat maternity roosting season of March through August to reduce any potentially significant impact to maternity roosting bats."

The commenter also recommended that a qualified Native American monitor be present during pedestrian surveys of the Project site and that forensic dog analysis should dictate the design of the Project. As reflected in the EIR, the Project area was surveyed with a qualified Kumeyaay Native American Monitor present. (EIR, p. 2.11-10.) The monitor was also present during an extensive archaeological subsurface testing. The pedestrian survey and the archaeological subsurface testing did not reveal any evidence of human remains or funerary practices throughout the Project area. As stated in the EIR, "[c]onsidering a variety of reasons, including but not limited to, the history of surface disturbance by agricultural activities, the mixed subsurface stratigraphy or homogenous stratigraphy, shallow soil deposit, high bedrock exposure, the lack of significant and surface artifacts, previous testing on site, the negative subsurface testing results by Dudek, and/or the few subsurface artifacts, the archaeological sites within the Proposed Project ADI were determined to have a low potential for significant buried deposits or culturally sensitive materials." (EIR, p. 2.4-18). Despite this finding, a ground penetrating radar survey (GPR) was conducted of the proposed substation and Switchyard Facilities because the areas were not subject to past agricultural disturbances. (EIR, p. 2.4-18.) The GPR survey did not identify any GPR anomalies consistent with potential prehistoric-period archaeological features. Accordingly, because there is a very low probability of encountering human remains during Project activities, the use of forensic dog analysis is not required. In the unlikely event that human remains or funerary features are encountered during Project activities, Mitigation Measures M-CR-2 and M-TCR-2 are included in the EIR to ensure any impacts are less than significant.

The commenter also expressed concern that the Project will impact the redevelopment of the Jacumba Hot Springs Resort, which is not a cultural resource issue. The Project does not prevent any activity on the Jacumba Hot Springs Resort. To the extent the comment suggests that the Project will cause economic impacts, the EIR discusses potential economic or social changes that may be caused by the Project in Global Response GR-1.

F. The EIR Adequately Analyzes the Potential for a Heat Island Effect

One commenter expressed the following concern: "If the solar modules are 20 to 30 degrees F hotter than ambient temperatures, and the heat will not disperse until more than 1,000 feet from the heat source, then project setbacks from residences need to be increased." The Global Response reviews the available literature on heat islands and utility scale solar projects—"The Photovoltaic Heat Island Effect: Large Solar Power Plants Increase Local Temperatures" ("PV Heat Island Study") and "Analysis of Potential for Heat Island Effect in Large Solar Farms" ("Columbia PV Heat Island Study")—and finds that any increase in ambient temperature dissipates with distance from the perimeter of the solar farm.

In addition, the author of the PV Heat Island Study prepared a follow on report entitled "Response to Technical Queries Associated with Permit NO: 2017-301" ("Response to Study"), wherein the author provides further analysis of heat island effects and utility scale solar projects. (See Exhibit G.) The Response to Study found that vegetation underneath solar panels can greatly reduce the increase in temperature underneath the solar panels. (*Id.* at p. 7; see also *id.* at p. 16 ["While no published research to date measures the impacts at such a large spatial footprint, I believe that leaving the grasses under the panels should greatly reduce the PVHI effect within the solar farm, which will serve to only assist in any reductions in the spatial extent of the PVHI effect outside of the array."].) The Response to Study also discussed how the author studied the spatial extent of the heat island effect for the PV Heat Island Study, but the information was excluded from the Study as a result of text/space constraints. The Response to Study states that the data collected during the PV Heat Island Study indicated the heat island effect "was indistinguishable from air temperatures over native vegetation when measured at a distance of 30m from the edge of the PV array." (*Id.* at 11.)

The Response to Study also critiques the accuracy of the sensors used in the Columbia PV Heat Island Study, and states that, if the uncertainty in the modeling in the Columbia PV Heat Island Study is accounted

for, "all measures of air temperature beyond 200m may actually be indistinguishable from ambient air temperatures." (*Id.* at 13.)

Accordingly, the Response to Study supports the EIR's analysis of heat island effects from a utility scale solar project, which concluded that "there is no evidence any possible increase in ambient temperature from the Proposed Project would significantly impact human health or the environment." (Global Response GR-2 Photovoltaic Heat Island, p. GR-2-2.)

G. The EIR Adequately Analyzes the Project's Greenhouse Gas Emissions

One commenter expressed concerns that the EIR did not account for the release of carbon as a result of the Project's disturbance of vegetation communities and soil. This comment has been responded to in Exhibit H hereto. In short, the EIR did account for greenhouse gas emissions as a result of the Project's disturbance of vegetation communities, and there is no evidence that soil disturbance will result in a loss of carbon sequestration. (Exhibit H; see also EIR, p. 3.1.4-28.) Further, even if soil disturbance results in carbon release, any carbon release would be insignificant and not impact the EIR's findings regarding the Project's avoidance of a significant amount of greenhouse gas emissions. (Exhibit H.)

H. The EIR Adequately Analyzes Valley Fever and Cumulative Air Quality Impacts

One commenter expressed concern that the Project could lead to cases of Valley Fever. The commenter stated that "The project will disturb topsoil, in a non-urban area that has not been disturbed for some time and will expose people from out of the area to the soil who come for construction. Moreover, Santa Ana winds are common . . . The FEIR's conclusion that 'Valley Fever is not considered highly endemic to San Diego,' FEIR at 2.2-8, is hardly comforting, especially given that cases have steadily been on the rise."

The comment does not provide any evidence that the EIR's analysis is flawed. The EIR adequately addresses Valley Fever, stating that there were no cases of the diseases between 2008 and 2019 in the Project site's zip code (EIR, p. 2.2-8), and the Project would comply with San Diego Air Pollution Control District Rule 55 during construction and decommissioning to limit the amount of fugitive dust generated by the Project (EIR, p. 2.2-26). Further, workers on site would be protected by regulations in Title 8 of the California Code of Regulations pertaining to Valley Fever, such as the implementation of an Injury and Illness Prevention Program. (*Ibid.*) As mentioned above, the Project will also implement PDF-HYD-3 to ensure vegetative cover is maintained on portions of the Project site after construction to provide additional dust control during the Project's term. (EIR, p. 2.2-27.) The EIR concludes that based on this information, the Project would have a less than significant impact with respect to Valley Fever exposure for sensitive receptors. (*Ibid.*; see also EIR, Response to Comment O6-23.)

A commenter also stated that he had contracted Valley Fever from Yuma, and that Valley Fever is also in the soil in Jacumba and that a few other residents had contracted Valley Fever. This statement, however, is not supported by any evidence. The County's most recent Monthly Communicable Disease Report from May 2021 includes data through June 14, 2021. It finds that: "the highest concentration of [Valley Fever] cases in San Diego County over the past ten years was in the southern region," and the map displaying the rates of cases within the County shows that Jacumba does not have a reportable case rate. (See Monthly Communicable Disease Report, May 2021, Volume 5, Issue 5: June 15, 2021, https://www.sandiegocounty.gov/content/dam/sdc/hhsa/programs/phs/Epidemiology/Monthly%20CD%20Report_May%202021.pdf.) This is telling as Title 17, Section 2500 of the California Code of Regulations requires health care providers to report confirmed or suspected cases of Valley Fever to the local health officer, meaning if a case had been diagnosed by a health care provider, it would have been reported to the County.

Finally, one commenter stated that the EIR's cumulative analysis of the Project's air quality impacts must consider emissions from projects in Mexico and the Project's impacts on the air quality in Mexico. However, as explained in the EIR, the "geographic extent for the analysis of cumulative impacts related to air quality includes the southeastern corner of the SDAB (San Diego County), bounded by the United States/Mexico border on the south and Interstate 8 to the north, with Jacumba Hot Springs to the west." (EIR, p. 2.2-34.) This does not mean that the EIR ignores emissions that may be generated in Mexico but contribute to air pollution within the geographic extent assessed for cumulative impacts. To the contrary, the EIR describes the San Diego Air Pollution Control District's ("SDAPCD") network of ambient air monitoring stations and identifies the air monitoring station in Otay Mesa-Donovan as the most representative of conditions in the Jacumba area due to "proximity to the Project site, similar geographic and climatic characteristics, and available measured ambient concentrations of pollutants . . . ." (EIR, p. 2.2-9.) Notably, the Otay Mesa-Donovan air monitoring station is immediately adjacent to the U.S.-Mexico border and, therefore, is exposed to and tracks binational air pollution. (See SDAPCD, Annual Air Quality Monitoring Network Report 2020, Fig. 2.1, available at https://www.sandiegocounty.gov/content/dam/sdc/apcd/monitoring/2020_Network_Plan.pdf.) Because this cumulative scenario considers local ambient air quality data (see Table 2.2-2), it necessarily includes an analysis of any emissions in the cumulative area that are generated in Mexico. Furthermore, the comment fails to identify any projects within Mexico that would contribute to the cumulative scenario.

I. The EIR Adequately Analyzes the Project's Consistency with the Jacumba Airport Land Use Compatibility Plan

A commenter expressed concerns with the EIR's conclusion that the Project is consistent with Policy JAC.2.8 of the Jacumba Airport Land Use Compatibility Plan ("ALUCP"). Policy JAC.2.8 states that "All proposed development in Safety Zones 2, 3, 4, and 5 regardless of whether the land use is listed as 'compatible' or 'conditional' shall adhere to the maximum lot coverage limitations indicated in Table JAC-2." Table JAC-2 provides maximum lot coverages for various land uses, such as a maximum 50% lot coverage in Zone 2 and a maximum 70% lot coverage in Zones 4 and 5 for cell phone towers and wind turbines. Because solar projects are not listed on Table JAC-2, the County applied the maximum lot coverages assigned for wind turbines and cell phone towers to the Project, as directed by the ALUCP. (See Policy JAC.2.5(b)(1).) The land use type for wind turbines and cell phone towers was determined to be the most similar land use in Table JAC-2 to solar arrays because wind turbines and cell phone towers are similarly unmanned facilities with limited operations and maintenance activity. The EIR concludes that the Project is consistent with these maximum lot coverages. (See, e.g., EIR, Response to Comment O7-91.)

The commenter claimed that this conclusion is flawed because a solar panel is not similar to a cell phone tower or a wind turbine and there is little area between solar panels upon which a plane can land. However, as explained in Response to Comment O7-90 of the EIR, Policy JAC.2.5 and Table JAC-2 are intended to measure "risk exposure for people on the ground in the event of an aircraft accident" and the "fundamental measure of risk exposure . . . is the number of people concentrate[d] in areas most susceptible to aircraft accidents." In other words, the purpose of the compatibility analysis is to evaluate risk to people on the ground from aircraft accidents, not the risk to aircraft operators due to construction of a project. Further, as additional evidence that solar panels are similar to cell phone towers and wind turbines, the February 2020 draft update to the Jacumba ALUCP includes solar/photovoltaic arrays in the same category as cell phone towers and wind turbines in Table JAC-2. (See, 2020 Jacumba ALUCP, https://www.san.org/Portals/0/Documents/Airport%20Projects/Planning/Jacumba-Airport-ALUCP-Feb-2020.pdf.)

The commenter also asserts that the area between solar panels should be included as lot coverage because it does not "meet the spirit or intent of the ALUCP's safety concerns." Policy JAC.2.5 measures risks to people on the ground in the event of an aircraft accident, not risk to aircraft operators due to construction of a project.

Further, Policy 2.8 states that "All structures, including parking structures and support buildings, shall be counted when determining maximum lot coverage." The County Zoning Ordinance also defines lot coverage as "the percentage of net site area covered by the vertical projection of any structure excluding any structure not extending above grade." Based on these definitions, maximum lot coverage is intended to be based on structures rather than the entirety of a developed property. Accordingly, it is appropriate to exclude the area between solar panels from the lot coverage calculation. (See Global Response GR-5, Airport Impacts; Response to Comment O7-91.)

A commenter also expressed the concern that the Project would not provide sufficient space for gliders operating at the Jacumba Airport to emergency land on the Project site. PDS staff coordinated with County Airports and the San Diego Airport Authority throughout processing of the Project to also ensure aircraft operator safety. The Project is consistent with the open land requirements in the ALUCP. Policy JAC.2.9 states that risks to light aircraft can be minimized in the event of a landing away from the airport by providing as much open land area as possible within the airport vicinity. Policy JAC.2.8 specifies that for every 10 acres of development, a project must provide 0.5 acres of open land. Subsequent to the public review period for the Draft EIR, the Project was redesigned to widen the Project's internal access road, which is in line with the west end of the airport runway, to 80 feet in width and increase setbacks along both the north and south sides of Old Highway 80. As a result of this redesign, the Project provides 23.94 acres of open land within Safety Zones 2, 3, and 4, which greatly exceeds the required 5.48 acres required by Policy JAC.2.8. (See EIR, pp. 2.6-32-33; EIR, Appendix T.)

Finally, a commenter expressed the concern that the Project would not be operated in accordance with the project design feature included to ensure the Project does not create a glare hazard for aircraft and gliders. Again, this concern is unfounded. PDF-HAZ-1, the PDF that imposes certain limitations on the solar panels' tracking behavior to eliminate glare, is included as Condition Nos. 75, 89 and 106 of the Major Use Permit, and the Mitigation Monitoring and Reporting Program for the Project. The Project must comply with these conditions in order to operate.

J. Mineral Resources Impacts Are Sufficiently Analyzed and Disclosed in the EIR

A commenter stated that: "It is unclear if the 40% waste factor is appropriate for the mineral resources lost to open space, given that the FEIR states that 'boring logs are unavailable for the potential mineral resources' for that area."

The EIR explains that "site specific data indicates much of the mapped alluvium and volcanic rock underlying the Proposed Project site is not considered a processable, minable and marketable resource since the alluvium predominantly consists of clays and clayey sands, with a lack of significant gravels, and the volcanic rock is highly fractured and generally weak and is therefore not suitable for aggregate due to poor strength quality." (EIR, p. 2.8-10.) However, the EIR acknowledges that site-specific studies have shown that the alluvium underlying the Switchyard Facilities may be of better quality, meaning the resource could be minable, processable, and marketable under the technologic and economic conditions that exist at present or which can be estimated to exist in the next 50 years. (*Ibid.*) Because no site-specific data is available for the area of the Project site that will underly the Project's open space easements, the EIR applies the same assumption to those mineral resources. (EIR, p. 2.8-11.) The EIR then calculates the total value of the resource underlying the open space easements at $216,081,994 using a 40% waste factor given the data available for the remainder of the site, including the Switchyard Facilities.

A commenter also claimed that the EIR inappropriately treats the Project (other than the Switchyard Facilities and open space easements) as a temporary project. However, in accordance with the County's Zoning Code, the Project includes a bonded decommissioning plan to ensure the Project will either be removed at the end of its 35-year operational term, or a subsequent use is reviewed and approved by the County. If an extension

of the Project is approved by the County, the County will be required to comply with CEQA again at that time and any impacts to mineral resources will be analyzed accordingly.

K. The Project's Noise Impacts Will Be Mitigated to Less Than Significant

One commenter claimed that Mitigation Measure M-NOI-2 does not actually prevent potential noise impacts. The comment, however, only acknowledges the notification requirements in M-NOI-2 and ignores the remainder of the mitigation measure and PDF-NOI-1. PDF-NOI-1 commits the Project to utilizing quieter panel washing equipment (e.g., pick-up truck and a towed IPC Eagle wash station) within 450 feet of a Noise Zone 1 property and within 250 feet of a Noise Zone 3 property. And M-NOI-2 restricts the quieter panel washing equipment to only operating for a certain period of time within a certain distance of Noise Zone 1 and Noise Zone 3 properties. For example, the quieter panel washing equipment may only operate at a distance of 50 to 75 feet from a Noise Zone 1 property for five minutes within any hour. Through implementation of these measures, the noise generated by the Project's panel washing equipment will be in compliance with the County's Noise Ordinance and any impacts would be less than significant.

L. The EIR Imposes Mitigation Measures to Reduce the Project's Wildfire Impacts to Less Than Significant

A commenter expressed concern about the development of a solar project in a High and Very High Fire Hazard Severity Zones, stating the Project's electrical equipment could fail and cause fires around the Project site. The commenter also stated that buildup of dry vegetation underneath the panels could be fuel for a fire and neglect of the solar equipment could lead to equipment failure. Further, the commenter stated that "Lawrence Shaw of Higher Powered, LLC has found that fires at solar installations rose 36% from 2017 to 2018. Since 2015 the Fire Administration has recorded 155 fires caused by solar installations." However, the commenter failed to explain how the EIR's analysis of potential wildfire impacts is insufficient in any way; the EIR addresses each of these issues.

Section 2.12 of the EIR discusses the Fire Hazard Severity Zones in the vicinity of the Project site (EIR, p. 2.12-2), analyzes fire risks associated with the Project's operations, like "Explosion/Arcs, arc flashing, electrical shorts, sparking, motor or other machinery fire, wiring and harnessing fire, overheated junction boxes, rodents chewing on wires and causing arcing" (*Id.* at 2.12-30), and implements three sets of measures to ensure any potential wildfire risks are reduced to less than significant. First, the Project has been designed so that solar panels will be set back 30 feet from the Project's fence line, vegetation below the panels will be maintained at roughly six inches, and six 10,000 gallon water storage tanks with fire department connections will be provided on site. (*Id.* at 2.12-32-33.) Second, the Project will implement Mitigation Measure M-WF-1, a Fire Protection Plan, to ensure all wildfire impacts are less than significant. This Plan will include fuel modification throughout the solar facility, a 24-hour remote operations center for the Project, a training program for local fire agencies on the deenergizing of the Project, and on-going maintenance of all facility components for the life of the Project, among other things. (*Id.* at 2-12-42-43.) Third, the Project will also contribute funding to the San Diego County Fire Protection District to enhance fire suppression and emergency services capabilities for the Project and the southeast portion of CSA 135 as part of Mitigation Measure M-WF-3. (*Id.* at 2.12-47.) In other words, the commenter provides no evidence that the EIR is inadequate with respect to its analysis of wildfire risks. Notably, the article cited by the commenter about Lawrence Shaw's findings states that the majority of the fires caused by solar panels were on residential projects, and fails to mention any fires at utility scale solar projects. (See PV Magazine, Solar system fires are on the rise, https://pv-magazine-usa.com/2020/04/22/solar-system-fires-are-on-the-rise/.)

M. The EIR Accurately Finds that the Project Is An Interim Use

`A commenter expressed concern that the EIR should consider the Project as permanent because the useful life of the Project may be greater than 35 years and the Project may be re-commissioned after the end of its term. However, the commenter fails to acknowledge that the Project is required to provide a security to the County to ensure the removal of the Project by the County Zoning Code. (See Section 2888.a.) To ensure this requirement is satisfied, the Major Use Permit expires in 2058 and requires the preparation of a decommissioning plan as a condition of approval. (See, e.g., Condition No. 78.) In other words, the Project will be required to decommission by the terms of the MUP. It is speculative to assume that the Project owner would apply for a new MUP, or that the County would approve such an application.

N. The Equity for Jacumba Alternative Need Not Be Analyzed in the EIR

A commenter stated that the Equity for Jacumba Alternative proposed by the Jacumba Community Sponsor Group should be included in the EIR because it will eliminate the Project's significant impacts to aesthetic resources and be found consistent with the General Plan and Subregional Plan's policies and goals. The commenter also stated that the County "should not use artificially narrow project objectives to preclude consideration" of the alternative.

CEQA does not require "analysis of every imaginable alternative;" an EIR need only analyze a reasonable range of alternatives. (*Cherry Valley Pass Acres & Neighbors v. City of Beaumont* (2010) 190 Cal.App.4th 316, 348; CEQA Guidelines, § 15126.6(a).) As stated in Global Response GR-6, Alternatives, the EIR "satisfied this standard by analyzing a reasonable range of alternatives to reduce the Project's significant and unavoidable impacts to aesthetic and visual resources from different viewpoints (i.e., from the Jacumba community and from I-8 and recreational lands), and mitigation measure **M-BI-3**'s significant and unavoidable impact to mineral resources. The alternatives analyzed demonstrate that modifying the Proposed project's site plan can reduce significant and unavoidable impacts to certain views from panoramic vistas and scenic viewpoints around the Project site. However, any development of the Project site would result in a significant and unavoidable impact to aesthetic and visual resources. Accordingly, the [] EIR need not analyze every possible alternative to the Proposed Project that may result in a reduced impact to a particular view. (*Sequoyah Hills Homeowners Assn. v. City of Oakland* (1993) 23 Cal.App.4th 704, 713-14.)" (EIR, GR-6, p. GR-6-4.)

For example, the Reduced Project – Northern Focus Alternative was analyzed in Global Response GR-6, Alternatives. The Alternative was proposed by the community and only included development north of the SDG&E corridor—a smaller footprint than the Equity for Jacumba Alternative. The EIR concluded that the Alternative would still result in significant and unavoidable impacts to focal or panoramic vistas (Impacts AE-3 to AE-9) and cumulative impacts to valued visual character or image and panoramic vistas from I-8 (Impacts AE-CU-1 and AE-CU-2). (EIR, Global Response GR-6, Alternatives, p. GR-6-6.) In other words, the Reduced Project – Northern Focus Alternative only avoided Impacts AE-4 and AE-5 (views from Old Highway 80 and the Jacumba Community Park) and that the Alternative, unlike the Equity for Jacumba Alternative, eliminated all development south of the SDG&E corridor. Accordingly, the Equity for Jacumba Alternative is not "considerably different from" the reasonable range of alternatives analyzed in the EIR, would not "clearly lessen the significant environmental impacts of the project," and, as a result, it need not be analyzed in the EIR. (CEQA Guidelines, § 15088.5(a)(3).)

While not requiring additional analysis in the EIR, a detailed response was provided to the Equity for Jacumba Alternative in the June 30, 2021, BayWa Letter to Planning Commission re July 9, 2021 Hearing.

O. The EIR Does Not Improperly Reject the Distributed Generation Alternative

A commenter claimed that the EIR improperly rejected the Distributed Generation Alternative because it did not account for the average annual growth rate of rooftop solar systems or the ability to develop solar systems on commercial buildings. However, the EIR discusses this information and did not reject the Alternative solely on either basis. Rather, the EIR rejected the Alternative because "it is outside the control of, and could not be implemented by the Project Applicant, the County or other counties where the Project electricity would be utilized within a reasonable period of time." (EIR, p. 4-6.)

For example, the EIR analyzes the rate of increase of solar projects as reported by the California Public Utilities Commission, SDG&E, and the County. (EIR, p. 4-6.) Using this data, the EIR concludes that "the number of new installations required to deliver up to an additional 90 MW of solar electricity by 2021 render this alternative highly speculative and therefore infeasible from a technical and commercial perspective." (EIR, p. 4-6.) The EIR also notes that the Distributed Generation Alternative is outside the control of the County. The "authority to direct investor-owned utilities (IOUs) to procure additional utility-side distributed generation and to determine how customer-side distributed generation is compensated rests with the CPUC." (EIR, p. 4-7.) Notably, the report cited by the commenter, Solar Industry Research Data by Solar Energy Industries Association (https://www.seia.org/solar-industry-research-data), states that over the last decade solar has experienced an average annual growth rate of 42%. However, that figure includes all solar projects, and the accompanying chart indicates that the largest area of growth has been in utility scale solar projects.

Additionally, the EIR states that "[l]arger scale rooftop solar (greater than 1 MW) was also considered under the" Alternative. The EIR acknowledged that it is possible to develop larger scale rooftop solar projects, but "it is speculative whether the CPUC would approve acquisition of additional distributed generation in San Diego County." (EIR, p. 4-7-8.) The EIR notes that implementation of distributed generation projects has proven difficult as a result of permitting and cost issues. (*Ibid.*)

Moreover, the EIR rejected the Distributed Generation and Storage Policy Alternative because it would not meet the majority of the Project objectives. The EIR found that the Alternative could meet, at least partially, Objectives 2 and 5, but not the remainder of the Project objectives. (EIR, p. 4-8-9.)

Finally, the commenter cited to articles and studies that discuss issues with developing solar facilities on undeveloped lands. But the comment failed to acknowledge that the Project will primarily impact fallow agriculture, disturbed habitat, and developed land—over 515 acres of the 626 acre project footprint will be land that has been disturbed. (See Mitigation Measure M-BIO-3.) The Project has been designed to avoid jurisdictional waters and habitat for endangered species. The landscape buffer and vegetation under the solar panels will be native species, removing and replacing invasive species. And the Project includes the Switchyard Facilities onsite to avoid impacts associated with long interconnection lines. One of the studies cited by the commenter acknowledges the benefits of this type of solar development. The article entitled "Environmental impacts of utility-scale solar energy" and published in the UC Davis Renewable and Sustainable Energy Review states: "Utilizing degraded land can offer additional environmental benefits when reclamation of these lands is prioritized. On-site landscaping using native plants and soil amendments can add to ecosystem service provisioning (e.g., soil stability, C sequestration) without the use of additional water and fertilizer inputs. A 550 MW PV power plan spread over 1400 ha of private, non-prime agricultural land in San Luis Obispo . . . is also the location of an effort to re-establish the native grasslands that once dominated." (*Id.* at p. 774.)

P. Recirculation of the EIR Is Not Required

A commenter expressed concern that the EIR should be recirculated as a result of the changes in the Final EIR and to analyze the Equity for Jacumba Alternative. Recirculation of the EIR is not required. The changes

made in the Final EIR do not constitute significant new information as that term is defined in CEQA Guidelines section 15088.5. Rather, the changes merely clarify the statements in the Draft EIR. (See CEQA Guidelines, § 15088.5(b).) Further, as discussed above, recirculation with analysis of the Equity for Jacumba Alternative is not required.

IV. THE PROJECT IS CONSISTENT WITH THE COUNTY'S LAND USE REGULATIONS

A. The Project Is Consistent with the County General Plan, the Mountain Empire Subregional Plan, and the Jacumba Vision Statement

A commenter expressed concern that the Project is not consistent with the County General Plan, Mountain Empire Subregional Plan, and Jacumba Vision Statement, as those planning documents were analyzed in Section 2.1, Aesthetics, and Section 3.1.4, Land Use, of the EIR. Those comments have been collected and addressed together.

When evaluating consistency with an agency's General Plan, "'it is nearly, if not absolutely, impossible for a project to be in perfect conformity with each and every policy set forth in the applicable plan . . . . It is enough that the proposed project will be compatible with the objectives, policies, general land uses and programs specified in the applicable plan.'" (*Golden Door Properties LLC v. Superior Court* (2020) 50 Cal.App.5th 467, 498-499, *quoting Save Our Heritage Organisation v. City of San Diego* (2015) 237 Cal.App.4th 163, 186.) To this end, the EIR evaluates whether the Project is consistent with relevant goals and policies in the General Plan, Mountain Empire Subregional Plan, and Jacumba Vision Statement.

1. Consistency with the Mountain Empire Subregional Plan, Scenic Highways Goal

A commenter alleged that the Project is not consistent with the Mountain Empire Subregional Plan, Scenic Highways Goal, which states: "Establish a network of scenic highway corridors within which scenic, historical and recreational resources are protected and enhanced." Table 2.1-1 summarizes why the Project is consistent with this goal: "Due to the inclusion of existing energy infrastructure in the I-8 and Old Highway 80 viewsheds, the brief duration of views to the Project site from I-8, screening of solar panels from view of Old Highway 80 motorists and because the Proposed Project does not inhibit the County from establishing regulations and/or development standards geared toward the protection and enhancement of scenic highways, the JVR Energy Park Project would not be inconsistent with the Scenic Highways Goal of the Mountain Empire Subregional Plan." (EIR, p. 2.1-73.) In addition, the Project will also permanently preserve 435 acres of habitat, which also demonstrates consistency with this goal.

2. Consistency with the Mountain Empire Subregional Plan, Industrial Goal under the Land Use Element

A commenter alleged that the Project is not consistent with the Mountain Empire Subregional Plan, Industrial Goal under the Land Use Element, which states: "Provide a land use pattern which will permit those kinds of industrial uses that will not detract from the rural charm and lifestyle of the subregion." The Project is classified as a major impact service and utility use (see EIR, p. 3.1.4-24), not an industrial use, so this goal is inapplicable to the Project. Even assuming the goal is applicable, however, the Project is consistent because the General Plan calls for the development of renewable energy production (see, e.g., Goal LU-5, Goal COS-14 and Policy COS-14.7, etc.) and the County's Zoning Code allows solar development on the property, as described in Section IV.B, below.

3. Consistency with the Mountain Empire Subregional Plan, Description of the Ketcham Ranch Specific Plan Area

A commenter alleged that the Project is not consistent with the Mountain Empire Subregional Plan's description of the Ketcham Ranch Specific Plan Area, which states: "The Ketchum Ranch Specific Plan proposes a multi-use concept, a residential community with recreational and visitor oriented commercial uses on approximately 1,300 acres next to Jacumba. [¶] The Ketchum Ranch Specific Plan proposal shall create a community in harmony with the existing town of Jacumba and provide services to the existing residents of Jacumba. It will also be sensitive in its design to the natural and historical resources of the Jacumba area. Adequate provisions shall be made to prevent periodic flooding originating at the Mexican border." This portion of the Mountain Empire Subregional Plan expresses a preference for the Ketchum Ranch Specific Plan, if and when it is ever submitted to the County for approval. It is not a goal or policy of general application that is applicable to the Project. Accordingly, the Project is consistent with this aspect of the Mountain Empire Subregional Plan.

4. Consistency with the Mountain Empire Subregional Plan, Conservation, Policy and Recommendation 6 Regarding the Jacumba Hotel

A commenter alleged that the Project is not consistent with the Mountain Empire Subregional Plan, Conservation, Policy and Recommendation 6, which states: "The Jacumba Hotel should be restored, if at all possible." The Project does not touch the location of the Jacumba Hotel, so this policy and recommendation does not apply. Further, the commenter presents no evidence that the Project will make it impossible to restore the Jacumba Hotel.

5. Consistency with the Jacumba Vision Statement

A commenter alleged that the EIR omits part of the Jacumba Vision Statement, and does not analyze the Project's consistency with the entire statement. The EIR presents the Jacumba Vision Statement in its entirety. (EIR, p. 3.1.4-23.) The Project's consistency with the Jacumba Vision statement is analyzed in Table 3.1.4-5. Even though the full Jacumba Vision statement was not reproduced in the Table, the consistency analysis responds to the entire vision statement, as demonstrated by adding the missing Jacumba Vision Statement paragraphs side-by-side to the analysis provided in Table 3.1.4-5 (see Table 1, below, accidentally omitted portions of Jacumba Vision Statement shown in underline).

Table 1. Consistency Analysis of the Jacumba Vision Statement in Table 3.1.4-5

Policy and Recommendation	Project Consistency with Policy
Vision Statement for Jacumba. Jacumba is a diverse community. The ratio of young to older citizens is about even, which makes the vision diverse as well. We want schools for the young, as well as much needed services, like fire protection, police, and medical care, and still not lose the wonderful feeling that is Jacumba. Clean air, beautiful scenery, superb climate, and no congestion or traffic. The community supports new development that is compatible with, and preserves the natural and historical environment, including water resources, and protects existing neighborhoods, manages	**Consistent.** The Proposed Project would be consistent with this vision statement. The Proposed Project would not increase population in the area, and therefore would not increase demand for public services such as schools and police protection. As discussed in Section 2.12, Wildfire, of this EIR, the fire protection measures in the FPP (M-WF-1), that has be prepared and submitted to the County Fire Marshal for approval, would be implemented. Please refer to response to Policy S-6.3 above. With implementation of M-WF-3, the Proposed Project would participate in a Fire Protection and

Policy and Recommendation	Project Consistency with Policy
growth to reinforce the rural small town character of the area, which includes agriculture, open space, and trails as important elements of the community. The community supports the provision of adequate public services by new development without compromising existing levels of service or burdening existing residents with the costs of growth. We hope someday to become the jewel of the backcountry.	Mitigation Agreement with San Diego County Fire Authority (SDCFA) to improve SDCFA's capacity to provide fire and emergency protection services. The project has been designed to be compatible with and preserve the natural and historic environment. By its very nature, the Proposed Project would increase the accessibility of renewable energy throughout California. Please refer to response to Policy LU 8.2 above. The Proposed Project would use groundwater from on-site wells. As discussed in Section 2.7, Hydrology and Water Quality of this EIR, a Groundwater Investigation has been prepared and a Groundwater Monitoring and Mitigation Plan (PDF-HYD-2) would be implemented for the Proposed Project. While there would be a short-term increase in vehicle trips due to construction, long term traffic impacts would be negligible as it is an unstaffed facility.

6. Consistency with County General Plan Policies COS-11.1 and COS-11.3

A commenter alleges that the County is not consistently interpreting two General Plan Conservation and Open Space Element policies, COS-11.1 and COS-11.3, because the EIR finds the Project consistent with these policies, while the 2015 Soitec Solar Development Revised Final Program Environmental Impact Report (Soitec EIR) found that the LanEast and LanWest projects analyzed at a program level in that EIR would require a General Plan Amendment due to their inconsistency with Policy COS-11.1 and Policy COS-11.3. Substantial differences in technology, location, project design and mitigation make comparing the LanEast and LanWest projects with the Project like comparing apples and oranges.

As an initial matter, the EIR analyzes the Project's consistency with General Plan Policy COS-11.1, Protection of Scenic Resources, and Policy COS-11.3, Development Siting and Design, in Table 3.1.4-4.[3] (See EIR, pp. 3.1.4-66 to 3.1.4-67, Table 3.1.4-4.) Table 3.1.4-4 explains why the Project is consistent with these two policies.

It is important to note that neither the LanEast nor LanWest projects were analyzed at a project level, nor were they approved by the County. In fact, when it certified the Soitec EIR in 2015, the County Board of

[3] Policy COS-11.1 states: "Require the protection of scenic highways, corridors, regionally significant scenic vistas, and natural features, including prominent ridgelines, dominant landforms, reservoirs, and scenic landscapes." (EIR, Table 3.1.4-4.)

Policy COS-11.3, Development Siting and Design states: "Require development within visually sensitive areas to minimize visual impacts and to preserve unique or special visual features, particularly in rural areas, through the following: [¶] • Creative site planning [¶] • Integration of natural features into the project [¶] • Appropriate scale, materials, and design to complement the surrounding natural landscape [¶] • Minimal disturbance of topography [¶] • Clustering of development so as to preserve a balance of open space vistas, natural features, and community character [¶] • Creation of contiguous open space networks." (*Ibid.*)

Supervisors selected Alternative 2A, which removed the LanEast and LanWest projects from the scope of the program. (See Findings Regarding Significant Effects Pursuant to State CEQA Guidelines Sections 15090, 15091, and 15093, Soitec Solar Development Project at p. 1 (September 17, 2015) ["The County adopts the Tailored Proposed Project and No LanEast and LanWest Alternative (Alternative 2A), and not the Proposed Project, for the reasons explained in these findings."].) Accordingly, the County Board of Supervisors never rendered a final determination as to whether the LanEast and LanWest projects were inconsistent with General Plan policies COS-11.1 and COS-11.3, and the Soitec EIR's analysis is not binding on the County. (*San Francisco Upholding the Downtown Plan v. City & County of San Francisco* (2002) 102 Cal.App.4th 656, 677-78.)

Also, the technology proposed for the LanEast and LanWest projects was substantially different than the single-axis PV trackers to be utilized by the Project. The Soitec projects proposed concentrated photovoltaic (CPV) technology, which would gather solar energy using a dual-axis tracking mechanism substantially different from the JVR Energy Park's trackers in both height and size. Each Soitec CPV tracker unit would be 48 feet across by 25 feet tall, with a maximum height of 30 feet above ground level, supported by a 28 inch steel pole. (Soitec EIR, p. 1.0-7.) When horizontal to the ground, the CPV panels would have a minimum ground clearance of 13 feet 6 inches. (*Ibid.*) The CPV tracker units also would require greater spacing to ensure that they would not shade one another, resulting in spacing between CPV tracker poles of 21 meters north/south and 25 meters east/west. (Soitec RFPEIR at pp. 1.0-23, 1.0-29, 1.0-32, available at: https://www.sandiegocounty.gov/content/sdc/pds/ceqa/Soitec-Solar-RFPEIR.html.)

In contrast, the Project will use PV panels that are 7.5 feet by 3.7 feet, with a maximum height of 12 feet, mounted on a single-axis tracking system, not mounted on a single pole. (EIR, p. 1-4 and 1-5.) Most of the Project's panels will be less than 12 feet high because the PV trackers will only reach this height in certain areas with higher potential flood depths. (EIR, p. 1-5.)

Accordingly, the CPV trackers intended for the LanEast and LanWest project sites would have been much more visually prominent than the PV trackers used for the Project. Not only were the CPV trackers 2.5 times taller, but also they were broad and widely spaced, so that each CPV tracker would appear visually distinct. Although the LanEast and LanWest projects would have utilized a 7-foot tall security fence like the Project, the security fence could not have obscured the CPV trackers due to their height and breadth, unlike the Project fence that is sufficiently tall to allow limited views of the tops of the PV panels.

With respect to location, the LanEast and LanWest projects were proposed right next to one another in an area bordered immediately to the north by I-8, and immediately to the south by Old Highway 80. (See Soitec EIR, Fig. 1-3.) Although no detailed project design was available, the Soitec EIR's Aesthetics section disclosed that the LanEast and LanWest sites would be visible by eastbound and westbound travelers at "an immediate foreground viewing distance and from a superior viewing angle, but would be occasionally screened by vegetation to the south and within the interstate median." (Soitec EIR, p. 2.1-39.) "Trackers would briefly dominate southerly oriented views over approximate 1.4-mile and 2.1-mile segments of the interstate through McCain Valley, and motorists could be drawn visually to the solar farm sites given their close proximity to the interstate." (Soitec EIR, p. 2.1-40.)

With respect to travelers along Old Highway 80, the LanEast and LanWest projects would be "visible from an immediate foreground viewing distance at a normal viewing angle, and solar farm development could obstruct and interrupt existing views of the In-Ko-Pah Mountains ridgelines. Lastly, the vertical profile and angle of trackers could create a serrated horizon line visible to passing motorists that would obstruct and degrade available views from the highway." (Soitec EIR, p. 2.1-40.)

In contrast, views of the Project along I-8 will be short, fragmented, and intermittent. Views of the Project for eastbound travelers will be less than 30 seconds, and interrupted by a low hill. (EIR, p. 2.1-32.) Although

views of the Project for westbound travelers will be longer, they are "non-continuous and routinely interrupted by intervening median elements, including elevated road cut terrain, boulders, and vegetation." (*Id.*)

Views of the Project along Old Highway 80 will exist for eastbound travelers for 0.95 miles, and westbound travelers for a discontinuous distance of 2.25 miles. (EIR, p. 2.1-33.) The Project will be set back on both sides of the highway—110 feet from the pavement to the north, and 175 to 180 feet from the pavement to the south. (EIR, p. 2.1-25.) Although the Project would interrupt existing views of the Project site, it would only occasionally obscure views of mountainous terrain to the north and south, which would remain visible. (EIR, p. 2.1-35; see also Figs. 2.1-11 [eastbound on Old Highway 80], an Figs. 2.1-13, 2.1-13A, and 2.1-13B [westbound on Old Highway 80].) As shown in the visual simulations, required landscaping and slatted or screened fencing would partially screen solar panels from view of travelers along Old Highway 80. (EIR, p. 2.1-29; see also EIR, pp. 2.1-68 and 2.1-69 [mitigation measures M-AE-5 and M-AE-6 requiring visual screening, including fencing and landscaping].)

This important factual context regarding the differences in technology, location, project design and mitigation explains why the General Plan consistency discussions and conclusions for the Project differed from those for the LanEast and LanWest projects in the Soitec EIR. Nor can the Soitec EIR be relied on to demonstrate any type of County inconsistency because the County Board of Supervisors never rendered a final determination as to whether the LanEast and LanWest projects were inconsistent with General Plan policies COS-11.1 and COS-11.3, and the Soitec EIR's analysis is not binding on the County. (*San Francisco Upholding the Downtown Plan v. City & County of San Francisco* (2002) 102 Cal.App.4th 656, 677-78.)

7. Consistency with General Plan Policy LU-1.9

The commenter alleges that the Project is not consistent with the General Plan Policy LU-1.9, which states: "Achievement of Planned Densities. Recognizing that the General Plan was created with the concept that subdivisions will be able to achieve densities shown on the Land Use Map, planned densities are intended to be achieved through the subdivision process except in cases where regulations or site specific characteristics render such densities infeasible." Table 3.1.4-4 in the EIR provides the following analysis of the Project's consistency with this policy. "Consistent: Other than the Switchyard Facilities, the Proposed Project would be an interim use that would be decommissioned at the end of the permitted use. Accordingly, the Proposed Project is consistent with this policy because residential densities planned for the Project site can be achieved at that future time, assuming market conditions and County decisionmakers allow." It is also important to add that on July 14, 2021, the County Board of Supervisors adopted an amended Housing Element to the General Plan. This Housing Element did not identify Jacumba in its sites inventory for the Regional Housing Needs Assessment. (See Housing Element, at Appendix G & H.)

B. The Project Complies with the County's Zoning Code

A commenter expressed concern that the Project does not comply with the County's Zoning Code. That is not the case. The development footprint for the Project is primarily designated S88, Specific Planning Area. Sections 2880 through 2889 of the County's Zoning Code are the Specific Planning Area Use Regulations and they permit the development of the Project and the Switchyard Facilities on the Project site upon issuance of a Major Use Permit.

With respect to the Switchyard Facilities, which will be transferred to SDG&E and will not be removed at the end of the Project's 35-year life, Section 2884(a) states that, upon issuance of a Minor Use Permit, Minor Impact Utilities are allowed on S88 land before a Specific Plan is adopted without requirement to remove the Minor Impact Utility use within a certain time limit. Notably, the electrical substation, switchyard, and associated transmission infrastructure are Minor Impact Utilities. (See Zoning Code, § 1355.)

With respect to the remaining solar development, which will be removed at the end of the Project's 35-year life pursuant to a bonded agreement with the County, Section 2888(a) allows interim use of land zoned S88 with the issuance of a Major Use Permit ("MUP") "for any use pursuant to a bonded agreement in an amount sufficient to ensure the removal of all buildings, structures, and other improvements within a specified time and/or under specified conditions when the decision-making body finds that such agreement will carry out the intent of this Ordinance and is enforceable by the County." Solar projects for offsite use with a project area of 10 acres or more are considered a Major Impact Service and Utility in all zones. (See Zoning Code, § 6954(b)(2); see also *id.* at § 1350.)

Accordingly, the Switchyard Facilities are a Minor Impact Utility use, while the remainder of the Project's solar development is a Major Impact Service and Utility use. Pursuant to the Specific Planning Area Use Regulations described above, the Switchyard Facilities will not be required to be decommissioned at the conclusion of the Project term, while the remainder of the Project will be removed.

A commenter raised two issues with respect to the County's Zoning Code. First, a commenter argues that there is a conflict between Zoning Code Sections 1350, 2885, and 2888(a) such that a Major Impact Service and Utility use cannot be placed on the Project site. Second, a commenter objected to the County's administrative economy by not issuing a separate Minor Use Permit for the Switchyard Facilities. Neither concern has merit.

First, there is no conflict between Zoning Code Sections 1350, 2885, and 2888(a). Section 1350 defines what constitutes a Major Impact Service and Utility use. Section 2885 identifies those uses allowed with a MUP on property zoned S88 prior to adoption of a Specific Plan—without a requirement to remove such uses within a set period of time or post a bond. And Section 2888(a) identifies those circumstances whereby *any use* can be permitted on property zoned S88 prior to adoption of a Specific Plan—including a Major Impact Service and Utility use—subject to a bonded agreement to ensure removal of all improvements within a specified time.

Second, a commenter assumed that the Switchyard Facilities are being permitted pursuant to Section 2888(a) because they are covered by the same MUP as the solar development. Not so. As described in the EIR, the Switchyard Facilities will be transferred to and operated by SDG&E after they are constructed, and will no longer be covered by the MUP. Accordingly, the Switchyard Facilities and the Project's solar development may be permitted under the same Major Use Permit while maintaining their distinct use types. (See Zoning Code, §§ 1215.a ["The principal uses conducted on a lot by two or more individual establishments, managements, or institutions shall be classified separately into use types."]; 7352(b) ["Any use allowed by a Minor Use Permit may be allowed by a Major Use Permit."].)

Finally, a commenter expressed concern that the Use & Enclosure Matrix in the County Zoning Ordinance does not indicate that a Major Impact Services and Utilities use, like the Project, may be permitted on property zoned Specific Plan Area (S88). As described above, Section 2888(a) provides a conditional exception where *any use* can be allowed on property zoned S88 prior to adoption of a specific plan. Further, the Matrix states that it is "a summary only. For complete regulations see appropriate sections of The Zoning Ordinance. In case of conflict between the provisions graphically represented in this matrix and the provisions set forth in the text of The Zoning Ordinance, the provisions of the Zoning Ordinance shall apply." As discussed above, the Specific Planning Area Use Regulations expressly permit the Project pursuant to a bonded agreement. Accordingly, the Project is consistent with the Zoning Ordinance.

V. Answers to Additional Comments and Questions Posed By Commenters and the Planning Commission

1. **Will the Project be located within the Jacumba rural village boundary?** Yes, the Jacumba rural village boundary extends around the Ketchum Ranch property, which encompasses the Project site. (See Mountain Empire Subregional Plan, Fig. 2.) The EIR analyzes the Project's consistency with the General Plan, Mountain Empire Subregional Plan, and the Jacumba Vision statement. Please also see Section IV.A, above.

2. **Sheet 101 on the Project's Plot Plans show battery storage containers and inverters in a drainage feature. Will the feature be eliminated with fill?** The drainage feature identified on Sheet 101 was analyzed in the EIR and determined not to be jurisdictional wetlands, riparian habitat, or County Resource Protection Ordinance Wetlands. (See EIR, Appendix D, Appendix H, Aquatic Resources Delineation Report.)

3. **The ECO Substation was constructed to eliminate the need to construct individual switchyards. Why does the Project include a switchyard?** The Project includes the Switchyard Facilities so that it can interconnect with the existing transmission infrastructure that intersects the Project site. This transmission line would be 1,860 feet in length, but would only extend approximately 540 feet from the Switchyard Facilities to the existing transmission infrastructure. The EIR analyzed an alternative to the Project that would eliminate the Switchyard Facilities and include a 2.5 mile underground transmission line connecting the Project to the ECO Substation. (See EIR, § 4.2.5.) This alternative was eliminated from further consideration because it could not be feasibly implemented and would increase environmental impacts relative to the Project.

4. **A visual simulation of the Switchyard Facilities has not been provided.** While a visual simulation of a close view of the Switchyard Facilities has not been included in the EIR, the potential aesthetic and visual resources impacts of the Switchyard Facilities—both as a part of the Project and as an individual component—have been analyzed at length in Section 2.1 of the EIR. The visual simulations in the EIR, such as a visual simulation of the views of the Project from I-8 and an undeveloped lot on Brawley Avenue, include views toward the Switchyard Facilities. However, because they are in the distant background of those views, the Switchyard Facilities are not easily distinguishable in those simulations. To provide additional information, a zoomed in view of the Switchyard Facilities from those vantage points are attached hereto as Exhibit I and J.

5. **A commenter submitted an alleged picture of landscaping at another solar project and claimed that local climatic and soil conditions will prevent the growth of the Project's landscaping screen.** Sheet 500 of the Plot Plan shows that the landscape buffer will include trees up to ten feet in height at planting. The landscape buffer will be irrigated throughout the life of the Project to ensure appropriate growth of the buffer. (See EIR, p. 1-16; see also Mitigation Measure M-AE-5.) There is no evidence that the landscape buffer will not grow accordingly, especially considering the Project site previously sustained irrigated agriculture for numerous years.

6. **The Project should not include development south of Old Highway 80 to ensure airport safety and permit the development of the Port of Entry.** As discussed in Section III.I above, the EIR analyzed the Project's consistency with the Jacumba ALUCP, and concluded that the Project is consistent with each of its policies, including the lot coverage and open land requirements. Further, the EIR concluded that the Project would not create any glare hazards. (EIR, pp. 2.6-34-36.) As such, the Project's development does not pose a safety concern to Jacumba Airport operations.

Further, the EIR analyzed the Project's consistency with any Port of Entry near Jacumba. The EIR states: "The California-Baja California Border Master Plan (County of San Diego 2014a) is a binational effort to coordinate planning and delivery of projects at land port of entries and the transportation infrastructure serving them . . . The 2014 California-Baja California Border Master Plan Update is the most recent update of this plan. The update listed prioritized border crossing or point-of-entry projects, including a Jacumba-Jacume POE project. The update explained that there was insufficient data to prioritize the Jacuma-Jacume POE project as it is in early conceptual planning stages with no funding." (EIR, p. 3.1.4-7.) "Because a border crossing at this location is still in early planning stages, lacks funding for further development, there is no conflict with the Proposed Project." (*Id.*, p. 3.1.4-50.)

7. **Will the Project have signage in English and Spanish?** Yes. Condition 103 of the Major Use Permit requires signage in English and Spanish to be "posted at all entrances to the facility stating that operations and maintenance personnel shall be prohibited from . . . harming, harassing, or feeding wildlife and/or collecting special-status plant or wildlife species, smoking, traveling (either on foot or in a vehicle) outside of the solar facility undisturbed portions of the Project site, no pets, no littering, [and] no persons not conducting operations and maintenance activities shall remain at the facility after daylight hours or exceed normal nighttime operational noise or lighting."

8. **Will the Project locate high voltage equipment in a historic flood plain?** Pursuant to PDF-HYD-1, all Project components located within the 100-year floodplain must comply with the County of San Diego Flood Damage Prevention Ordinance, County Hydrology Manual, and County Hydraulic Design Manual, which requires elevation of all solar panels at maximum tilt, inverter/transformer platforms, battery storage containers, and all electrical components one (1) foot above base flood elevation. Further, high voltage equipment, like the substation and Switchyard Facilities, is located outside areas of inundation over six inches from the 100-year flood plain.

9. **Do the Project's 70-110 feet high poles exceed the height standards for the Project area?** Yes, however, the County Zoning Code states that a Major Use Permit may exempt a structure from the Ordinance's height limitations, and solar energy systems of more than 200 feet must comply with Federal Aviation Administration safety height requirements. (See Zoning Code, §§ 4620, 6954.) The Major Use Permit for the Project will permit the Project's poles to reach up to 115 feet in height.

10. **Will the Project's batteries be recycled?** Yes. The materials utilized in lithium-ion batteries can be reused. As such, battery recycling is a developing industry with multiple companies growing in the space. (See, e.g., Redwood Materials, which has recycling and processing facilities in Carson City, Nevada [https://www.redwoodmaterials.com/].)

11. **The Fire Protection Plan should include a special foam or other equipment needed to suppress fires in lithium ion batteries.** As discussed in Section 2.12 of the EIR, the Project's battery storage containers will be equipped with multiple levels of protections against fires, including integrated heat and fire detection and suppression systems, which would be linked to an automatic inert gas suppression system and a basic interior sprinkler system. The batteries would be monitored via the SCADA control system, which would track the performance, voltage and current, and state of charge of the batteries, proactively searching for changes in performance that could indicate impending battery cell failure. If an event is identified, the system powers down and isolates those battery strings in order to avoid potential failures and fire risks. (EIR, p. 2.12-31-32.)

12. **The Plot Plans must accurately reflect the Project's fencing on Sheets 100 and 102 along the south and north boundaries of the collector substation.** The Plot Plans accurately reflect the fencing on Sheets 100 and 102. There is no flood fencing proposed around the substation or Switchyard Facilities; the Project will utilize a standard chain link fence in these areas.

13. **The Project's batteries and inverters/transformer platform located south of the airport runway on Sheet 104 and 300 of the Plot Plans should be moved closer to the border fence. Similarly, the Project's batteries and inverters/transformer platform located next to Jacumba residences on Sheet 400 of the Plot Plans should be moved 300 feet north of their mapped location.** The EIR sufficiently analyzes impacts associated with the current locations for the batteries and inverters/transformer platforms for the Project. However, BayWa is willing to consider relocating the batteries and inverters/transformer platforms in these locations as suggested by the commenter to the extent such relocation is feasible, in accordance with County regulations, acceptable to County staff, and does not increase any environmental impacts. This evaluation will occur during final project design. For the batteries and inverters/transformer platform located next to Jacumba residences, BayWa assumes that the request is to move the components further east from the residences, not north.

14. **The elevations near the farm buildings on Sheet 400 of the Plot Plan should be reviewed for accuracy.** Sheet 400 shows several horizontal dimensions (text placed above straight dimension lines with arrows at each end) such as "~2895' (VAR)" around the Project that show east-west spacing between on-site drive aisles that are oriented north-south. These width values are relatively close to the ground elevation values nearby shown as contour labels (2785 at very base of hill, 2825 near MUP boundary). Although they are both black text showing four-digit numbers, horizontal dimensions are not to be confused with contour labels that depict elevation.

15. **The Community Sponsor Group suggested that the list of potential plants suitable for Project landscaping should be revised to include certain species.** BayWa will consider the Group's suggestions regarding modifications to the plants included in the landscaping plans and implement the modifications to the extent they are deemed acceptable to the County.

16. **What is the efficiency of the modules? How far apart are they? What is the tracking behavior? Is there a plan to replace the modules after a certain period of time?** As stated in Appendix V of the EIR, the Project will utilize modules with a wattage of approximately 540 watts. The panels will have an efficiency of approximately 20%. The distance between the modules is approximately 12 feet east to west. Before the sun rises, trackers are in wake-up angle position meaning modules are near-to-parallel to ground. As the sun rises, trackers rotate the module row to the east to face the sun and gradually follows the sun throughout the day until sun sets in the west. The maximum tilt on either east or west is 52 degrees and the trackers rotate the module row back to wake-up angle position for the next day. This backtracking feature of the trackers positions the module row to specifically avoid shading from adjacent module rows during maximum tilt. This behavior will be modified in two areas as a result of PDF-HAZ-1, which states: "(1) all PV panels south of Old Highway 80 will utilize a minimum 20 degree east facing wake angle; and (2) all PV panels north of Old Highway 80 and south of the SDG&E Transmission Corridor shall have afternoon backtracking disabled. Instead, the PV panels will stay at their maximum 52 degree west facing rotational limit until after the sun has set." Other than for repair requirements, there is no plan to replace the panels during the Project's operational term.

17. **Will vegetation under the panels reduce the Project's energy output? The Project should consider weed cloth or gravel to account for dust control and erosion.** The Project has been designed to account for vegetative growth underneath the solar panels, and such growth will not materially affect the Project's power generation. (See Exhibit C.)

18. **The Project should install iron-flow batteries, like the ones at SDG&E's Campo facility.** Lithium-ion batteries are the leading technology for utility-scale battery energy storage systems currently. Iron flow batteries are still a nascent technology not yet deployed apart from at pilot scale. The lithium-ion batteries the Project will utilize are already safely operating in San Diego County. (See Exhibit C.)

19. **Will the anti-reflective coating on the panels diminish over time?** The anti-reflective coating on the panels are designed to last the lifespan of solar module. (See Exhibit C.)

20. **The Project should utilize dry (water free) panel cleaning techniques.** BayWa is willing to consider utilizing panel washing equipment that is capable of dry cleaning methods so long as the equipment complies with the County's Noise Ordinance.

21. **Has US Customs been contacted about the Project?** BayWa has had contact with the United States Border Patrol regarding the Project.

22. **Will the Project's landscaping impact native habitat?** The Project's landscaping will impact less than one acre of native vegetation; the remainder of the landscaping will replace disturbed lands or fallow agricultural land. Impacts to the native vegetation and fallow agricultural land will be mitigated, as discussed further in Section 2.3 of the EIR. Notably, however, the landscaping will plant native vegetation over the land that was previously disturbed, resulting in a restoration of that portion of the Project site.

23. **Does the Project exceed setback requirements for the underlying zones?** The Project will be built on lands zoned Open Space (S80), Specific Plan (S88), and General Rural (S92), subject to issuance of a Major Use Permit. The applicable setbacks associated with the underlying S80, S88, and S92 zones are 60 feet (front yard), 15 feet (interior side yard), 35 feet (exterior side yard), and 25 feet (rear yard). The Project complies with these setback requirements as shown on the plot plan.

VI. CONCLUSION

BayWa appreciates the Board's close attention to this matter, and County staff's dedicated work on the Project over the past several years. As discussed above, the Project is consistent with the County's land use regulations and the EIR adequately satisfies CEQA. Accordingly BayWa respectfully requests the Board approve the Project and certify the EIR. BayWa believes that such action will set the standard for renewable energy development in the County, enabling the County to achieve its renewable energy and climate action goals, while limiting environmental impacts.

Sincerely,

Ryan Waterman

Attachments

cc: Mr. Geoff Fallon (BayWa)

EXHIBIT A

Gov. Newsom Emergency Proclamation

July 30, 2021

EXECUTIVE DEPARTMENT
STATE OF CALIFORNIA

PROCLAMATION OF A STATE OF EMERGENCY

WHEREAS Californians are experiencing the impacts of climate change firsthand, from droughts to wildfires to heatwaves to floods to rising seas to mudslides to vanishing snowpacks; and

WHEREAS the effects of climate change threaten the health and safety of Californians, as well as the State's access to clean and reliable energy; and

WHEREAS in April, May, and July 2021, I proclaimed states of emergency because of severe drought conditions in 50 counties; and

WHEREAS because of drought conditions, water supplies in California's reservoirs have dropped to levels so low that hydroelectric power plants have had to reduce or cease production, leading to a reduction of nearly 1,000 megawatts of capacity and further exacerbating the drought's impact on California; and

WHEREAS in June and July 2021, I proclaimed states of emergency because of record-breaking extreme heat events that hit California and other Western states, increasing residents' demand and putting significant demand and strain on California's energy grid; and

WHEREAS at the same time as the July 2021 Extreme Heat Event, the Bootleg Fire in Southern-Central Oregon threatened the California-Oregon Interlie, which delivers power from the Pacific Northwest into California, and reduced electricity supply into California by almost 4,000 megawatts; and

WHEREAS many other transmission lines are located in high fire threat areas, including lines located in other states on which California depends, and thus wildfires are likely to continue impacting California's energy supply unpredictably during this wildfire season; and

WHEREAS because of the accelerating and compounding effects of continuing wildfires, ongoing drought, and extreme heat conditions caused by climate change, California currently faces an additional projected energy supply shortage of up to 3,500 megawatts during the afternoon-evening "net-peak" period of high power demand on days when there are extreme weather conditions, which is even greater than projected in May 2021; and

WHEREAS in July 2021, the California Independent System Operator (CAISO) sought additional resources for summer 2021 through its Capacity Procurement Mechanism but sufficient resources were not available to make up for the projected shortfall; and

WHEREAS it is necessary to take immediate action to reduce the strain on the energy infrastructure, increase energy capacity, and make energy supply more resilient this year to protect the health and safety of Californians; and

WHEREAS there is insufficient time or supply to install new energy storage or zero-carbon energy projects to address the immediate shortfall of up to 3,500 megawatts during extreme weather events that is now projected for this summer; and

WHEREAS until additional clean energy projects are online, it is essential to minimize, to the greatest extent possible, emissions resulting from additional energy production needed to avoid the shortfall in 2021, and to promptly mitigate the effect of those emissions to protect the health and safety of Californians; and

WHEREAS wildfire, drought, and extreme heat events are likely to persist through this summer and recur next summer, and impact several Western states simultaneously, posing further threats to California's energy supply and limiting our ability to import additional energy into the State; and

WHEREAS a second summer of extreme drought, heat, and fire in 2022 would pose an even more grave threat to California's energy supply, unless additional actions to increase California's energy infrastructure and capacity begin now; and

WHEREAS it is already too late, under normal procedures, to bring additional sources of energy online in time to address the previously unforeseen shortfall of up to 5,000 megawatts that is now projected for the summer of 2022 given the now-apparent likelihood that trends of drought, wildfire, and heatwaves continue into next year, making it necessary to take further action immediately; and

WHEREAS in 2018, California enacted Senate Bill 100, a landmark policy requiring that zero-carbon energy resources supply 100 percent of electric retail sales to customers by 2045; and

WHEREAS in March 2021, the California Energy Commission, California Air Resources Board, and California Public Utilities Commission, released a joint agency report outlining paths to reach the goal of 100 percent clean electricity by 2045; and

WHEREAS even more rapid procurement and deployment of clean energy production is necessary to end the vicious cycle in which generating energy contributes to the very climate-impacted emergencies that threaten energy supply; and

WHEREAS actions to accelerate procurement and deployment of clean energy projects will help prevent future emergency shortfall situations, and advance the State's progress toward achieving its clean energy goals, including the retirement of fossil fuel resources; and

WHEREAS under the provisions of Government Code section 8558, subd. (b), I find that conditions of extreme peril to the safety of persons and property exist throughout California due to the combined effects of drought, wildfire, and extreme heat on the State's energy system; and

WHEREAS under the provisions of Government Code section 8558, subd. (b), I further find that conditions of extreme peril to the safety of persons and property exist due to rapid, unforeseen, sudden, and severe energy shortages throughout California caused by these climate events; and

WHEREAS under the provisions of Government Code section 8558, subd. (b), I find that responding to the sudden and severe energy shortages requires extraordinary measures beyond the authority vested in the California Public Utilities Commission; and

WHEREAS under the provisions of Government Code section 8625, subd. (c), I find that local authority is inadequate to cope with the magnitude and impacts of the conditions of extreme peril; and

WHEREAS under the provisions of Government Code section 8571, I find that strict compliance with various statutes, regulations, and orders specified in this proclamation would prevent, hinder, or delay appropriate actions to prevent and mitigate the effects of the conditions of extreme peril.

NOW, THEREFORE, I, GAVIN NEWSOM, Governor of the State of California, in accordance with the authority vested in me by the State Constitution and statutes, including the California Emergency Services Act, and in particular, Government Code sections 8567, 8571, 8625, and 8627, **HEREBY PROCLAIM A STATE OF EMERGENCY** to exist in California.

IT IS HEREBY ORDERED THAT:

1. All agencies of state government shall use and employ state personnel, equipment, and facilities or perform any and all activities consistent with the direction of the Governor's Office of Emergency Services and the State Emergency Plan. Also, all residents are to obey the direction of emergency officials with regard to this emergency in order to protect their safety.

2. All energy agencies shall act immediately to achieve energy stability during this emergency, and the California Public Utilities Commission is requested to do the same. In particular, the California Energy Commission is directed, and the California Public Utilities Commission and the CAISO are requested, to work with the State's load serving entities on accelerating plans for the construction, procurement, and rapid deployment of new clean energy and storage projects to mitigate the risk of capacity shortages and increase the availability of carbon-free energy at all times of day.

3. To provide incentives for large energy users to reduce their electricity demand when an extreme heat event, a sudden and

severe reduction in transmission capacity (including reductions due to wildfire), or both, are projected to result in acute energy shortages this summer, the Department of Finance is directed to provide payments to fund electrical demand reduction programs to be established by California utilities, in accordance with the requirements below. Payment shall be made to any investor-owned utility or publicly owned utility for the eligible costs of an incentive payment program, including reasonable administrative costs, that the Department of Finance, in consultation with the CAISO, the California Energy Commission, and the California Public Utilities Commission, determines, based on documentation submitted by the utility, satisfies the following requirements:

a. The utility must operate the program through and no later than October 31, 2021.

b. The utility must require that its participating customers, as a condition of receiving incentive payments from the utility under the program, commit to reduce their electricity demand by a preset minimum number of kilowatts per hour for all periods of time as to which the CAISO publishes notice that load reduction under such programs is necessary, which periods shall be only within the time of a CAISO Grid Warning or Grid Emergency.

c. The utility must permit participating customers to shift to back up generation (including any method of generation permitted by Paragraphs 4.a and 4.b of this proclamation) during the period specified in subparagraph (b) of this Paragraph.

d. The utility must pay participating customers $2 per kilowatt hour reduced during the period specified in subparagraph (b).

e. The utility must pay participating customers $0.75 per kilowatt hour committed if the CAISO has issued a day-ahead Alert and the utility has directed participating customers to prepare to reduce their load under the program, but then the CAISO does not ultimately publish notice that load reduction under such programs is necessary;

f. The utility must prohibit participating customers from participating in both the Emergency Load Reduction Program and this program, and participating customers may only participate with respect to an amount of reduced electricity demand that is incremental to an obligation to reduce load that the participating customer has agreed to under another demand response program providing compensation for reducing load;

g. The utility must require that participating customers, upon enrollment, report to the utility how much (if any) backup

generation they intend to use during the periods of load reduction specified in subparagraph (b), and if available, information on whether the backup generation is portable or stationary, and the federal emissions tier for each generator;

h. The utility must provide to the California Air Resources Board the information collected under subparagraph (g), plus an estimate of total load reduction achieved by ZIP code, each month; and

i. The utility must provide to the Department of Finance documentation establishing the utility's procedures for verifying the amount of load reduced by participating customers for purposes of calculating payments as specified in subparagraph (d), and for confirming that participating customers are not also receiving compensation under the Emergency Load Reduction Program or other demand response program as specified in subparagraph (f), and the utility must agree that determination of the sufficiency of the documentation required by this subparagraph shall be in the sole discretion of the Department of Finance, in consultation with the CAISO, the California Energy Commission, and the California Public Utilities Commission; and

j. The utility must agree to provide, upon request of the Department of Finance, necessary documentation evidencing the claimed costs of the incentive program for which the utility seeks payment.

To the extent it would otherwise apply to actions under this Paragraph, Chapter 3.5 (commencing with section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, is suspended.

4. Through October 31, 2021, on any day for which the CAISO issues a Grid Warning or Emergency notice based on its determination that, despite its reliance on all available resources, an imminent shortfall is projected because of an extreme heat event, a sudden and severe reduction in transmission capacity (including reductions due to wildfire), or both, the following subparagraphs shall be in effect. Beginning August 15, 2021, application of subparagraphs (a), (b), and (f) shall become limited to participants in a program instituted by a utility under Paragraph 3, and participants in the California Public Utilities Commission's Emergency Load Reduction Program, Base Interruptible Program, and Agricultural & Pumping Interruptible Program.

a. For purposes of regulations concerning stationary generators, use of stationary generators shall be deemed an "emergency use" under California Code of Regulations (CCR), title 17, section 93115.4, subd. (a)(30)(A)(2) during a period running from two hours before the beginning of the

effective time of the CAISO Grid Warning or Emergency notice to one hour after the end of that effective time.

b. For purposes of regulations concerning portable generators, the period running from two hours before the beginning of the effective time of the CAISO Grid Warning or Emergency notice to one hour after the end of that effective time shall be an "emergency event" under CCR, title 17, section 93116.1, subd. (b)(14), and a loss of electrical service shall be deemed "beyond the reasonable control of the owner or operator" under CCR, title 17, section 93116.2, subd. (a)(12)(A)(2). In addition, the period running from two hours before the beginning of the effective time of the CAISO Grid Warning or Emergency notice to one hour after the end of that effective time shall be an "emergency event" under CCR, title 13, section 2452, subd. (j), and interruptions caused during those times shall be deemed an "unforeseen interruption of electrical power from the serving utility" under CCR, title 13, section 2453, subd. (m)(4)(E)(1).

c. Restrictions on the use of prohibited resources adopted by the California Public Utilities Commission under Decision 16-09-056, Ordering Paragraphs 3 and 4[b], and as implemented in the tariffs of regulated energy utilities, are suspended for any non-residential customer who is enrolled in the Base Interruptible Program or Agricultural & Pumping Interruptible Program.

d. The provisions of Water Code section 13385, subd. (i)(1)(A) as they pertain to daily average and instantaneous temperature limitations in waste discharge requirements for thermal power plants are suspended for any thermal power plant that maintains operations to abate the effects of this emergency. Any exceedance of the daily average or instantaneous temperature limitations resulting from maintaining operations during this time shall not constitute a violation for purposes of calculating mandatory minimum penalties under Water Code section 13385, subd. (i).

e. Permitting requirements or conditions of certification adopted by the Energy Commission pursuant to Public Resources Code, sections 25216.5, subd. (a) and 25500 et seq., as well as permitting requirements adopted by local air quality management districts, shall be suspended to the extent they restrict the amount of power that a facility may generate, restrict the amount of fuel that a facility may use, or impose air quality requirements that prevent the facility from generating additional power, for use in California, during the period running from two hours before

the beginning of the effective time of the CAISO Grid Warning or Emergency notice to one hour after the end of that effective time.

f. Any other permit, regulation or law prohibiting, restricting or penalizing the use of stationary or portable generators during the period running from two hours before the beginning of the effective time of the CAISO Grid Warning or Emergency notice to one hour after the end of that effective time is suspended.

g. Any other permit, regulation or law prohibiting, restricting or penalizing any other conduct allowed by this Paragraph, other than conduct described in subparagraph (f), is suspended.

5. Through October 31, 2021, when the CAISO issues a Grid Warning or Emergency notice based on its determination that, despite its reliance on all available resources, an imminent shortfall is projected because of an extreme heat event, a sudden and severe reduction in transmission capacity (including reductions due to wildfire), or both, and when the Governor's Office of Emergency Services also publishes notice that this Paragraph shall become effective, then:

a. In regulations concerning the use of auxiliary engines by ocean-going vessels berthed in California ports, the Grid Warning or Emergency notice shall establish an "emergency event" under CCR, title 17, section 93118.3, subd. (c)(14).

b. This proclamation, the CAISO's issuance of Grid Warning or Emergency notice, and the notice published by the Governor's Office of Emergency Services shall together be deemed to provide notice to reduce use of grid-based electrical power under CCR, title 17, section 93118.3, subd. (c)(14)(C). Expiration of the Grid Warning or Emergency notice, the CAISO's issuance of a Cancellation notice, or notice of an end to the "emergency event" from the Governor's Office of Emergency Services shall be deemed to provide notice under that same section that reduction is no longer necessary. Ships that are berthed in California ports while the CAISO Grid Warning or Emergency notice is in effect shall not be required to use shore power until 11:59 p.m. on the third day following the last consecutive day on which the CAISO issued a Grid Warning or Emergency notice.

c. A ship operating on auxiliary engines pursuant to an "emergency event" under subparagraph (a) shall be deemed to qualify for an exemption under CCR, title 17, section 93118.3, subd. (d)(1)(E)(1)(a), and any visit

occurring during the period described in subparagraph (b) shall be counted towards compliance under CCR, title 17, section 93118.3, subd. (d)(1)(F)(1).

d. Any other permit, regulation or law prohibiting, restricting or penalizing the use of auxiliary ship engines or other conduct allowed by this Paragraph is suspended.

6. Any facility that operates in excess of permitting requirements or conditions of a certificate suspended by Paragraph 4.e shall:

   a. notify the relevant local air quality management district, the California Energy Commission, and the California Air Resources Board of its actions within 48 hours; and

   b. report additional fuel use, additional hours of operation and times of operation, and energy produced by that additional use and operation to the relevant local air quality management district, the California Energy Commission, and the California Air Resources Board within 30 days of operation under this proclamation.

7. In order to help address any exceedances in emissions permitted under federal law and other federal obligations that result from acts taken under this proclamation, and to avoid jeopardizing public health or safety as a result of those acts, the California Air Resources Board shall develop by November 15, 2021, and then promptly implement, a State-funded plan to mitigate the effects of additional emissions authorized by this proclamation beyond ordinarily permitted levels. The mitigation plan shall include plans to invest in programs to improve air quality in communities, with a particular focus on disadvantaged communities, and to reduce risk to sensitive populations. To the extent it would otherwise apply to actions under this Paragraph, Chapter 3.5 (commencing with section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, is suspended.

8. As necessary to assist state agencies, local governments, utility companies, contractors, and others, the Department of Water Resources and the California Energy Commission shall enter into contracts to arrange for the procurement of materials, goods, and services necessary for projects likely to be online by October 31, 2021, that would expand energy supply and storage to respond to energy supply shortages caused by climate change. For contracts first executed through October 31, 2021, applicable provisions of the Government Code and the Public Contract Code, including but not limited to travel, advertising, and competitive bidding requirements, are suspended to the extent necessary to effectuate this Paragraph and Paragraphs 9 and 10.

9. With respect to all post certification petitions for changes in power plant project design, operation, performance, including geothermal generation and integrating solar generation and

battery storage with appurtenant facilities on an existing site, the following statutes and regulations are suspended to the extent the California Energy Commission determines that the petitioned-for change should be granted and would reduce the energy shortfall resulting from this emergency by October 31 2021:

a. California Environmental Quality Act in Public Resources Code, Division 13 (commencing with section 21000) and regulations adopted pursuant to that Division;

b. Californid Coastal Act in Public Resources Code, Division 20 (commencing with section 30000) and regulations adopted pursuant to that Division; and

c. Title 20, section 1769, of the California Code of Regulations.

10. With respect to new emergency and temporary power generators of 10 megawatts or more that the California Energy Commission determines will deliver net peak energy before October 31, 2021, the provisions of Public Resources Code, Division 13 (commencing with Section 21000) and regulations adopted pursuant to that Division, are suspended to the extent that the California Energy Commission determines that such generators should be licensed and that:

a. generation will be located in a previously disturbed site;

b. generation will use natural gas as soon after construction as practicable;

c. there is a secure water supply for the project; and

d. there is an available grid interconnection.

Public Resources Code section 25500 shall apply to the issuance of a license under this Paragraph (notwithstanding the 50-megawatt limitation in Public Resources Code section 25120).

11. With respect to new, and expansions of, battery storage systems of 20 megawatts or more that the California Energy Commission determines are capable of discharging for at least two hours and will deliver net peak energy by October 31, 2022, the provisions of Public Resources Code, Division 13 (commencing with Section 21000) and regulations adopted pursuant to that Division, are suspended to the extent that the Energy Commission determines that such systems should be licensed. Public Resources Code section 25500 shall apply to the issuance of a license under this Paragraph (notwithstanding the 50-megawatt limitation in Public Resources Code section 25120). The California Energy Commission shall implement the provisions in this Paragraph in consultation with local jurisdictions and state agencies.

12. The California Energy Commission shall establish a process to expedite all actions described in Paragraphs 9 through 11. The California Energy Commission's implementation of and actions taken under Paragraphs 9 through 11 shall not be subject to the provisions of Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code, and the California Energy Commission may delegate its authority under Paragraphs 9 through 11 to the Executive Director of the California Energy Commission. The California Energy Commission shall maintain on its website a list of all activities or approvals for which it has relied on suspensions under this proclamation.

13. The California Public Utilities Commission is requested to exercise its powers to expedite Commission actions, to the maximum extent necessary to meet the purposes and directives of this proclamation, including by expanding and expediting approval of demand response programs and storage and clean energy projects, to ensure that California has a safe and reliable electricity supply through October 31, 2021, to reduce strain on the energy infrastructure, and to ensure increased clean energy capacity by October 31, 2022. In particular, for purposes of expediting Commission actions, these emergency circumstances may be deemed an unforeseen emergency situation under Public Utilities Code section 311, subd. (d) & (g) and section 306, subd. (b); an event necessary for the preservation of the public health and safety or general welfare under Public Utilities Code section 311, subd. (h); an emergency situation involving matters upon which prompt action is necessary due to the disruption or threatened disruption of public facilities, allowing for an emergency meeting under Government Code section 11125.5, subd. (a-b); and a circumstance in which the failure of the Commission to adopt a decision before the expiration of the 30-day review and comment period would cause significant harm to public health or welfare under the Commission's Rules of Practice and Procedure 14.6, subd. (c)(10).

14. The CAISO is requested to take all actions available and use best efforts, including seeking waivers to its existing tariff processes, to expedite the interconnection to the transmission grid of resources specified by the California Energy Commission for purposes of meeting the intent of this proclamation.

15. The California Energy Commission, in consultation with the California Air Resources Board, the CAISO, and the California Public Utilities Commission, shall identify and prioritize action on recommendations in the March 2021 Senate Bill 100 Joint Agency Report, and any additional actions that would accelerate the State's transition to carbon-free energy. The California Energy Commission shall report its recommendations to me within 60 days.

This proclamation is not intended to, and does not, create any rights or benefits, substantive or procedural, enforceable at law or in equity, against the State of California, its agencies, departments, entities, officers, employees, or any other person

I **FURTHER DIRECT** that as soon as hereafter possible, this proclamation be filed in the Office of the Secretary of State and that widespread publicity and notice be given of this proclamation.

IN WITNESS WHEREOF I have hereunto set my hand and caused the Great Seal of the State of California to be affixed this 30th day of July 2021.

GAVIN NEWSOM
Governor of California

ATTEST:

SHIRLEY WEBER, PH.D
Secretary of State

EXHIBIT B

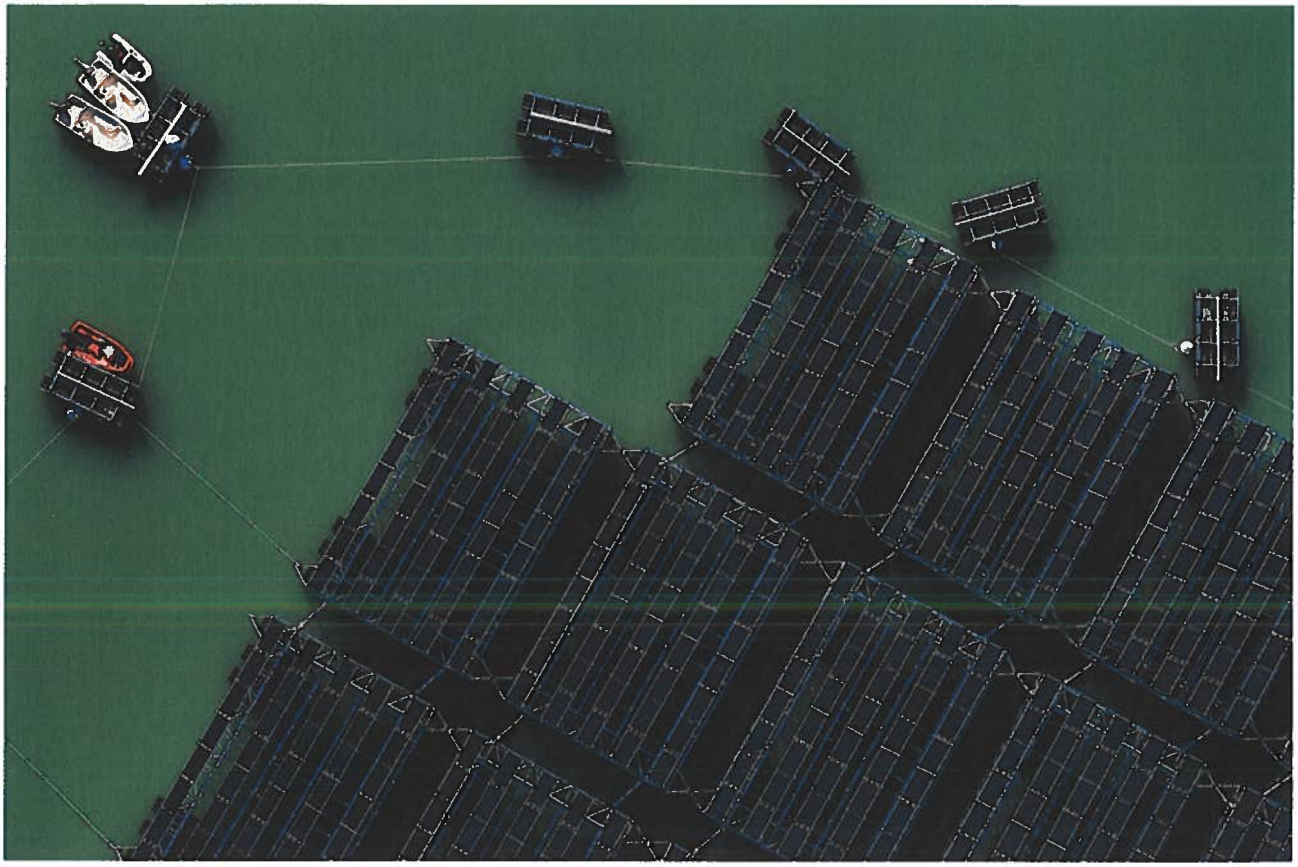
Renewables Grow at Record Pace But Still Too Slow

ClimateWire, August 3, 2021

CLIMATE AND WEATHER & 10 OTHERS

Renewables grow at record pace. It's still too slow

BY BENJAMIN STORROW | 08/03/2021 06:47 AM EDT



Barges with solar panels are arranged on Lac des Toules, an alpine lake in Switzerland. | Valentin Flauraud/Keystone via AP

CLIMATEWIRE | The world is installing record amounts of renewable energy. But it's not enough to stabilize the climate.

That's the conclusion of two recent reports. One, from the International Energy Agency, found that renewable electricity generation worldwide is expected to increase 8% this year, thanks in part to record installations of wind and solar in 2020 and a near-record year in 2021.

But the growth is colliding with a massive leap in global electricity demand. That has stalled emissions reductions as some nations expand their use of fossil fuels. Renewables are meeting about half of the additional demand for power, with natural gas and coal offering the rest. The IEA predicts coal generation will surge 5% this year, and could reach record highs in 2022.

The findings show that the world's carbon-cutting efforts are in retreat.

The IEA estimates that power-sector emissions need to fall 4.4% annually between 2020 and 2025 to put the planet on track for net-zero emissions. But carbon dioxide levels from power plants are expected to increase 3.5% this year and 2.2% next year. That would be enough to set a new record for emissions in the global power sector.

"Renewable power is growing impressively in many parts of the world, but it still isn't where it needs to be to put us on a path to reaching net-zero emissions by mid-century," Keisuke Sadamori, the IEA's director of energy markets and security, said in a statement. "As economies rebound, we've seen a surge in electricity generation from fossil fuels. To shift to a sustainable trajectory, we need to massively step up investment in clean energy technologies — especially renewables and energy efficiency."

A separate study suggests there may be limits to how quickly the world can pick up the pace.

Even nations that have moved aggressively to install wind and solar in recent years have fallen short of the levels needed to limit warming to 1.5 degrees Celsius, according to a study published in *Nature Energy*. One complication is that developing nations, which have been relatively late adopters of renewables, have failed to match the deployment rates of wealthier nations.

The findings speak to the need for governments to do everything in their power to accelerate the growth of renewables, but also suggest there may be limits to how fast clean energy can be installed, said Aleh Cherp, a professor of environmental science and policy at Central European University in Budapest, Hungary, who authored the study with a team of other European researchers.

"We have indeed discovered that despite the declining equipment cost and increasing technological expertise the growth of renewables in many countries is slowing down," Cherp wrote in an email.

Factors like land availability, resource constraints, permitting challenges and lack of government support have all limited renewable growth, he said. The findings also suggest that global leaders and climate advocates should look to other zero-carbon electricity sources like nuclear energy to find emissions reductions.

"Not all climate mitigation scenarios project very high rates of solar and wind expansion," Cherp said. "Perhaps the scenarios with more realistic rates contain some solutions which deserve our attention."

The study examined wind and solar deployment in the world's 60 largest electricity markets between 1985 and 2019. More specifically, it measured the maximum rate of wind and solar development in those markets, and compared it with the annual installation figures modeled by the United Nations' Intergovernmental Panel on Climate Change in its various 1.5-degree pathways.

The study concluded that wind deployment on average grew at a maximum rate of 0.8% annually, while solar peaked at 0.6%. Half of the IPCC's 1.5 C scenarios envision wind growing by more than 1.3% annually while solar grows at 1.4% annually. A quarter of IPCC scenarios peg solar growth at 3.3% annually.

The world has picked up the pace of renewable installations since 2019. In 2020, almost 280 gigawatts of wind and solar capacity were installed worldwide, up from 191 GW in 2019, according to the IEA. The agency is predicting that 270 GW will come online this year, followed by 280 GW in 2022.

As large as those numbers are, they pale in comparison to what the agency thinks is needed to reach net zero. It estimates that 630 GW of solar and 390 GW of wind will need to be installed on an annual basis by 2030.

More on this topic

MAY 2021

18th

NEWS Article **Landmark climate report outlines energy sector overhaul**

NEWS Article **Landmark climate report outlines energy sector overhaul**

EXHIBIT C

BayWa Technical Memo re Responses to Public Comments

August 16, 2021

JVR Energy Park—Technical Memorandum re Response to Public Comments

To: County of San Diego Board of Supervisors

Date: August 16, 2021

This technical memorandum responds to public comments about the JVR Energy Park Project ("Project"), notably how the Project will provide energy to the Jacumba Community, the size of the Project, and the Project's technical specifications and capacity.

I am a licensed professional engineer and am employed as a Project Engineer at BayWa r.e. Solar Projects LLC ("BayWa"). Among other areas of expertise, I am versed in the use of the computer programs AutoCAD, PVSyst (a program used to calculate projected energy production by a given solar project design), and PVWatts, a publicly accessible web-based software similar to PVsyst. As a BayWa Project Engineer, I have primary responsibility for solar project design of the Project. My resume is attached as Appendix A, hereto.

Microgrid for the Jacumba Community

One commenter requested that the Project consider constructing a microgrid for the Jacumba Community as a community benefit. In response, a microgrid to power the Jacumba Community is infeasible. First, San Diego Gas & Electric ("SDG&E") has franchise rights to provide retail power to the Community and owns the distribution system. As a result, only SDG&E would be capable of developing a microgrid to service the residents of Jacumba. Next, the Project has only been studied and approved by the California Independent System Operator and SDG&E to interconnect to the electric grid at one location, the 138kV ECO – Boulevard Transmission Line. Developing a microgrid to provide power to the town could require a multi-year process with SDG&E to determine its feasibility and any additional facilities that would be required to interconnect to the local distribution system. That said, the wholesale power that the Project will generate will flow on the path of least resistance from generation to electrical load. The Jacumba Community's electrical load is presently served through the Boulevard Substation, which is "down stream" of the Project. As such, adding a generator, the Project, close to electrical load will create additional reliability for the Jacumba Community. The Federal Energy Regulatory Commission (FERC) requires solar power plants to meet the same reliability standards as all other power generation technologies.

Comparisons to Other Solar Projects in the County

One commenter noted that the Jacumba Solar Project, which is owned and operated by BayWa and was permitted by the County, generates 20 megawatts (MW) of electricity on a 108 acre development footprint. The commenter asked why a similar acreage-to-MW ratio could not be utilized for the Project—i.e., why does the Project utilize 604 acres to deliver 90 MW of electricity.

BayWa r.e.

In response, the acreage required for a utility scale solar project depends on a variety of factors, including the shape and topography of the project site, environmental constraints, setbacks and zoning requirements, and the technology utilized by the project. The Jacumba Solar Project utilized fixed tilt technology, meaning the panels do not rotate throughout the day, with two modules in portrait orientation stacked next to each other and approximately 23 feet separating one module row from the next (the 23 feet includes the length of the two modules and the space between module rows). In comparison, the Project utilizes a single-axis tracking system whereby the Project's panels rotate throughout the day to track the sun. The Project will utilize one module in portrait orientation with approximately 20 feet separating each module row (the 20 feet includes the length of one module and the space between module rows). This means there are fewer modules in an area as compared to the Jacumba Solar Project. However, single-axis tracking systems have a greater energy output (as measured in MWh) due to their sun-tracking feature when compared to fixed-tilt systems.

The following table shows how other utility scale solar projects in the County compare on an acreage-to-MW ratio with the Project.

Project	Technology	Capacity (MWac)	Acres	Acres/MW
Rugged Solar[1]	CPV, dual axis tracker	80	765	9.6
Tierra del Sol Solar[1]	CPV, dual axis tracker	60	420	7
Ocotillo Wells[2]	PV, fixed tilt	50	336	6.7
Crimson Solar Project (BLM)[3]	PV, fixed tilt or single axis tracker	350	2,500	7.1
Viking Solar Project (Imperial County)[4]	PV, fixed tilt or single axis tracker	100	604	6.04

[1] https://www.sandiegocounty.gov/content/dam/sdc/pds/ceqa/Soitec-Documents/Final-EIR-Files/1.0_ProjectDescription_Part1.pdf

[2] https://www.sandiegocounty.gov/pds/PC/140124-Supporting-Documents/PDS2012-3300-12-004/Technical-Studies1/1_Ocotillo_Wells_Solar_Project_Description.pdf

[3] https://eplanning.blm.gov/public_projects/nepa/88925/20007541/250008663/Crimson_Solar_Draft_EIS-EIR-PA.pdf

[4] https://sdcommunitypower.org/wp-content/uploads/2020/12/00.-Agenda-Packet.pdf

Aramis Solar Project (Alameda County)[5]	PV, single axis tracker	100	410	4.1
Jacumba Solar[6]	PV, fixed tilt	20	108	5.4
JVR Community Buffer Alternative	PV, single axis tracker	90	604	6.71

As shown in the table, the Project's acres-to-MW ratio is less than the Rugged and Tierra del Sol Solar projects, and similar to the Viking,[7] Ocotillo Wells, and Crimson solar projects. A major constraint on the Project's acres-to-MW ratio is the Project site's irregular shape which requires space to be left around the tracker rows near the perimeters instead of a snug fit throughout the site. The site is not a geometrical shape, and it is also broken into 4 distinct areas leading to discontinuity of panels and addition of more peripheral requirements such as fence, setbacks, and roads.[8] In sum, the Project's energy output per acre is determined by the technology utilized and site and environmental constraints. The Project's acres-to-MW ratio cannot be extrapolated by comparing the Project to other solar projects because energy output depends on these factors.

Number of Solar Modules and Project Size

One commenter asked whether the Project size could be reduced given the Final Environmental Impact Report (EIR) analyzed installing up to 300,000 photovoltaic (PV) 540 watts (W) modules, which the commenter calculated could generate up to 162 MW. In response, the 300,000 PV module estimate was included in the EIR for the Project based upon the initial design of the Project, which utilized a 385 W module. As explained in Appendix V of the EIR, the Project's module wattage was increased by 40% to 540 W during the public review of the EIR. The Project's 540 W modules are larger than 385 W modules, measuring approximately 3.7 feet in width and 7.5 feet in length. As a result of this increase in size, there will be less modules on the Project site—i.e., the Project site cannot fit 300,000 540 W modules. For

[5] https://files.ceqanet.opr.ca.gov/261715-5/attachment/mn5XbdrQrZG9GyjEEXpvK2lKtd91DEuXhh2N0xRvcdWvisNSBMtdMBF_zT_yKMpaAccm-d85l44zv-a90

[6] https://www.sandiegocounty.gov/content/dam/sdc/pds/ProjectPlanning/Jacumba-Solar/FEIR/1_Project%20Description.pdf

[7] One commenter stated that the Viking project will generate 150 MW on 604 acres. However, San Diego Community Power executed a Power Purchase Agreement with the project for 100 MW of power. See footnote 4 above.

[8] As an example of the site constraints, the Project's total fenced area will only total 547 acres, meaning 76 acres would not be developed with solar panels.

example, the Community Buffer Alternative would install approximately 200,000 to 220,000 modules and produce a power capacity of approximately 110 MW DC, pending final design to be approved by the County. These modules have been analyzed in the EIR (see, e.g., EIR, p. 1-28 [describing size of 540 W module], Appendix U [analyzing height and surface area of 540 W modules]), and utilizing 540 W modules will decrease the surface area covered by PV modules on the Project site when compared to 385 W modules.

Bifacial Module Capacity with Vegetative Cover

One commenter asked whether the vegetation under the panels will reduce the Project's energy output and requested the Project consider weed cloth or gravel underneath the panels. In response, bifacial gain, or production generated from the back-side cells of the photovoltaic module, is based on a number of factors, including, but not limited to: spacing between modules, height of modules above the ground, ground reflectivity (albedo), and rear-side shading of the modules from racking or tracker equipment. The Project has been designed to account for vegetative growth underneath the solar panels, and such growth will not materially affect the Project's power generation.

Iron Flow Battery Technology

One commenter stated that the Project should install iron-flow batteries, like the ones at SDG&E's Campo facility. In response, lithium-ion batteries are the leading technology for utility-scale battery energy storage systems. This technology has the highest power density, storage capacity, and efficiency. The technology is the most widely available technology that has already been accepted and approved by fire safety authorities across the country, including here in San Diego County. Iron flow batteries are still a nascent technology not yet deployed apart from at pilot scale. The lithium-ion batteries the Project will be utilizing are comprised of similar battery cells to those used in electric vehicles, power tools, laptops, and homes. These lithium ion batteries are already safely operating in San Diego County at the 250 MW Gateway Battery project and two SDG&E projects: Kearney Mesa 20MW and Escondido 30MW.

Anti-Reflective Coating

One commenter asked whether the panel's anti-reflective coating will diminish over time. In response, the anti-reflective coating on the panels is designed to last the lifespan of solar module.

Regards,

Akhila Krishnan

Akhila Krishnan, P.E.

Project Engineer

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solarprojectsus@baywa-re.com | www.baywa-re.us |

BayWa r.e.

Appendix A

Resume of Akhila Krishnan, P.E.

AKHILA KRISHNAN, PE

Foothill Ranch, CA 92630 · akhilakr@usc.edu

SUMMARY:

Ms. Akhila is currently serving as Project Engineer for BayWa r.e. Solar Projects. She has seven+ equivalent years of experience in disciplines including engineering, permitting, energy, policy, and education. She has two engineering degrees in electrical engineering – a bachelor's and a Master's, and her qualifications also include professional engineering (P.E.) license and a diploma in Sustainability. Her specific experience in the solar industry is in both residential and utility-scale PV systems. Her experience with the California Public Utilities Commission provides a well-informed insight into state-level engineering-policy nexus. She is involved in several multi-disciplinary organizations which contribute to her thorough work, and successful completion of a variety of projects.

WORK EXPERIENCE:

Project Engineer — BayWa r.e. Solar Projects, LLC

- ***Project Engineering*** for acquisition, greenfield and construction solar+storage projects in **12+ US states** totaling **3+ GW**
- Evaluate **Power Purchase Agreement** on technical basis; **oversee EPCs** for high-voltage interconnection yards and PV construction; coordinated **Engineering and EPC RFPs, Independent Engineer RFPs** and evaluated bids on cost, technicality, experience, and project timeline.
- ***Inverter SME*** for BayWa portfolio of projects under development; creating inverter technology roadmap, assessing its suitability for projects, documenting lessons learned and managing relations with manufacturers on technical side.
- **Engineering due diligence** in understanding the project lifestyle, from initial design to EPC handoff, ability to understand complex development and permitting requirements.

Design Engineer — BayWa r.e. Solar Projects, LLC

- ***Design Engineering,*** for initial-stage PV utility-scale solar farms in US and MX, ranging from 1MW – 500MW
- **Established standards** for design and energy production for Engineering; coordinate drafting (consultant) and estimate requests.
- ***Electrical & Energy Engineering:*** Created **tools to calculate reactive power needs** supplied by inverters and capacitor banks; prepared **tool to calculate soiling on PV modules** through analyzing meteorological station data; conducted site visits to measure albedo using albedometer; researched on weather sources for their accuracy and applicability.
- Manage Design Engineering and collaborate with Project Engineers, Sales Engineers and Development team to make all deliverables estimate-ready.
- Run **energy production analysis** for locations in US and Mexico and prepare project schedule.
- Request EPC quotes from vendors and subcontractors on acquired projects to refine project estimates for financial model.

Senior PV Systems Designer — Sunrun, Inc.

- **Designed and prepared permitting submittal review for Oahu's (HI) first PV with energy storage system** and successfully resolved all design complications leading it to be the first Tesla Powerwall battery install (BrightBox-™) for Sunrun.
- **Estimated $36,000 (Sunrun) and $6000 (Customer) in savings** for 12 out of 30 projects by avoiding 'Main Panel Upgrade'.
- Eliminated issues in bill of materials through audits, bringing down failure occurrences to 2 per Branch Office by maintaining closed-loop feedback from Installation, Operations, Planning and Permitting.
- **Verified and improved AHJ and Utility (AZ, HI, OR, NV) requirements' database repository** through 235+ design evaluations.
- Recognized at yearly corporate conference for excellent communication and design support.
- Train and mentor 15+ Designers – in person and remote – under the regional team of 5 states: Arizona, Nevada, Oregon, Colorado for quality, performance, and updated design procedures.

Senior PV Systems Designer — **Sunrun, Inc.**

- **Crafted 300+ residential solar PV system designs**, totaling up to 7.5MW capacity of renewable energy to residential homes by US using AutoCAD and (Sunrun proprietary) software with thorough understanding of NEC codes, wire sizing, load calculations, voltage drop, etc.
- Primary designer for Prescott, AZ and serving POC for every design under it; pushed the Branch at 2nd position in the company by collaborating with Branch Personnel to keep customer needs at top priority and lowest turnaround time for all projects.
- Categorized as role-model performer; delivered projects for toughest AHJs like NYC, in turn eliminating regional project backlog, while displaying extreme attention to detail and design concept clarity, eventually achieving Risk Taker Award.

Research Assistant — **California Public Utilities Commission**

- **Provided decision-making recommendations on CPUC resolutions to the President of the Commission and the Energy Advisor** on matters related to **smart grid, R&D, transmission infrastructure and their budgets**, saving the executive department much time to comprehend and summarize an average of 40-page resolutions.
- Researched and created CPUC Staff Report on **PG&E utility smart grid pilots** for progress on line sensors; doubled the value of research by providing comparison to other utilities' progress.
- Facilitated analysis based on parties' testimonies for multi-functional teams on Demand Response (DR) market paradigm,
  supporting renewable integration and system reliability to aid planning perspective on market/protocol design in DR ruling.

Energy Engineering Associate Intern — **Visage Energy**

- Analyzed more than 50 proposals for SCE Living Pilot Project supporting SONGS retirement, narrowing down to four proposals for every category to be implemented after the nuclear power plant retirement in San Onofre.
- Determined and developed strategies for mixed-use of reliability measures including Energy Efficiency, DSM and Storage by evaluating proposals for best integration of non-traditional strategies.
- Provided analyses, prepared reports and presented to Executives on stakeholder collaborative aspect for the pilot program.

Teaching Assistant — **USC Viterbi School of Engineering**

- Evaluated each paper exam by fine-tuning the difficulty level based on student batch, increasing the class performance.
- Assisted Professor for 'Introduction to Power Systems' (EE 443) with class lectures and conversations.
- Lead class projects, proctored exams and provided lecture plus assignment support to more than 40 students.

CREDENTIALS: Fundamentals of Engineering (F.E.)/ (E.I.T.), Professional Engineer (P.E.), Electric Power; ENGAGE Graduation Diploma – In Sustainability

SOFTWARE: AutoCAD, Power World, ETAP, System Advisor Model (SAM), Vensim, MS Suite, Salesforce, BrightPath, PVSyst.

UNIVERSITY PROJECT EXPERIENCE:

Renewable Energy Project Development Plan: Concentrated Solar PV – 340MW, Utility Scale

- Developed PV plan with energy estimate for 100,000 selected (Google Earth) customers in California working in a team of 4.
- Prepared Project Cash Flow using System Advisor Model (SAM) factoring bank financing, tax, credits and incentives.
- Compiled the complete plan- inception to energizing- with environmental studies, project schedule and commissioning.

Formula One Car Project

- Managing and issuing project scope, statement, schedule and Work Breakdown Structure for prototype design and construction of Formula One car in lieu of business development, leading a team of 6 as the Project Manager.
- Driving profitability in execution of the 3-stage project by adjusting priorities and incorporating lessons learned.
- Leveraging strengths of individual team members with respect to project phases and requirements to bring out the best in a short period of time while construing an environment of trustworthiness, respect and enthusiasm.
- Eliminating incompetency by analyzing performances, incorporating iterative process for thorough task execution and evaluation based on instructor feedback and proactive risk management.

Design Bid Construction Project: USC Apartments, USC

- Prepared Design-Bid-Build proposal for a mixed-use residential apartment leading a team of 6 with a complete plan.
- Provided a complete plan from inception to contacting to commissioning including scheduling, budgeting and staging plan.
- Submitted RFIs and final proposal with the best real cost estimate of the project leading to win the contract for the firm.

Energy Modeling: Apple Data Center

- Analysis of energy estimate for Apple's Maiden Data Center and monitoring change in energy production and consumption over next 17 years with additive renewable capacity (solar PV and fuel cell) for both of primary and back-up facilities.
- Performed sustainability check and energy engineering evaluations using analytical tool (Vensim) inclusive of energy efficiency response of the facility and changing demand in future due to square foot expansion of the center.

Design Project: Transmission Planning Assessment and System Planning for Generation Retirement

- Determined least expensive system additions considering rights-of-way, tower configuration and bus ties to meet reliability
  criteria and improve economic efficiency of a 37-bus system.
- Performed N-1 contingency analysis ensuring safe operation during failures and develop improvements to transmission
  planning based on least-cost design.
- Designed new transmission lines and transformer positions to model a wind farm into the grid with lower system losses.

***230/115 kV* Substation Protection and Design**

- Designed one-line engineered diagram with highly redundant microprocessor relays and circuit breaker positions to
  encompass the physical layout of the substation using MS Visio.
- Deployed protection criteria like phase distance, directional ground over current, line differential schemes for both pilot
  and non-pilot protection by choosing and evaluating suppliers and products.
- Developed relay trip/contact logic and engineered settings for relay schemes like Direct Transfer Trip, Directional,
  Comparisional Block, etc. to facilitate communication among relays and DC diagram with output contact assignment.

POWER WORLD Problem Set

- Developed a set of 8 original problems using Power World to tie-in theoretical concepts to practical real world problems.
- Performed sensitivity analysis to aid in technical performance study of the system used for power flow models.

EDUCATION:

University of Southern California (USC), Los Angeles, California
Viterbi School of Engineering, Master of Science, Electrical Engineering- Electric Power, GPA: 3.55/4.00
University Institute of Technology (UIT), R.G.P.V. Bhopal, India
Bachelor of Engineering, Electrical and Electronics, GPA: 3.60/4.00

LEADERSHIP

President, USC Energy Club
Member Organizations: IEEE Power & Energy Society (PES), IEEE Women in Engineering (WiE), Young Professionals in Energy (YPE), Women of Renewable Industries and Sustainable Energy (WRISE)

AWARDS

Pacesetters Club, Sunrun
Risk Taker Award, Sunrun
Second Position, NODAL Volleyball, India

EXHIBIT D

Jacumba Hot Springs Property Value Assessment

The Doré Group, August 13, 2021

THE DORÉ GROUP

INTERNATIONAL REAL ESTATE CONSULTATION AND FORENSIC VALUATION

Appraisal Report

JVR Energy Park Impact Report

Prepared For:

Mr. Geoff Fallon
EVP Development, BayWa r.e.
18575 Jamboree Road, Suite 850
Irvine, CA 92612

THE DORÉ GROUP
INTERNATIONAL REAL ESTATE CONSULTATION
AND FORENSIC VALUATION

August 9, 2021

Mr. Geoff Fallon
EVP Development, BayWa r.e.
18575 Jamboree Road, Suite 850
Irvine, CA 92612

Re: BayWa r.e. Solar Project- Jacumba

Dear Mr. Fallon:

Pursuant to your request, I performed consultation services for BayWa r.e. Solar Projects, LLC., more specifically an impact report on residential values before and after nearby solar farms were constructed. Findings in this report were used to estimate the potential impact on residential properties in Jacumba Hot Springs after the development of the proposed, JVR Energy Park. To form an opinion on this issue, I have researched existing solar farms in urban, suburban, and rural residential neighborhoods and have analyzed the property values before and after the construction of the solar farms. I have not been asked to assign any value to any specific property.

The proposed project consists of 24 legal parcels totaling 1,345.85± acres. It is located adjacent to the community of Jacumba Hot Springs in southeastern unincorporated San Diego County. The Assessor Parcel Number(s) (APN) will be identified later in this report. The subject property is mostly vacant land, and is zoned Specific Plan, Village Residential, Rural Lands, and Rural Commercial.

The proposed solar farm, JVR Energy Park, is located along the eastern border of the community of Jacumba Hot Springs within San Diego County. JVR Energy Park is to be developed with a solar energy project with a rated capacity of up to 90 megawatts (MW) of alternating current (AC). The project site includes 1,345.85 acres; the solar facility is to cover 604 acres of the Community Buffer Alternative. The project will also create 350 temporary jobs during the 13 months of construction, and 2-3 permanent jobs for the duration of the operation (approximately 35 years).

This report was prepared for the client and intended user, BayWa r.e. Solar Projects, LLC. The intended use of this appraisal is to provide consultation and value impacts for due diligence and consultation purposes. Our analysis may be used for disclosure purposes in public forums considering the exposure of the project in the local community.

This appraisal report has been prepared in accordance with our interpretation of the State of California's guidelines and requirements, the *Uniform Standards of Professional Appraisal Practice ("USPAP")*, FIRREA Appraisal requirements, and FDIC Appraisal Guidelines

I have done careful research of the property and gathered and analyzed considerable data and information relating to solar farms impact on property values. I certify that I have no present or contemplated future interest in the property beyond this estimate of value. I have performed no services, as an appraiser, regarding the property that is the subject of this report within the three-year period immediately preceding acceptance of this assignment.

Acceptance of this report constitutes an agreement with these conditions and assumptions:

HYPOTHETICAL CONDITIONS

- This report assumes the JVR Energy Park is constructed and in use for the after value impacts.

EXTRAORDINARY ASSUMPTIONS

- None

Based on the appraisal described in the accompanying report, subject to the Hypothetical Conditions, Extraordinary Assumptions and General Conditions and Assumptions, I have made the following value conclusion:

Reconciled Opinion of Impact

It is anticipated the rural residential property values in the community of Jacumba Hot Springs, adjacent to the proposed JVR Energy Park will see an impact on their property value of:

0% TO 1% DECREASE

Thank you for the opportunity of submitting this appraisal. If I can be of further service, please do not hesitate to call.

Respectfully submitted,
The Doré Group, Inc.

Lance W. Doré, MAI, FRICS
President/CEO
CA-AG002464
lwdore@thedoregroup.com

TABLE OF CONTENTS

Summary of Salient Facts and Conclusions

PROJECT:	JVR Energy Park Directly East of Jacumba Hot Springs Jacumba Hot Springs, CA 91934
PROJECT DEVELOPER:	BayWa r.e. Solar Projects, LLC
LEGAL DESCRIPTION:	Lengthy, retained in our files
ASSESSOR PARCEL NUMBER(s):	614-100-20, -21, 614-110-04, 660-020-05, -06, 660-150-04, -07, -08, -10, -14, -17, -18, 660-170-09, 661-010-02, -15, -26, -27, -30, 661-060-12, -22, 660-140-06, -08, 660-150-21, and -16
INTENDED USE:	The intended use of this report is to provide consultation and value impacts for due diligence and consultation purposes
INTENDED USER(S):	The client and intended user is BayWa r.e. Solar Projects, LLC

Project

PROJECT AREA:	**Total:** 1,345.85± acres, which is comprised of 24 legal parcels. **Solar Farm:** 604± acres The entire project will exist north and east of Jacumba Hot Springs. The solar farm is to be developed east of the community
ZONING:	Zoning within the project area is a mix of: • Specific Plan and Public Agency Lands • Specific Plan • Village Residential (VR-2) • Rural Lands (RL-40) • Rural Commercial

IMPROVEMENTS: The project is to occur on vacant land.

HIGHEST AND BEST USE

Site: Solar Facility

As Proposed: Solar Facility

RECONCILED OPINION OF IMPACT

It is anticipated the rural residential property values in the community of Jacumba Hot Springs, adjacent to the proposed JVR Energy Park will see an impact on their property value of:

0% TO 1% DECREASE

Definitions of Market Value & Property Rights Appraised

Market Value: As defined by the Office of the Comptroller of Currency (OCC) under 12 CFR, Part 34, Subpart C-Appraisals, 34.42 Definitions, the Board of Governors of the Federal Reserve System (FRS) and the Federal Deposit Insurance Corporation in compliance with Title XI of FIRREA, as well as by the Uniform Standards of Appraisal Practice as promulgated by the Appraisal Foundation, is as follows.

Market value means the most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby,

1. Buyer and seller are typically motivated;
2. Both parties are well informed or well advised, and acting in what they consider their own best interest;
3. A reasonable time is allowed for exposure in the open market;
4. Payment is made in terms of cash in U.S. dollars or in terms of financial arrangements comparable thereto; and
5. The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Property Rights Appraised

Fee Simple Estate: The property right of ownership appraised was the fee simple estate. The fee simple title can be defined as follows:

"Absolute ownership unencumbered by any other interest or estate, subject only to the limitation imposed by the governmental powers of taxation."[1]

Please refer to the Definitions section in the Addenda for additional definitions.

[1] Appraisal Institute, *The Dictionary of Real Estate Appraisal*, 6th Edition (AI, Chicago: 2015)

HYPOTHETICAL CONDITIONS AND EXTRAORDINARY ASSUMPTIONS

Acceptance of and/or use of this report constitutes acceptance of the indicated Hypothetical Conditions and Extraordinary Assumptions; these can only be modified in a written document(s) executed by both parties.

HYPOTHETICAL CONDITIONS

A hypothetical condition assumes a condition which is known to be contrary to fact, but which is assumed for the purpose of discussion, analysis, or formulation of opinions. This appraisal is subject to the following hypothetical conditions:

- This report assumes the JVR Energy Park is constructed and in use for the after value impacts.

EXTRAORDINARY ASSUMPTIONS

And extraordinary assumption is an assumption which, if found to be false, could alter the resulting opinion or conclusion. This appraisal is subject to the following extraordinary assumptions:

- None

General Conditions and Assumptions

The appraisal has been completed subject to the following General Conditions and Assumptions:

- This appraisal was completed per the requirements of the *Uniform Standards of Professional Appraisal Practice (USPAP)* and those additional requirements expected of a member of the Appraisal Institute. The development process used was a complete analysis that is documented in this appraisal report.

- By use of this appraisal report, each party that uses this report agrees to be bound by all of the Hypothetical Conditions and Extraordinary Assumptions stated herein. The opinions are only as of the date stated in the appraisal report. Changes since that date in external and market factors, or in the subject property itself, can significantly affect the conclusions presented in the appraisal report.

- The Doré Group was not provided engineering studies or detailed plans for alternative development. However, The Doré Group researched the project's proposed plans which detailed the development layout.

- The referenced size estimate of the project area includes 24 parcel(s) (1,345.85 acres), and is based on information provided by the client. This figure(s) was assumed to be accurate and was relied upon in the valuation of the property.

- This appraisal is to be used only for the purpose stated herein. While distribution of this appraisal in its entirety is at the discretion of the client, individual sections shall not be distributed as this report is intended to be used in whole and not in part.

- All files, work papers and documents developed in connection with this assignment are the property of The Doré Group. No part of this appraisal, its value estimates, or the identity of the firm or the appraiser(s) may be communicated to the public through advertising, public relations, media sales, or other media without The Doré Group's prior written consent. If the appraisal report is referred to or included in any offering material or prospectus, the report shall be deemed referred to or included for informational purposes only and The Doré Group, its employees, and the appraiser(s) have no liability to such recipients. The Doré Group disclaims any and all liability to any party other than the party that retained The Doré Group to prepare the appraisal report.

- The information contained in this appraisal report, or upon which the report is based, has been gathered from sources the appraiser(s) assumes to be reliable and accurate. The owner of the subject property may have provided some of such information. Neither the appraiser(s), nor The Doré Group, shall be responsible for the accuracy or completeness

of such information, including the correctness of estimates, opinions, dimensions, sketches, exhibits, and factual matters. Any authorized user of the appraisal report is obligated to bring to the attention of The Doré Group any inaccuracies or errors that it believes are contained in the report. Any plans provided are intended to assist the client in visualizing the property; no other use of these plans is intended or permitted. Appraisals are based on the data available at the time the assignment is completed. Amendments/modifications to appraisals based on new information made available after the appraisal was completed will be made, as soon as reasonably possible, for an additional fee.

- No part of the appraisal report shall be used in conjunction with any other analyses. Reference to the Appraisal Institute or to the MAI designation is prohibited. Except as may be otherwise stated in the letter of engagement, the appraisal report may not be used by any person(s) other than the party(ies) to whom it is addressed or for purposes other than that for which it was prepared. Any authorized user(s) of this appraisal report who provides a copy to, or permits reliance thereon by, any person or entity not authorized by The Doré Group in writing to use or rely thereon, hereby agrees to indemnify and hold The Doré Group, its affiliates and their respective shareholders, directors, officers and employees, harmless from and against all damages, expenses, claims and costs, including attorneys' fees, incurred in investigating and defending any claim arising from or in any way connected to the use of, or reliance upon, the appraisal report by any such unauthorized person(s) or entity(ies).

- If the appraisal report is submitted to a lender or investor with the prior approval of The Doré Group, such party should consider this report as only one factor, together with its independent investment considerations and underwriting criteria, in its overall investment decision. Such lender or investor is specifically cautioned to understand all Hypothetical Conditions and Extraordinary Assumptions incorporated in this appraisal report.

- The appraiser(s) may not divulge the material (evaluation) contents of the report, analytical findings, or conclusions, or give a copy of the report to anyone other than the client, legal authorities via subpoena, or the Appraisal Institute.

- The appraisal report is based on the assumption of: (a) responsible ownership and competent management of the subject property; (b) no hidden or unapparent conditions of the subject property, subsoil or structures that render the property more or less valuable (no responsibility is assumed for such conditions or for arranging for engineering studies that may be required to discover them); (c) full compliance with all applicable federal, state and local zoning and environmental regulations and laws, unless noncompliance is stated, defined and considered in the Report; and (d) all required licenses, certificates of occupancy and other governmental consents have been or can be

obtained and renewed for any use on which the value opinion contained in the appraisal report is based.

- The physical condition of the improvements considered by the appraiser(s) is based on visual inspection by the appraiser(s). The Doré Group assumes no responsibility for the soundness of structural components or for the condition of mechanical equipment, plumbing or electrical components.

- The presence of hazardous substances may affect the value of the subject property. No hidden or unapparent conditions of the subject property, subsoil or structure, including without limitation, asbestos, formaldehyde foam insulation, polychlorinated biphenyl, petroleum leakage, or agricultural chemicals, which would make the property more or less valuable, were discovered by or made known to the appraiser(s). The appraiser(s) is not qualified to test for such substances and no responsibility is assumed for such conditions or engineering necessary to discover them. Unless otherwise stated, the appraiser(s) assumed there was no existence of hazardous materials or conditions, in any form, on or near the subject property.

- No opinion is intended to be expressed and no responsibility is assumed for the legal description or for any matters that are legal in nature or require legal expertise or specialized knowledge beyond that of a real estate appraiser. Title to the subject property was presumed to be good and merchantable and the property was appraised assuming there were no adverse easements, encroachments, liens, encumbrances, special assessments, or other restrictions.

- The appraised value was based on the assumption that there were no tax liens affecting the subject property. Unless otherwise noted, the subject property was found to be current in the payment of real estate taxes as of the date of value according to the applicable county treasurer-tax collector. It was assumed that any special assessments affecting the subject property are typical and appropriate for the area and do not have an impact on the value conclusion in this report and that any outstanding bonds have been paid.

- The Doré Group was not provided with a Biological Survey detailing possible biological species. Without a recent biological survey of the property, it could not be determined which species are actually on or frequent the subject land. The vegetation cover on the subject land is typical for the area and may provide habitat for many indigenous animal species found throughout the area.

- No opinion is expressed with regard to potential seismic impact and it was assumed that the subject's potential risks are similar to those shared by most properties throughout the region. The Doré Group makes no warranty as to the seismic stability of the subject

land. The assumption was made that any future development of the property, if any, would occur in accordance with all appropriate regulations and ordinances regarding grading, fill, and applicable building codes.

- Any forecasted potential gross income referred to in the appraisal report is based on my forecasts. Any forecasts are not predictions of the future. Rather, they are the appraiser's best opinions of current market thinking on future income and expenses. The appraiser(s) and The Doré Group make no warranty or representation that these forecasts will materialize. The real estate market is constantly fluctuating and changing. It is not the appraiser's task to predict, or in any way warrant, the conditions of a future real estate market; the appraiser(s) can only reflect what the investment community, as of the date of the appraisal report, envisages for the future in terms of rental rates, expenses, and supply and demand.

- Except as may be otherwise stated in the letter of engagement, the appraiser(s) shall not be required to give testimony in any court or administrative proceeding relating to the subject property or the appraisal. If the appraiser(s) is subpoenaed pursuant to a court order, the client agrees to pay The Doré Group's regular per diem rate plus expenses.

- In the event of a claim against The Doré Group, its affiliates, their respective officers or employees, or the appraiser(s) in connection with or in any way relating to this appraisal report or this engagement, the maximum damages recoverable shall be the amount of the monies actually collected by The Doré Group or its affiliates for this appraisal report and under no circumstances shall any claim for consequential damages be made.

- Necessary licenses, permits, consents, legislative or administrative authority from any local, state, or federal government, or private entity, are assumed to be in place or reasonably obtainable.

SCOPE OF WORK

According to the *Uniform Standards of Professional Appraisal Practice*, it is the appraisers' responsibility to develop and report a scope of work that results in credible results that are appropriate for the appraisal problem and intended user(s). Therefore, the appraiser has identified and considered:

- the client and intended users;
- the intended use of the report;
- the type and definition of value;
- the effective date of value;
- assignment conditions;
- typical client expectations; and
- typical appraisal work by peers for similar assignments.

In preparing this report, I investigated solar farms throughout California and their impact on adjacent residential property values. I compared property values before and after the solar farm was constructed. I collected, confirmed, and reported data that were applicable in the consultation process. Data collection involved the use of various sources including the Multiple Listing Service, RealQuest, Dataquick, Inc. (data collection services), county deed records, and in-house materials. The data collected and confirmed have been reported to an extent sufficient for the particular appraisal problem involved.

This appraisal is prepared for the client and intended user BayWa r.e. Solar Projects, LLC. The problem to be solved is to provide consultation services reflecting the impacts of solar farms to adjacent properties. The intended use is to provide consultation and value impacts for due diligence and consultation purposes. This appraisal is intended for the use of the client and intended user.

REPORT TYPE:	This is an appraisal report as defined by the Uniform Standard of Professional Appraisal Practice. This format provides a detailed and complete description of the appraisal process, subject data and consultation.
PROJECT IDENTIFICATION:	The project has been identified through the Final Environmental Impact Report, and other public documents. Additionally, legal descriptions and the assessors' parcel numbers were used to verify the project outline.

INSPECTION:	The subject property has not been inspected. Verification of project area were based on plat maps, aerials, and JVR Energy Park outlines.
MARKET AREA AND ANALYSIS OF MARKET CONDITIONS:	A complete analysis of market conditions has been made. The appraiser maintains and has access to comprehensive databases for this market area.
HIGHEST AND BEST USE ANALYSIS:	A complete as vacant and as improved highest and best use analysis for the subject has been made. Physically possible, legally permissible and financially feasible uses were considered, and the maximally productive use was concluded.
VALUATION ANALYSIS:	
Cost Approach:	A cost approach was not applied as we were not asked to assign any value to any specific property.
Sales Comparison Approach:	A sales approach was applied as there is adequate data to develop an opinion of impact. I will utilize a paired sales analysis for property values before and after solar farm construction.
Income Approach:	An income approach was not applied as we were not asked to assign any value to any specific property.
HYPOTHETICAL CONDITIONS:	None.
EXTRAORDINARY ASSUMPTIONS:	None.

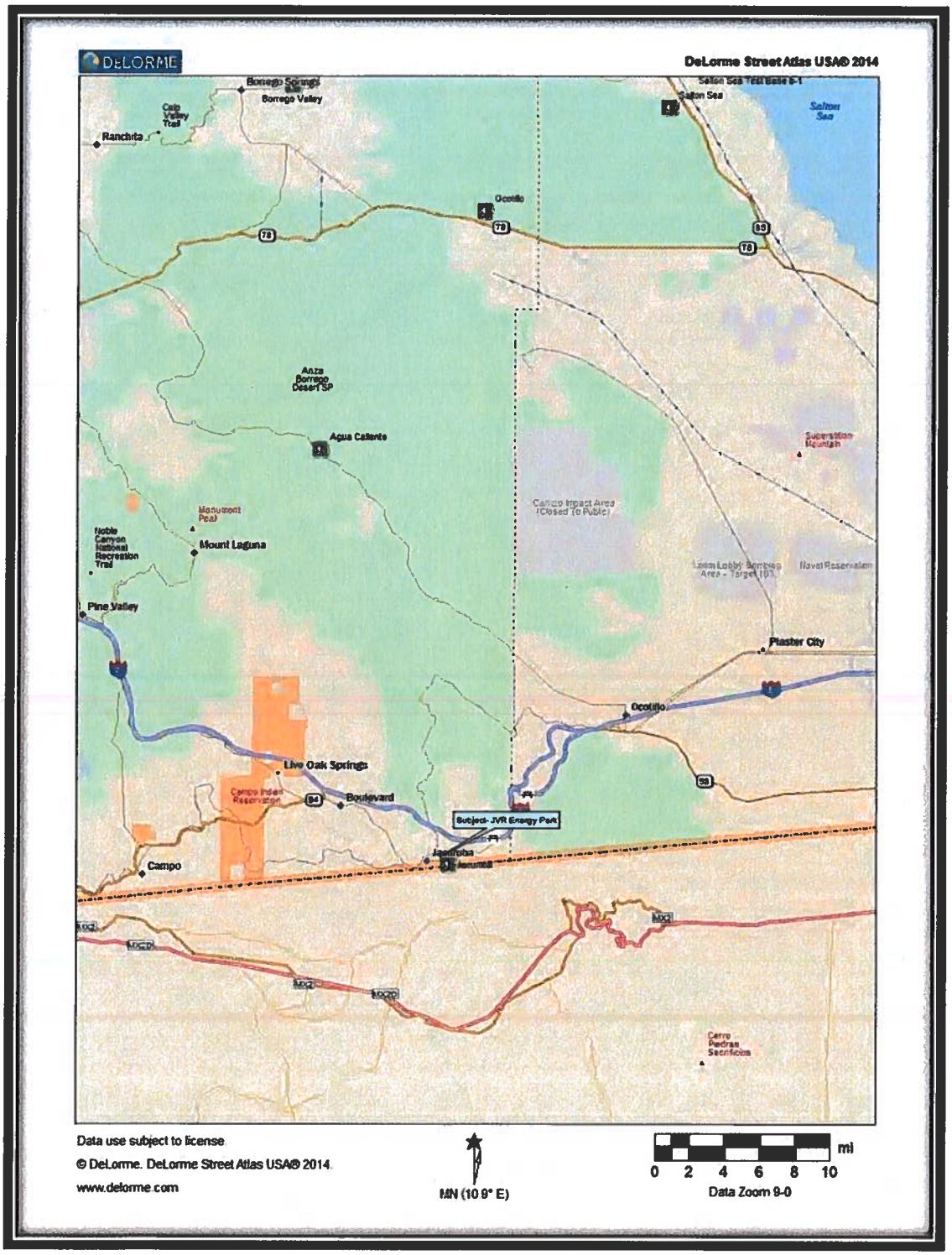
DOCUMENTATION:

The Doré Group was provided with the document(s) listed below. Unless noted, the document(s) did not indicate any unusual or detrimental conditions that have an impact on value. These documents were assumed to be accurate and were relied upon in the valuation of the subject property.

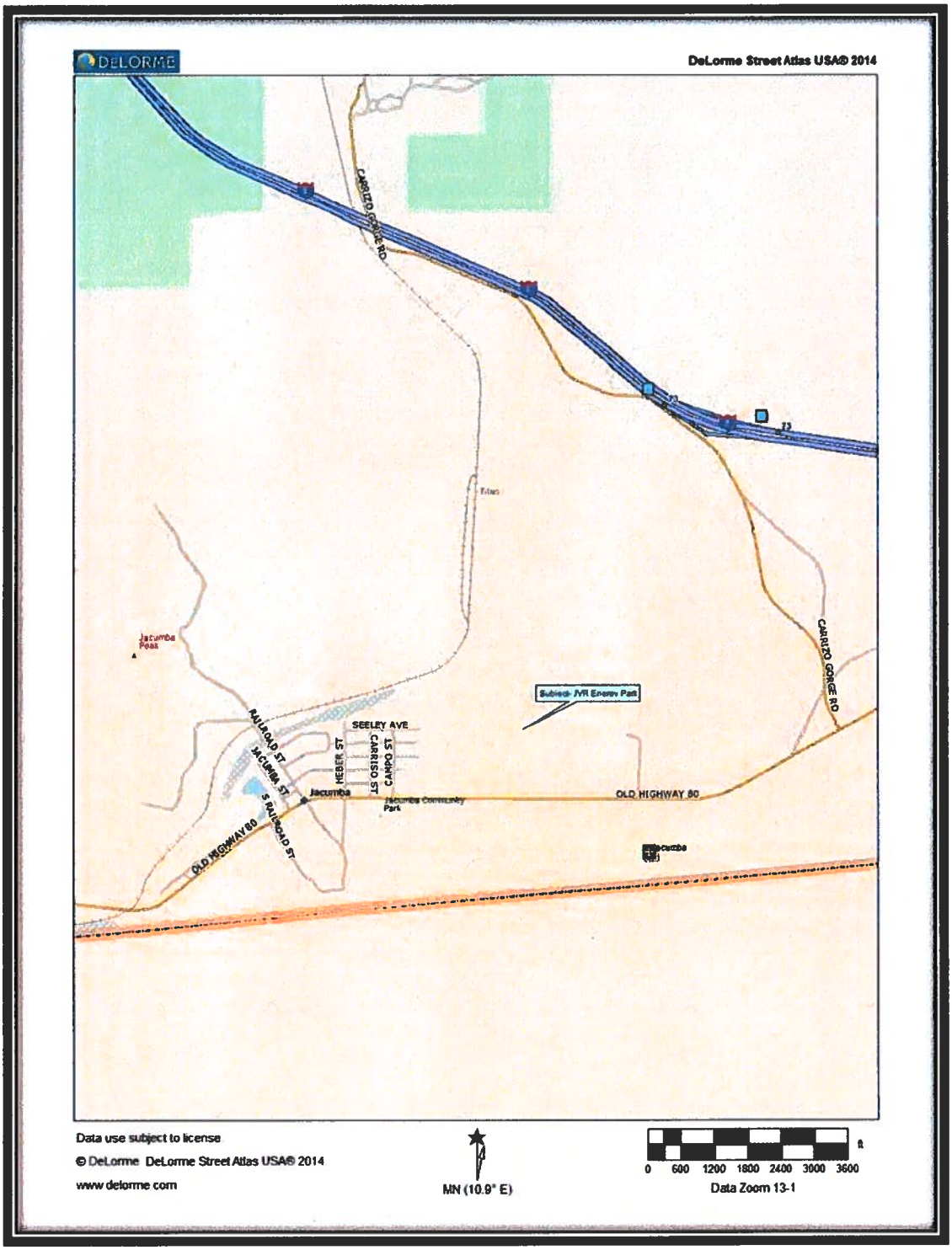
- Project EIR Documents

No responsibility is assumed for any missing pertinent data contained within these documents and the reconciled value does not reflect knowledge of their content.

REGIONAL MAP



CITY MAP


DELORME
DeLorme Street Atlas USA® 2014
CARRIZO GORGE RD
Jacumba Peak
Subject: JVR Energy Park
SEELEY AVE
HEBER ST
CARRISO ST
CAMPO ST
RAILROAD ST
JACUMBA ST
Jacumba
Jacumba Community Park
OLD HIGHWAY 80
S RAILROAD ST
OLD HIGHWAY 80
CARRIZO GORGE RD
Data use subject to license
© DeLorme DeLorme Street Atlas USA® 2014
www.delorme.com
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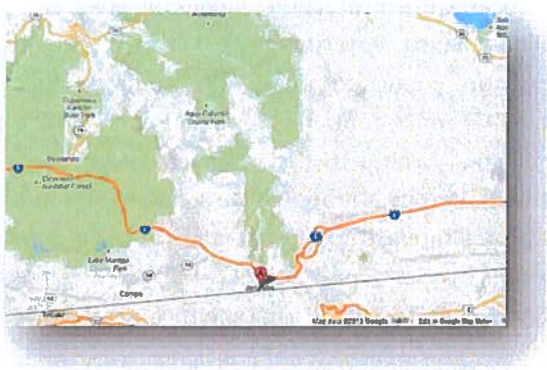
Data Zoom 13-1

AREA DESCRIPTION – JACUMBA HOT SPRINGS



LOCATION

Jacumba Hot Springs, renamed from Jacumba in June 2013, is an unincorporated census-designated community in the remote Mountain Empire region of southeastern San Diego County. Encompassing 6.1 square miles and situated at 2,800 feet above sea level in a valley of the Jacumba Mountains just one-half mile north of the U.S.-Mexico border, it is surrounded by unincorporated and/or governmentally protected lands. The border fence, a former unmanned and now closed border crossing, and the Mexican community of Jacume are located immediately to the south and the communities of Campo and Boulevard are several miles to the west.

TRANSPORTATION

Primary access to Jacumba Hot Springs is via Interstate 8 and Old Highway 80. I-8 runs in an east/west direction approximately two miles north of the community and extends from Ocean Beach (west) into Arizona (east). Old Highway 80 is a decommissioned portion of U.S. State Route 80 and meanders in a general east/west direction to the south of the interstate and through the center of the community. Primary surface streets serving the community include Calexico Avenue, Seeley Avenue, and Campo Street. The county-owned single runway Jacumba Airport is located about one mile east of the town center and is the only airport in the Mountain Empire region.

POPULATION / DEMOGRAPHICS

According to 2010 Census estimates, Jacumba Hot Spring's total population of 561 people was living in 216 households. The average household size was 2.60 persons, the average family size was 3.38 persons, and the median age was 39.9 years. SANDAG estimated a total population of 1,047 and an average household size of 2.64 persons for the entire 91934 zip code in 2020.

Historical & Forecasted Population Estimates - 91934 Zip Code					
	2008	2020	2030	2040	2050
Population	602	774	1,290	1,911	2,700
Absolute Change	n/a	172	516	621	789
Percentage Change	n/a	28.57%	66.67%	48.14%	41.29%
Avg Annual % Change	n/a	5.71%	13.33%	9.63%	8.26%
Source: SANDAG					

SERVICES / RECREATION

Jacumba Hot Springs has adequate schools, police and fire protection, public facilities, and utilities. Typical of a remote area, shopping facilities, dining, entertainment, and recreational amenities are limited often requiring travel to the more populated areas of the county. Public schools, including Jacumba Elementary School (Jacumba) and Mountain Empire High School (Pine Valley), are operated by the Mountain Empire Unified School District. Law enforcement is provided by the San Diego County Sheriff's Department, the U.S. Border Patrol, and the California Highway Patrol. Fire protection is provided by the California Department of Forestry & Fire Protection (Station 43) and the Rural Fire Protection District. San Diego Gas & Electric it the primary utility provider and Jacumba Community Services District is the local agency for water and sewer service.

Visitors and residents are drawn to Jacumba Hot Springs for its temperate climate, natural beauty and natural mineral hot springs. Recreational attractions are largely nature-based due to the extensive amount of public lands available for hiking, equestrian and a variety of outdoor activities. Other attractions include the Jacumba Hot Springs Resort. As mentioned, regional shopping malls require driving to the cities of Lakeside, El Cajon, or Escondido.

LOCAL ECONOMY

Jacumba Hot Spring's local economy was historically centered on ranching and the area's natural sulfur hot springs. Ranchers occupied the area in the 1800's. With an average water temperature of 104 F and a capability of filling large public baths, the area became a popular destination resort in the 1920's and 1930's. Most visitors would take the train from San Diego to stay in the world class Hotel Jacumba. After World War II, the more northern hot springs - including Murrieta and Palm Springs - became more popular. When the new interstate was constructed two miles north of the city, roadside businesses suffered further and the community went into economic decline. The Jacumba Hotel eventually closed and was destroyed by an arson fire in 1983. After a period of rotating uses and ownership, the newly renovated Jacumba Hot Springs Resort was re-opened in June 2013.

Today Jacumba Hot Springs is primarily a remote and rural "bedroom" community with a significant amount of retired residents and a small tourist base. Due to its remote location, its economy tends to lag behind San Diego County's more populated employment centers. As mentioned, it is a census designated place (CDP) and, according to the 2019 American Community Survey, had a labor force totaling 307. Local employment was almost entirely in construction, professional/scientific/management/administrative/waste management, educational services/healthcare/social assistance, and public administration.

According to SANDAG, the 91934 zip code had a median household income of $41,186 in 2010. Approximately 67% of the population had a household income between $0 and $44,999.

Real Estate Development

Jacumba Hot Spring's development primarily consists of low to average quality single family residential development and limited industrial and commercial development. With the exception of the Jacumba Hot Springs Resort, commercial development primarily caters to local residents and is concentrated along Old Highway 80. SANDAG estimated a total acreage of 30,892 for the entire 91934 zip code in 2010, of which 19,205 acres (62%) were developed. The majority of vacant developable land in the 91934 zip code is zoned for low-density single-family development. The developed acreage in this zip code could be broken down as follows:

- Single family residential - 1,413 acres (7%)
- Industrial - 124 acres (0.6%)
- Commercial - 114 acres (0.6%)
- Agricultural/extractive - 476 acres (2.5%)
- Parks/military use - 16,082 acres (83.4%)

According to the 2010 Census, Jacumba Hot Springs had 294 housing units at an average density of 48.0 units per square mile. Of these units, about 57% were owner-occupied and 43% were renter-occupied. The homeowner vacancy rate was 7.4% and the rental vacancy rate was 7.9%. SANDAG estimated a total of 455 housing units, about 13% which were vacant, for the entire 91934 zip code as of January 2020. The 2020 inventory of units could be broken down as follows:

- 325 single family detached units
- 10 single family attached units
- 80 multi-family
- 40 mobile homes/other

San Diego County general plan documents have long included plans for the revitalization and growth of the Jacumba area, including future development of the Ketchum Ranch and a thriving country town center.

Conclusion

Jacumba Hot Springs is located in the Mountain Empire region of southeastern San Diego County and has average access to the more populated areas of San Diego County and limited services and employment typical of a remote community. Development is primarily single family residential with limited commercial and industrial uses. Construction, public administration, and services comprise the bulk of local employment. Given Jacumba's temperate climate, affordable real estate prices, mineral hot springs, and lack of substantial nuisances, the long-term outlook for the community is favorable.

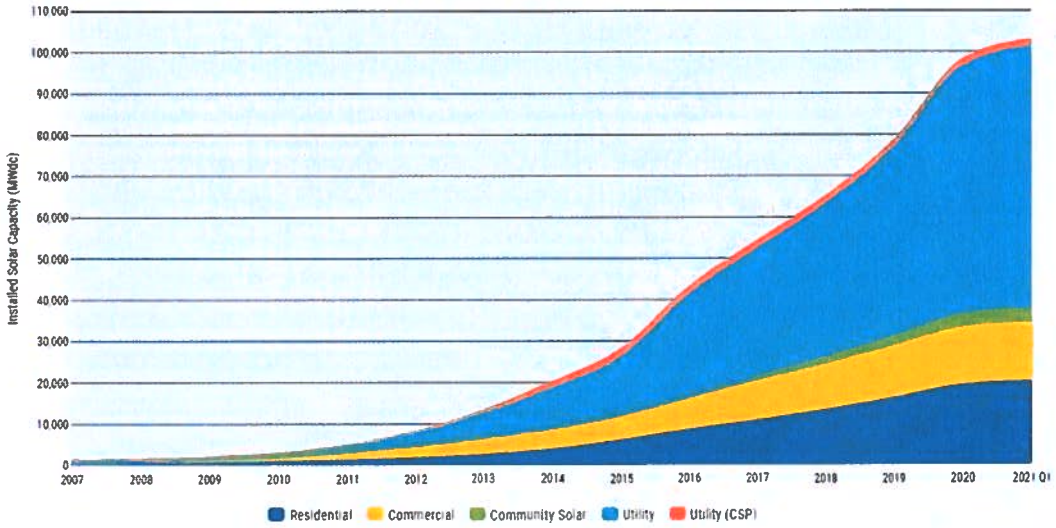
MARKET ANALYSIS- SOLAR INDUSTRY

The following information was gathered from Solar Energy Industries Association (SEIA), and Berkley Lab.

SOLAR INDUSTRY OVERVIEW

The solar industry has been ever growing over the last 10 years. It is a 50-state market, though California has traditionally dominated the solar industry. As the cost of solar installation has declined, the market has seen sharp growth. Prices as of 4Q 2020 are historically the lowest levels, and the number of installations is at an all-time high. For residential solar panels, the overall price has dropped from $40,000 (2010) to $20,000 (2020). For utility solar farms, prices range from $16/MWh to $35/MWh. This price range has made utility solar competitive with other forms of generation. The solar industry is expected to continue this growth as regulations like the Renewable Portfolio Standard push the United States towards increasing energy production from renewable energy resources.

Cumulative U.S. Solar Installations



Source SEIA/Wood Mackenzie Power & Renewables U.S. Solar Market Insight 2021 Q1

The following list shows the Key Figures as noted by the quarterly *SEIA/Wood Mackenzie Power & Renewables U.S. Solar Market Insight*

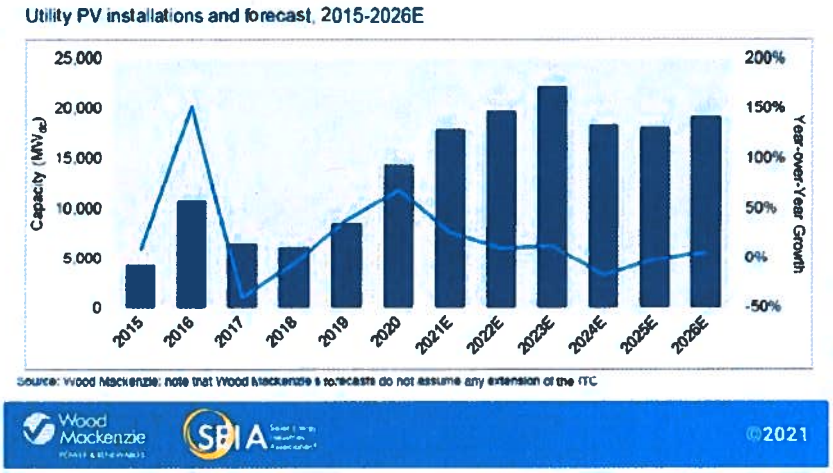
- "In Q1 2021, the U.S. solar market installed just over 5 GW_{dc} of solar capacity, a 46% increase over the first quarter of 2020 and the largest Q1 on record.
- With Q1 additions, cumulative solar capacity in the U.S. has officially surpassed 100 GW_{dc} and is expected to pass 100 GW_{dc} next year.
- Solar accounted for 58% of all new electricity-generated capacity added in the US in Q1 2021, with wind making up most of the remainder

- Residential solar was down 8% from Q4 2020, but up 11% from Q1 2020 with 905 MW_{dc} installed, thanks to healthy sales pipelines that spilled over into the first quarter.
- Commercial solar and community solar volumes declined from Q4 2020, as is typical for these market segments. Commercial solar increased 19% over Q1 2020 and community solar declined 15% from Q1 2020.
- Utility-scale solar set a record for first-quarter installations at 3.6 GW_{dc}. Texas made up the largest share of this capacity, with more than 1.4 GW_{dc} of installations
- A total of 6.2 GW_{dc} of new utility-scale solar power purchase agreements were announced in Q1 2021, on par with Q1 2020. The total utility-scale contracted pipeline has grown to nearly 77 GW_{dc}.
- Wood Mackenzie forecasts that the solar industry will continue to break annual installation records every year for the next three years before the investment tax credit (ITC) fully phases down under current law. Another 160 GW_{dc} of capacity will be installed between 2021 and 2026 to accompany today's current operational fleet of over 100 GW_{dc}. This will bring the total operating PV fleet to over 250 GW_{dc} by the end of 2026."

UTILITY SCALE SOLAR FARMS

Utility scale solar farms are representative of solar projects which generate greater than 1 megawatt (MW) of solar energy. Additionally, utility-solar projects sell the power they generate directly to the electric grid. As of June 15, 2021, there are 17 GW_{dc} of projects under construction. The top three largest utility solar farms exist in California. The Solar Star project in California, generates 579 MW of energy and it powers 255,000 homes. The Topaz Solar Farm in California has a total capacity of 580 MW and it powers 160,000 homes. Ivanpah Solar project in California was originally launched in 2014 and was the largest solar plant in the world at the time. It has a capacity of 392 MW.

In recent years, pushes and pulls have been placed on the utility scale solar farm industry. President Biden's push towards improving American infrastructure is expected to exponentially grow the renewable energy industry. In March 2021, Biden published *The American Jobs Plan* which details the nation's infrastructure upgrade while creating jobs. It also addresses the target to make the electric sector 100% carbon-free by 2035. On the other hand, SEIA recognizes components like "high component costs, global logistics challenges, tax equity supply shortages, and EPC (engineering, procurement, and construction)" will apply some constraints to the solar industry. More specifically, the price of steel has doubled since the COVID-19 pandemic. This has greatly impacted the utility-scale solar farm projects as they require more steel to support the structures.



SOLAR POWER IN CALIFORNIA

According to Solar Energy Industries Association (SEIA), "California has the largest solar market in the US and has been a longtime champion of solar because of the many economic and environmental benefits it provides, including billions in local investment. Solar supplies more than 20% of California's electricity today, but it must play a bigger role if the state is to reach climate and energy goals."

CLIMATE AND ENERGY GOALS

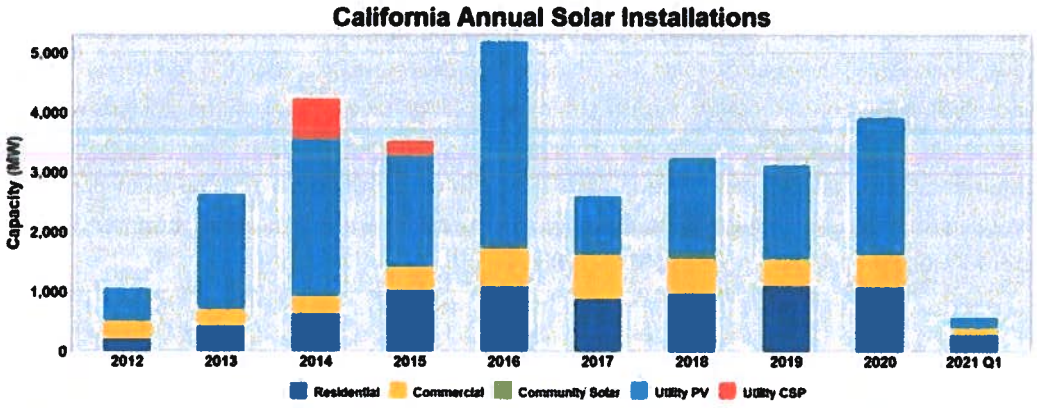
Per the Renewable Portfolio Standard, effective January 1, 2019, all of California's electricity will come from renewable resources by 2045. It is anticipated most of the energy will come from solar power. This is expected to be achieved through both residential solar panels and utility-scale solar farms. Additionally, in 2020, the State of California Building Standards Commission requires that all new homes built in California must have solar. The state has been making progress towards becoming 100% carbon-free. Incentive towards solar installation can be seen in the Investment Tax Credit. This federal law allows solar owners to deduct 26% of the total system cost from their federal taxes. For residential solar installations, this incentive is no longer applicable after 2023.

ADDITIONAL HIGHLIGHTS

The following highlights are gathered from SEIA's *California Solar* report:

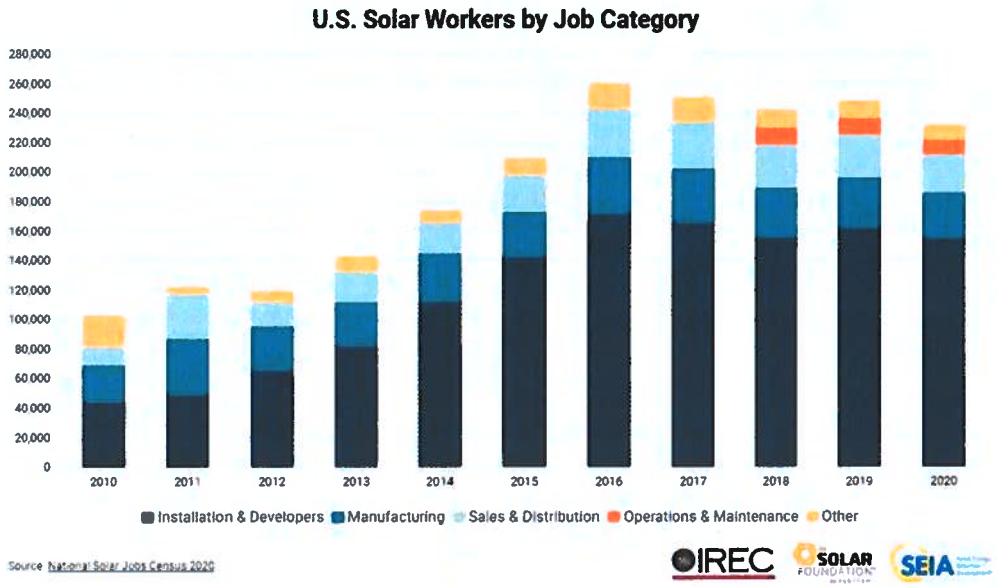
- SEIA passed SB 364, which preserves the solar property tax exclusion regardless of the outcome from Proposition 15. Without the legislation, Prop 15 would have rolled back the solar property tax exclusion for existing and new projects, putting must of California's solar fleet at risk of default
- SEIA successfully advocated for new rules to capture the fully capacity value of solar+storage systems, making solar+storage more competitive with natural gas

- SEIA secured a permit to allow more than 4,000 MW of shovel-ready solar projects to move forward as California considers additional protections from the Joshua Tree under the California Endangered Species Act
- SEIA reached a settlement in the San Diego Gas and Electric General Rate Case, achieving changes to SDG&E's rates that will allow more customers to adopt solar and storage, and that require the utility to consider further rate changes favorable to solar customers in 2021
- SEIA reached a settlement in Southern California Edison's General Rate Case that will require the utility to consider the value that solar provides in meeting grid needs before spending ratepayer dollars on grip upgrades, ensuring that solar is recognized for the benefits it delivers to SCE's distribution system.
- SEIA has successfully delayed the approval of a proposed solar installer citation program that would have been unworkable and added significant costs for solar installers and has persuaded policymakers to revisit the proposal before moving forward.
- SEIA achieved significant improvements to the CPUC's avoided cost calculator tool, which will be used to determine the benefits that distributed solar provides. SEIA is not leading a industry coalition in the state's proceeding to review net metering.



JOBS WITHIN THE SOLAR INDUSTRY

The solar industry creates both temporary and long-term jobs. With each solar project development, temporary workers are hired into to complete the construction, and long-term workers are hired to maintain the project. According to SEIA, "As of 2020, more than 230,000 Americans work in solar at more than 10,000 companies in every U.S. state."



CONCLUSION

Overall, with federal pushes towards renewable energy the solar industry is expected to continue to grow. Since 2010, the cost of solar installations has decreased significantly, which caused an increase in development. Recently, supply chain constraints have increased the price of supplies utilized in solar project developments. Historically, California has led the nation in solar development, but in recent years, Florida and Texas have rapidly grown in their development. Utility, residential, commercial, and community solar projects are expected to consistently grow in order to meet the nations' goal of 100% carbon-free.

PROJECT DESCRIPTION

LOCATION:	East and adjacent to Jacumba Hot Springs, southeastern unincorporated San Diego County
CURRENT USE:	Vacant land
PROPOSED USE:	Develop the JVR Energy Park, a 90-megawatt solar energy project and an energy storage facility.
ASSESSOR PARCEL NUMBER(S):	614-100-20, -21, 614-110-04, 660-020-05, -06, 660-150-04, -07, -08, -10, -14, -17, -18, 660-170-09, 661-010-02, -15, -26, -27, -30, 661-060-12, -22, 660-140-06, -08, 660-150-21, and -16
LEGAL DESCRIPTION:	Lengthy, retained in my files.
PROJECT SIZE:	**Total:** 1,345.85± acres, which is comprised of 24 legal parcels. **Solar Farm:** 604± acres
SHAPE:	The project is irregular in shape, and functional for the intended use
FRONTAGE/ACCESS:	The subject has good accessibility via Old Highway 80 (paved) and Carrizo Gorge Road (paved).
TOPOGRAPHY:	The subject is generally level. It has a maximum elevation of 3,077 ft and a minimum elevation of 2,722 ft (per google aerial). The average elevation is noted as 2,793
SOIL CONDITIONS:	I am not an expert in the field of geotechnical engineering. However, based on this report's conclusions, the soil conditions appear to be typical for this region, and adequate to support solar development.
HAZARDOUS SUBSTANCES:	I did not observe any evidence of toxic or hazardous substances during inspection of the sites, however I have no expertise in evaluating toxic or hazardous site conditions and cannot make substantiated remarks in this field of study. The subjects are not listed as hazardous sites per the *Hazardous Waste and Substances*

Sites List compiled by the California Environmental Protection Agency.

SITE IMPROVMENTS:

Street Lighting:	No
Sidewalks:	No
Curb & Gutters:	No
Landscaping:	None.

FLOOD ZONE:

The subject is in an area mapped by the Federal Emergency Management Agency (FEMA). The project area is in FEMA flood zone D, which is classified as an area of undetermined but possible flood hazards.

FEMA Map Number: 06073C2100F
FEMA Map Date: May 16, 2012

The project area is in an undetermined area, or Zone D. No flood analysis has been conducted in this area, but a flood risk still exists. Flood insurance rates reflect the uncertainty of the flood risk.

WETLANDS/ WATERSHED:

There are no notable wetlands on the subject area.

ENVIORNMENTAL ISSUES:

There are no known adverse environmental conditions on the subject site. Please reference Limiting Conditions and Assumptions

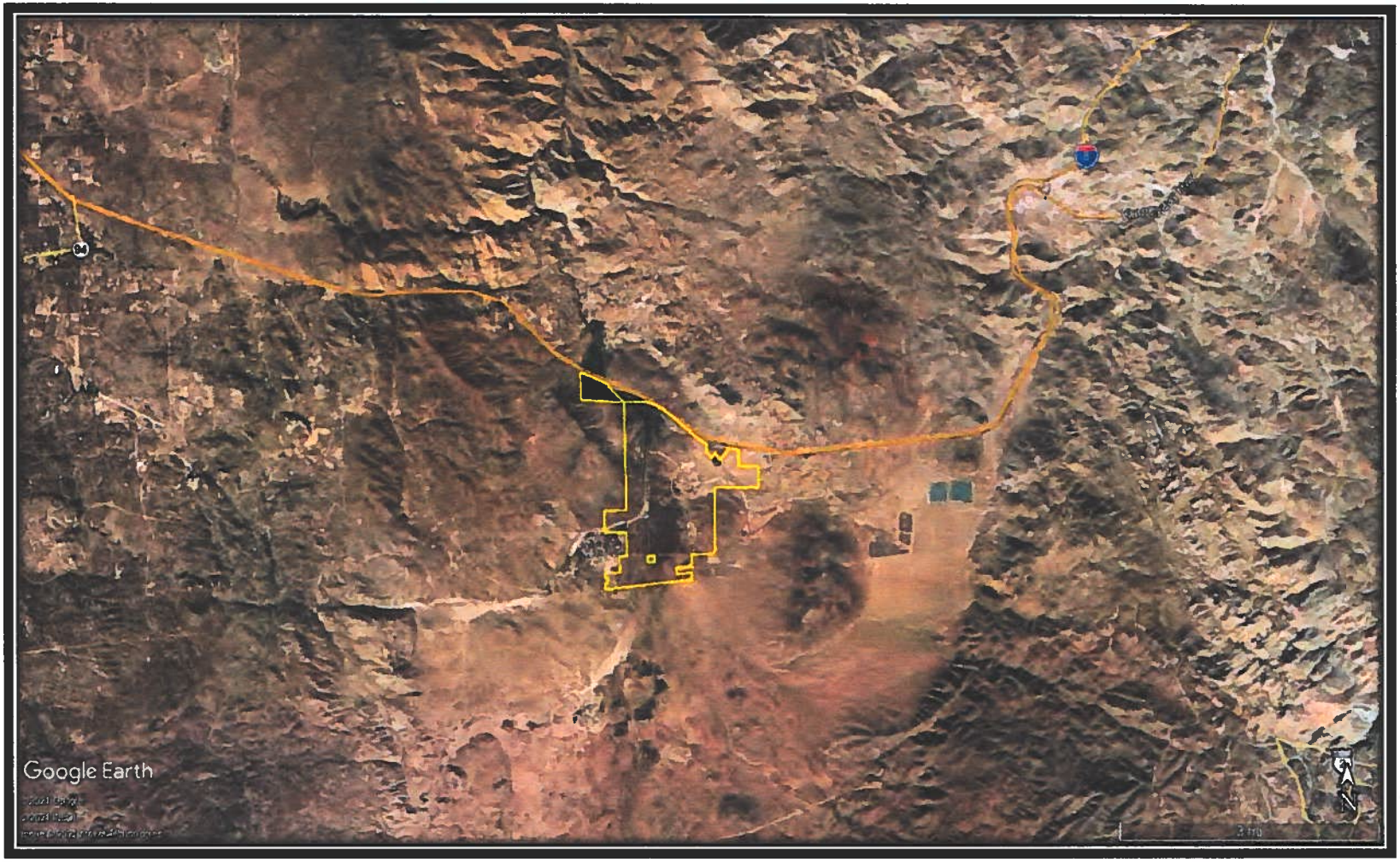
ENCUMBRANCES/ EASEMENTS:

There are no known adverse encumbrances or easements, and I was not provided a Preliminary Title Report on the subject properties.

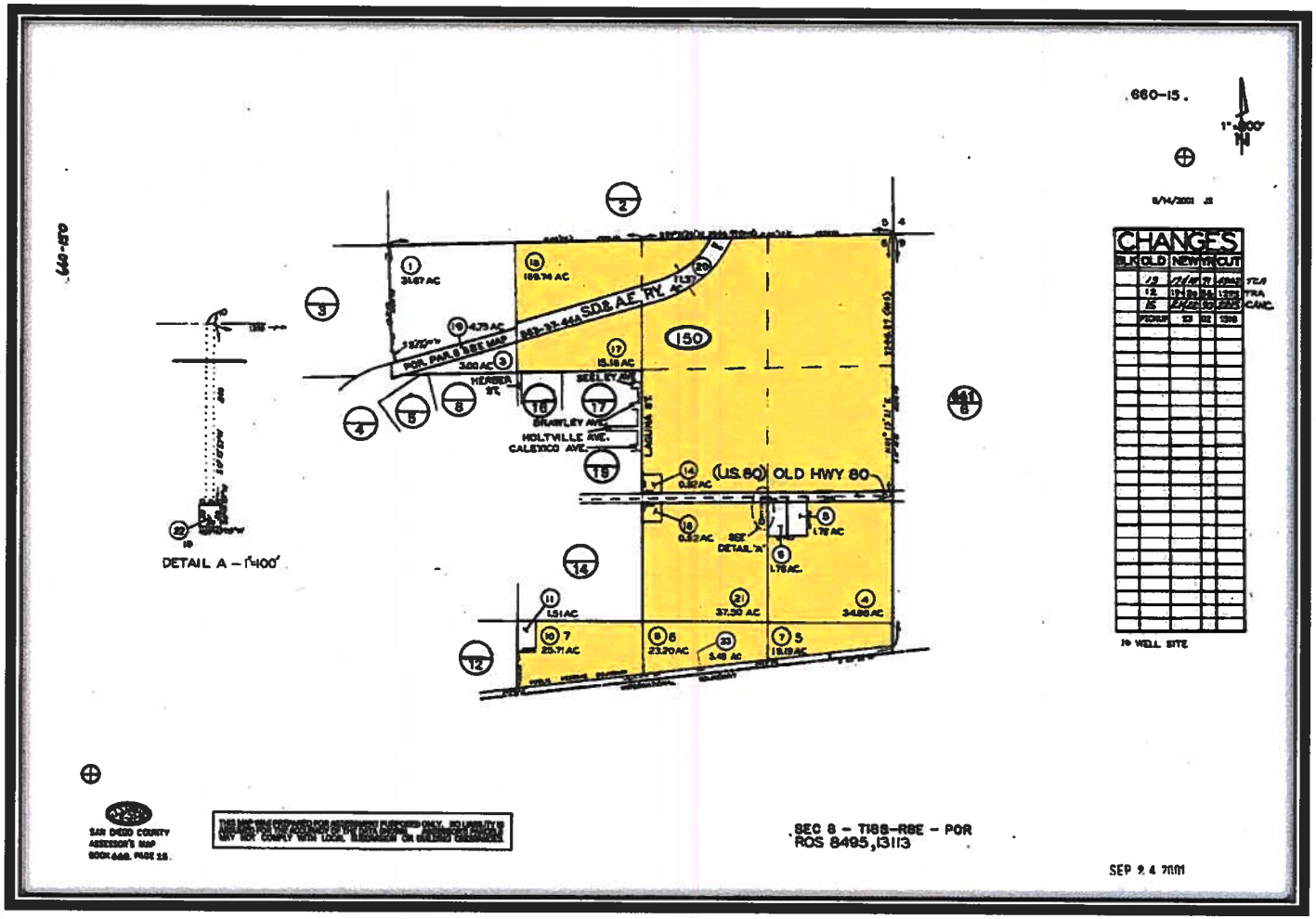
SITE COMMENTS:

None.

PROJECT AERIALS


Google Earth

PARCEL MAPS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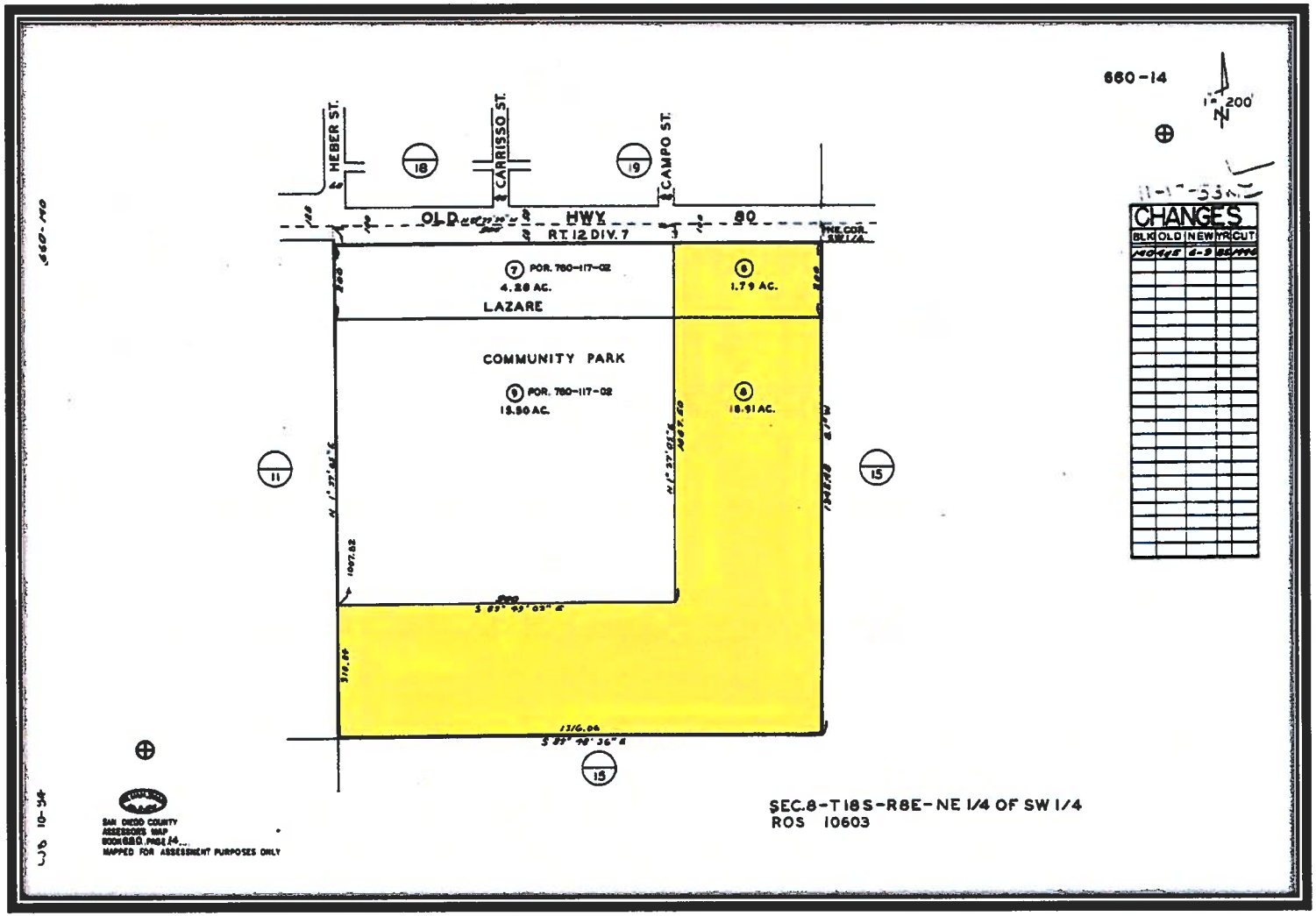
SD&AE RY
150
(U.S.80) OLD HWY 80
BRAWLEY AVE.
HOLTVILLE AVE.
CALEXICO AVE.
DETAIL A - 1"=100'
SEC 8 - T18S-R8E - POR
ROS 8495,13113
SEP 2 4 2001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200'
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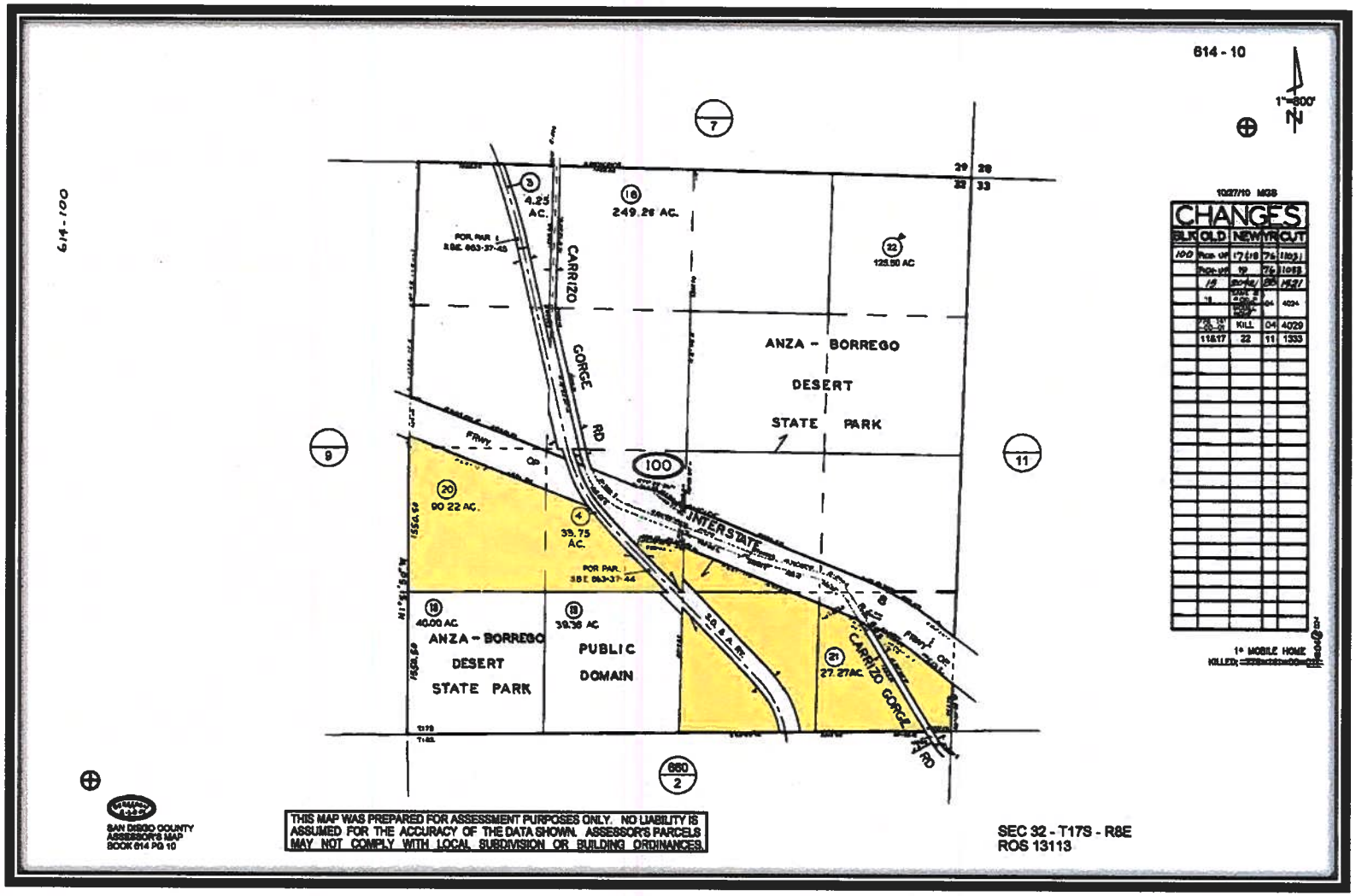
CARRISSO ST.
CAMPO ST.
OLD HWY 80
RT. 12 DIV. 7
POB. COR. SW 1/4
18
19
11
15
7
POR. 760-117-02
4.28 AC.
LAZARE
COMMUNITY PARK
9
POR. 760-117-02
15.50 AC.
6
1.79 AC.
6
18.91 AC.
CHANGES
BLK OLD NEW YR CUT
660-NO
SEC. 8-T18S-R8E-NE 1/4 OF SW 1/4
ROS 10603
SAN DIEGO COUNTY
ASSESSORS MAP
MAPPED FOR ASSESSMENT PURPOSES ONLY


614 - 10
614 - 100
1" = 800'
CHANGES
BLK OLD NEW YR CUT
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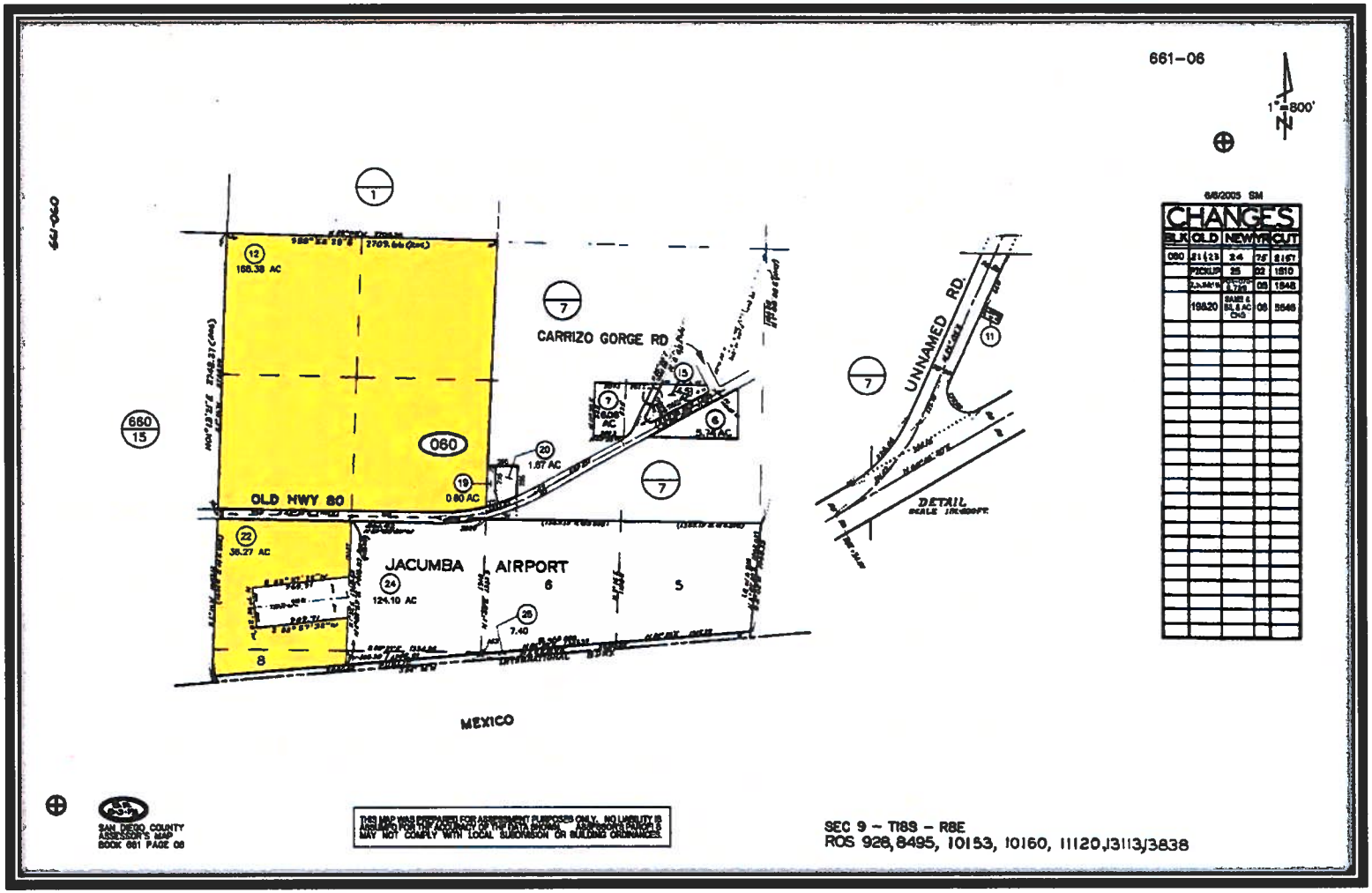
249.26 AC.
122.50 AC
ANZA - BORREGO
DESERT
STATE PARK
CARRIZO GORGE RD
INTERSTATE 8
90.22 AC.
39.75 AC.
40.00 AC.
39.36 AC.
ANZA - BORREGO
DESERT
STATE PARK
PUBLIC
DOMAIN
27.27 AC.
CARRIZO GORGE RD
SAN DIEGO COUNTY
ASSESSOR'S MAP
BOOK 614 PG 10
THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCELS MAY NOT COMPLY WITH LOCAL SUBDIVISION OR BUILDING ORDINANCES.
SEC 32 - T17S - R8E
ROS 13113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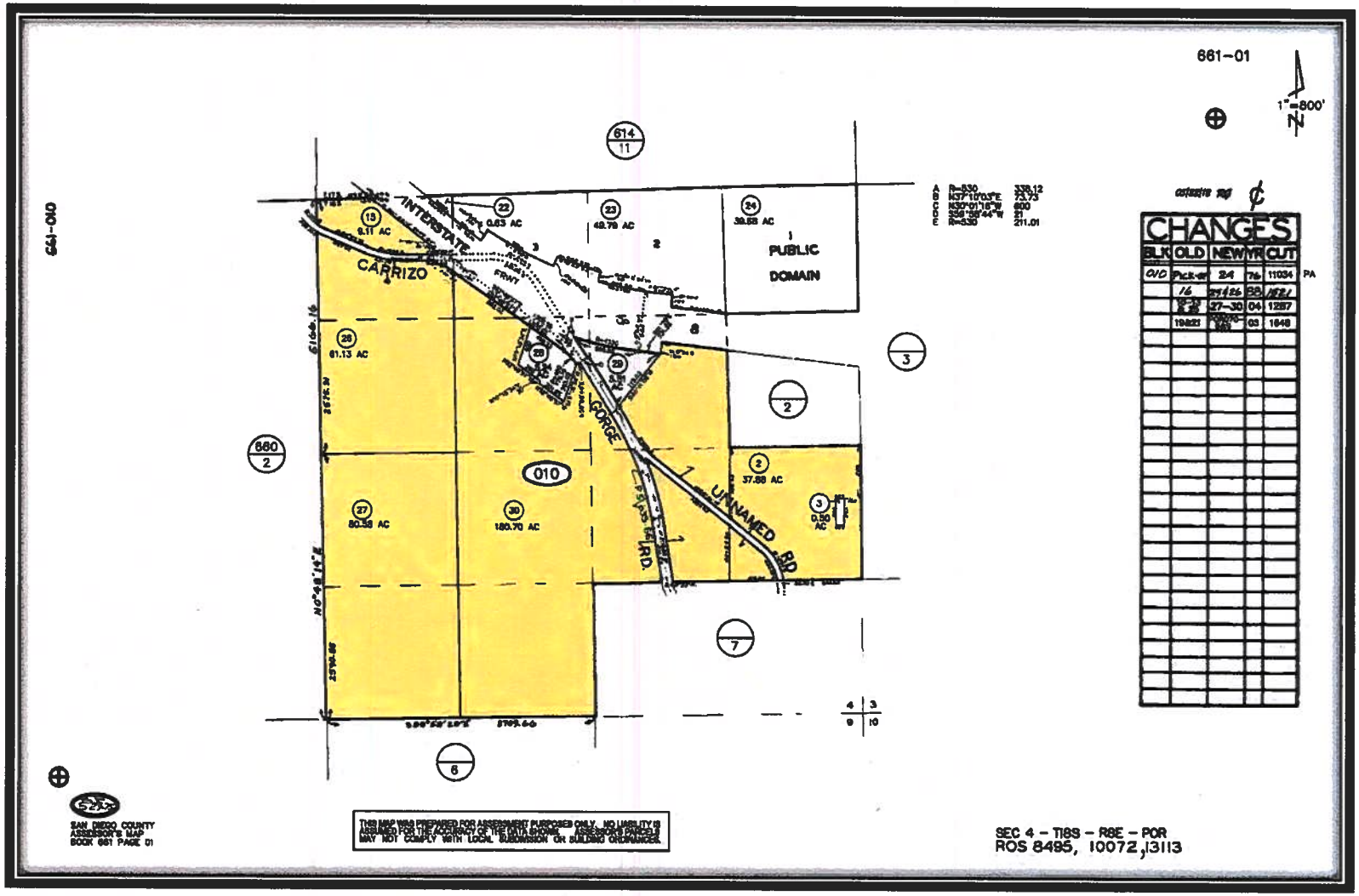
660-060
CARRIZO GORGE RD
UNNAMED RD.
OLD HWY 80
JACUMBA AIRPORT
MEXICO
DETAIL
CHANGES
SEC 9 - T18S - R8E
ROS 928, 8495, 10153, 10160, 11120, 13113, 13838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CARRIZO
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DOMAIN
GORGE
RD.
UNNAMED RD
010
660
2
641-040
CHANGES
SAN DIEGO COUNTY
ASSESSOR'S MAP
BOOK 661 PAGE 01
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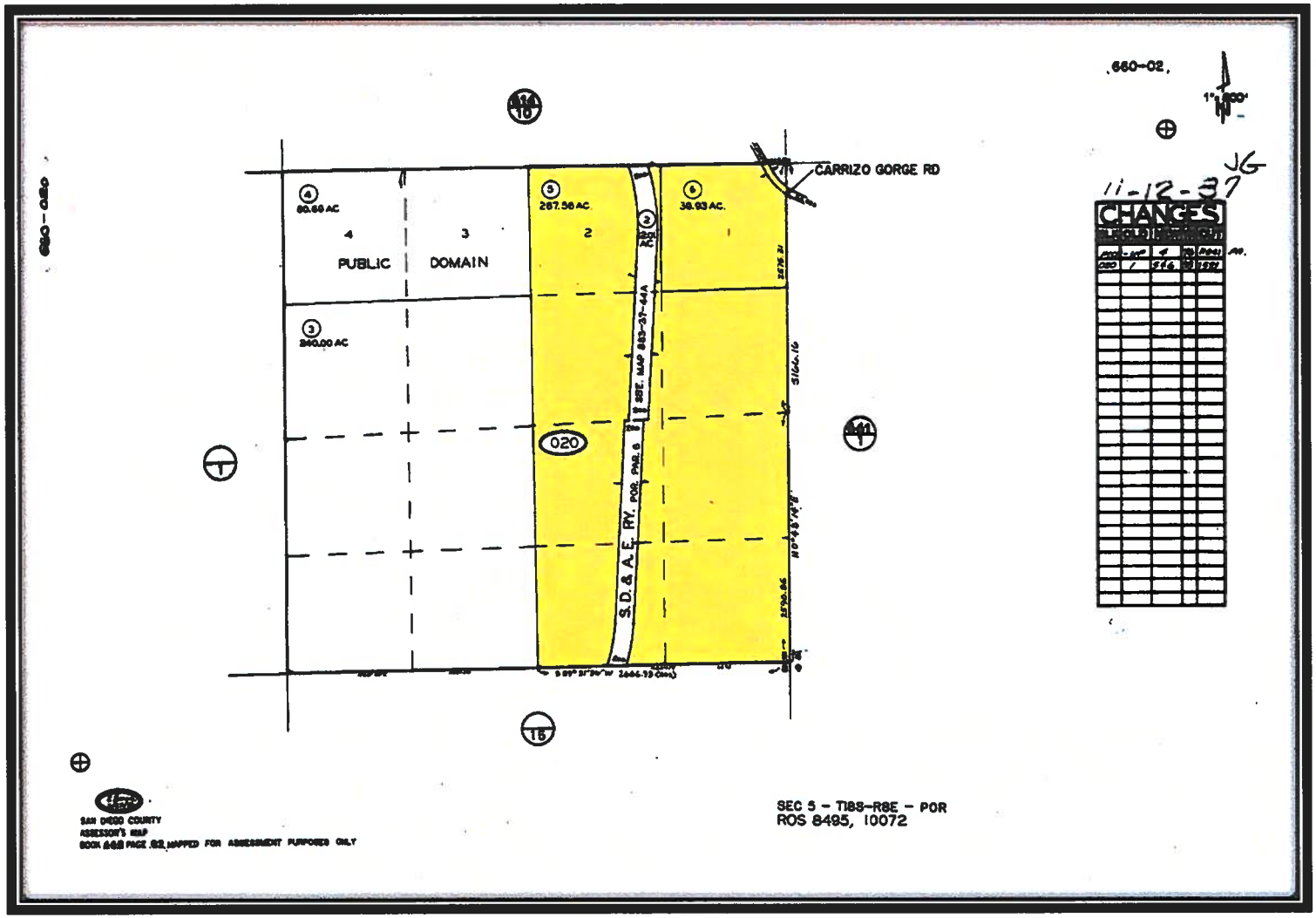
SEC 4 - T18S - R8E - POR
ROS 8495, 10072,13113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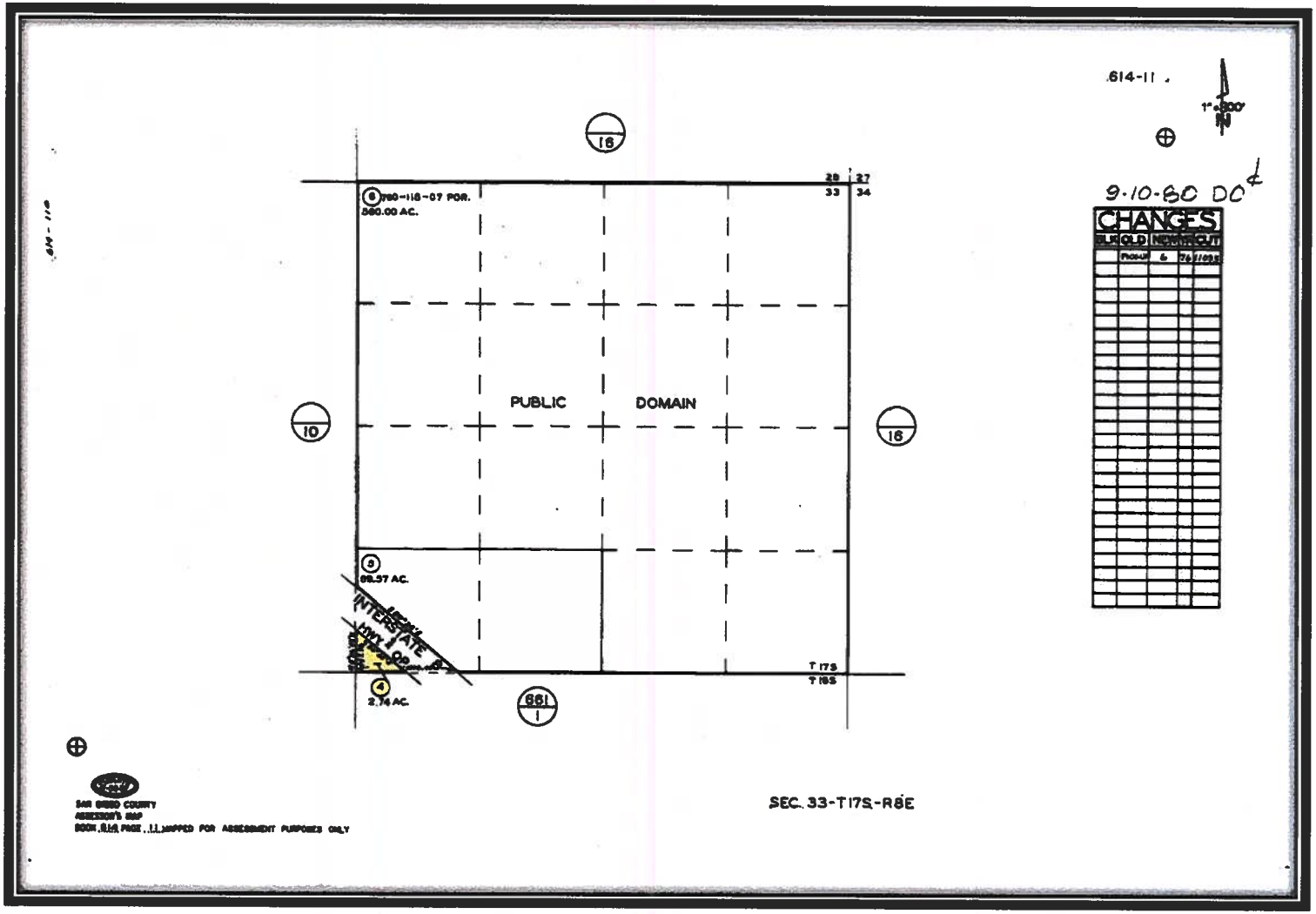
CARRIZO GORGE RD
PUBLIC
DOMAIN
020
S.D.& A.E. RY.
SEE MAP 883-37-44A
CHANGES
SEC 5 - T18S-R8E - POR
ROS 8495, 10072
SAN DIEGO COUNTY
ASSESSOR'S MAP
MAPPED FOR ASSESSMENT PURPOSES ONLY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DOMAIN
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260.00 AC.
28
33
27
34
99.57 AC.
INTERSTATE
2.14 AC.
T 17S
T 18S
SEC. 33-T17S-R6E

Zoning And Land Use Controls

ZONING AUTHORITY: San Diego County

ZONING CODE: S80, S88, S92, RR

ZONING DESCRIPTION:

S80 (Open Space)- This area is intended to provide for appropriate controls for land generally unsuitable for intensive development. Permitted uses within this zone should have minimal impact on the natural environment

S88 (Specific Plan Area)- This area is intended to accommodate Specific Plan areas shown on the San Diego County General Plan. This zone can create an unlimited variety of land uses.

S92 (General Rural)- This area is intended to provide appropriate controls for land which is: rugged terrain, watershed, dependent on ground water for a water supply, desert, susceptible to fires and erosion, or subject to other environmental constraints. This area can be used for low intensity recreational uses, residences on very large parcels, animal grazing, or other consistent uses.

RR (Rural Residential)- This area is intended to create and enhance residential areas where agricultural use compatible with a dominant, permanent residential use is desired.

The chart below shows each parcel's acreage, zoning, and existing land use designation:

JVR Energy Park- Zoning, Land Use, and Parcels				
No.	APN(s)	Acreage	Existing Land Use Designation	Zoning
1	614-100-20	90.22	Specific Plan and Public Agency Lands	S80/S88/S92
2	614-100-21	27.27	Specific Plan	S88
3	614-110-04	2.74	Specific Plan	S88
4	660-020-05	267.56	Specific Plan	S88
5	660-020-06	39.93	Specific Plan	S88
6	660-150-04	34.96	Specific Plan	S80
7	660-150-07	19.19	Specific Plan	S80
8	660-150-08	23.2	Specific Plan	S80
9	660-150-10	25.71	Specific Plan	S80
10	660-150-14	0.92	Specific Plan	S88
11	660-150-17	15.18	Specific Plan	S88
12	660-150-18	169.74	Specific Plan	S88
13	660-170-09	0.06	Village Residential (VR-2)	RR
14	661-010-02	37.88	Rural Lands (RL-40)	S92
15	661-010-15	9.11	Specific Plan	S88
16	661-010-26	61.13	Specific Plan	S88
17	661-010-27	80.58	Specific Plan	S88
18	661-010-30	180.7	Specific Plan	S88
19	661-060-12	166.38	Specific Plan	S88
20	661-060-22	36.27	Specific Plan	S80
21	660-140-06	1.79	Rural Commercial	S88
22	660-140-08	16.91	Specific Plan	S88
23	660-150-21	37.5	Specific Plan	S88
24	660-150-16	0.92	Rural Commercial	S88
Total		**1,345.85**		

ZONING COMMENTS: None.

JVR Energy Park Description

Overview

The JVR Energy Park is a proposed solar facility. The project is to exist on 1,345.85 acres and is to include the development of photovoltaic modules, underground AC and DC collection system, inverter/transformer platforms, on-site substation, a switchyard, transmission poles, battery energy storage system, fiber optic line, control system, meteorological weather stations, site access driveways, internal access, perimeter security fencing, lighting, water tanks, and fuel modification zones. Landscaping is planned to be added along the perimeter fencing in order to mitigate the visual impacts. Below we have provided an overview of the PV Modules, the substation, construction plan, and project approvals and permits.

PV Modules

The PV modules, also referred to as the "solar farm" earlier in this report, cover the majority of the project area, approximately 604 acres. It is planned there will be 300,000 PV modules which will be installed in rows or arrays across the project area. Their purpose is to convert the energy of the sun's photons into DC electrons. Per the *JVR Energy Park Project Draft EIR*, "The modules would be mounted on single-axis trackers oriented in the north-south direction. Single-axis tracking systems would employ a motor mechanism that allows the arrays to track the path of the sun (from east to west) throughout the day. The PV modules are uniformly dark in color, non-reflective, and designed to be highly absorptive of all light that strikes their glass surfaces." The guaranteed useful life of PV modules is approximately 35 years.

PV Modules support Structures

The PV modules are planned to be mounted onto support structures which allow them to be properly position such that they can capture the sun's solar energy. Support systems are metal pipe pile or I-beams which are driven into the soil and have a diameter from 6 to 10 inches. This is a concrete free support structure which results in minimal site disturbance. Additionally, with the PV modules on the support structure, the maximum height of the structure is approximately 12 feet.

Collector Substation

An important aspect to the project's solar facility is the collector substation. "The purpose of the substation is to collect the power from the AC collector system and convert the voltage from 24.5 kV to 138 kV, as well as to be able to isolate equipment in the event of an electrical short-circuit or for maintenance." The projects substation is to be a 152-foot by 180-foot building located near the center of the eastern side of the project site.

CONSTRUCTION

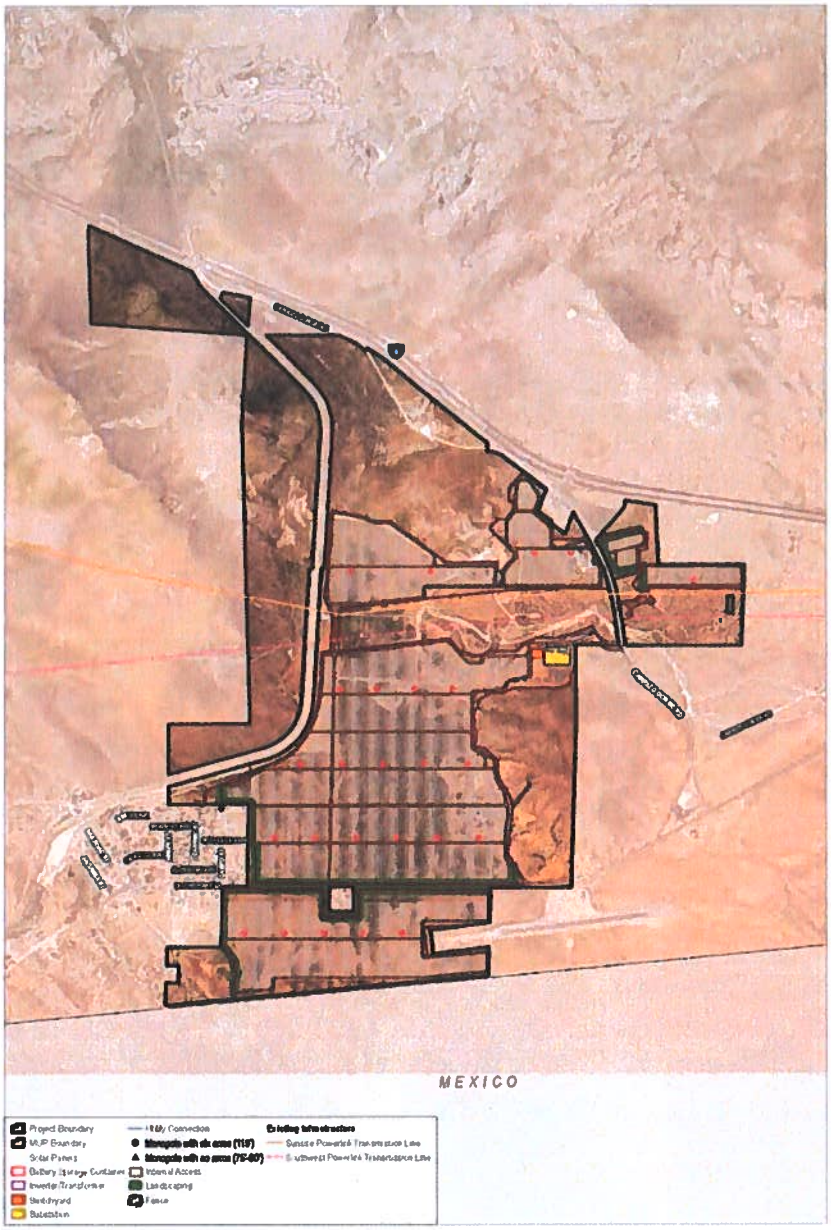
Construction of the JVR Energy Park is planned to occur over 13 months. The construction phases include, site mobilization, demolition of dairy and ranch structures, site preparation, fence installation, landscaping installation, substation, switchyard, and meteorological station installation, pile driving, tracker and PV module installation, DC electrical, underground medium AC voltage electrical, transformer platform installation, battery energy storage system installation, and commissioning. This would require many temporary workers during the construction period.

PROJECT APPROVALS AND PERMITS

In order to develop a solar facility on the project site, the county requires a Major Use Permit because the JVR Energy Park is considered a "Major Impact Service and Utility Type." The project has not been approved by San Diego County. On top of the MUP, additional permits required to develop the project include, a grading permit, building and demolition permit, County Right-of-Way Permit, and various ministerial permits.

Approvals/ Permits to be Obtained	
Government Agency	Action/Permit
County of San Diego	Major Use Permit County Right-of-Way Permits Grading permit Building permits Demolition permits Improvement plans Exploratory borings, direct-push samplers, and cone penetrometers permits Waiver of Board Policy I-111 Approval for the Transfer of Parcel to SDG&E
Regional Water Quality Control Board	General Construction Stormwater Permit
Federal Aviation Administration	Federal Aviation Administration 7460
California Department of Transportation	Transportation permits for the movement of vehicles or loads exceeding the limitations on the size and weight contained in Division 15, Chapter 5, Article 1, Section 35551, of California Vehicle Code (1983)
US Department of Homeland Security US Customs and Border Protection	Consistency with US Customs and Border Protection safety and access policies
San Diego County Fire Authority	Fire and Emergency Protection Services Agreement
California Public Utilities Commission	Section 851 Advice Letter
Miscellaneous	All other discretionary permits and approvals necessary from local, state, and federal agencies with jurisdiction over the project.

PROJECT OVERVIEW



DUDEK

FIGURE 1-2
Project Components

SUBSTATION

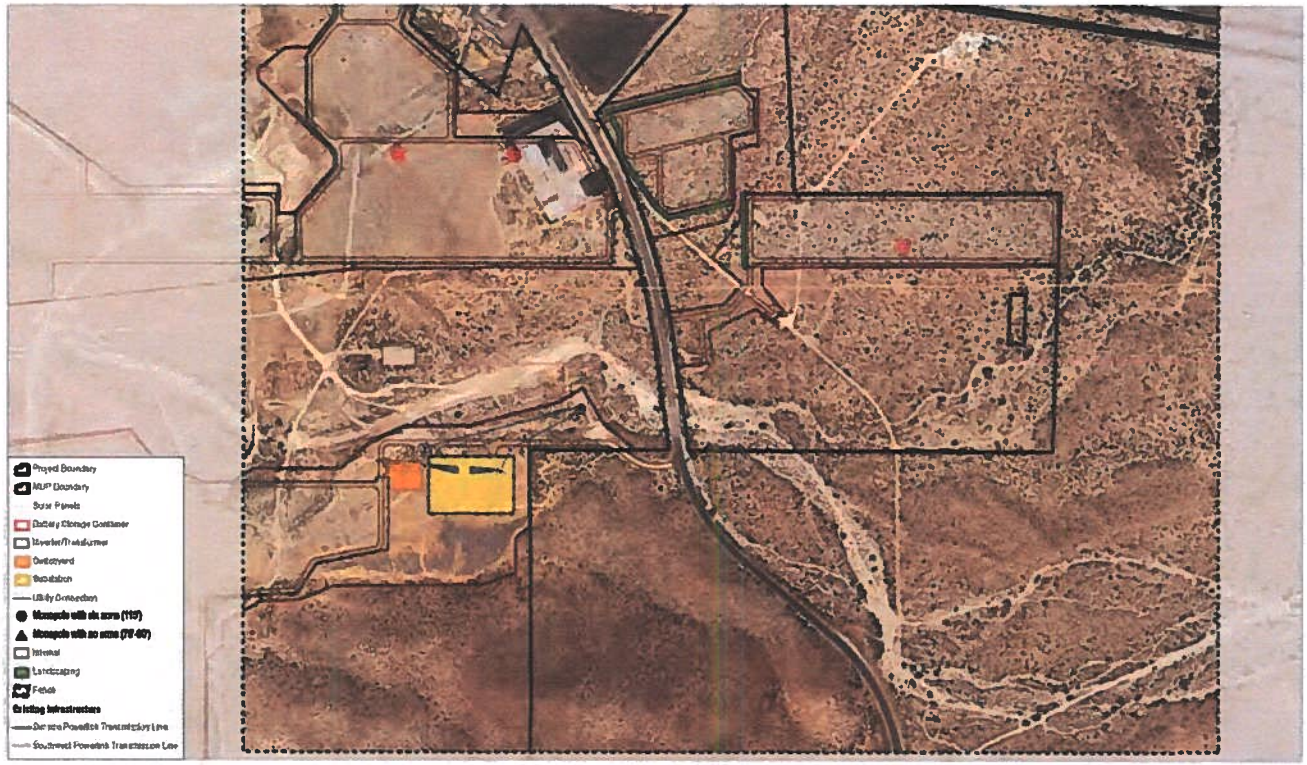


FIGURE 1-3B
Enlarged Site Plan

LANDSCAPING PERIMETER

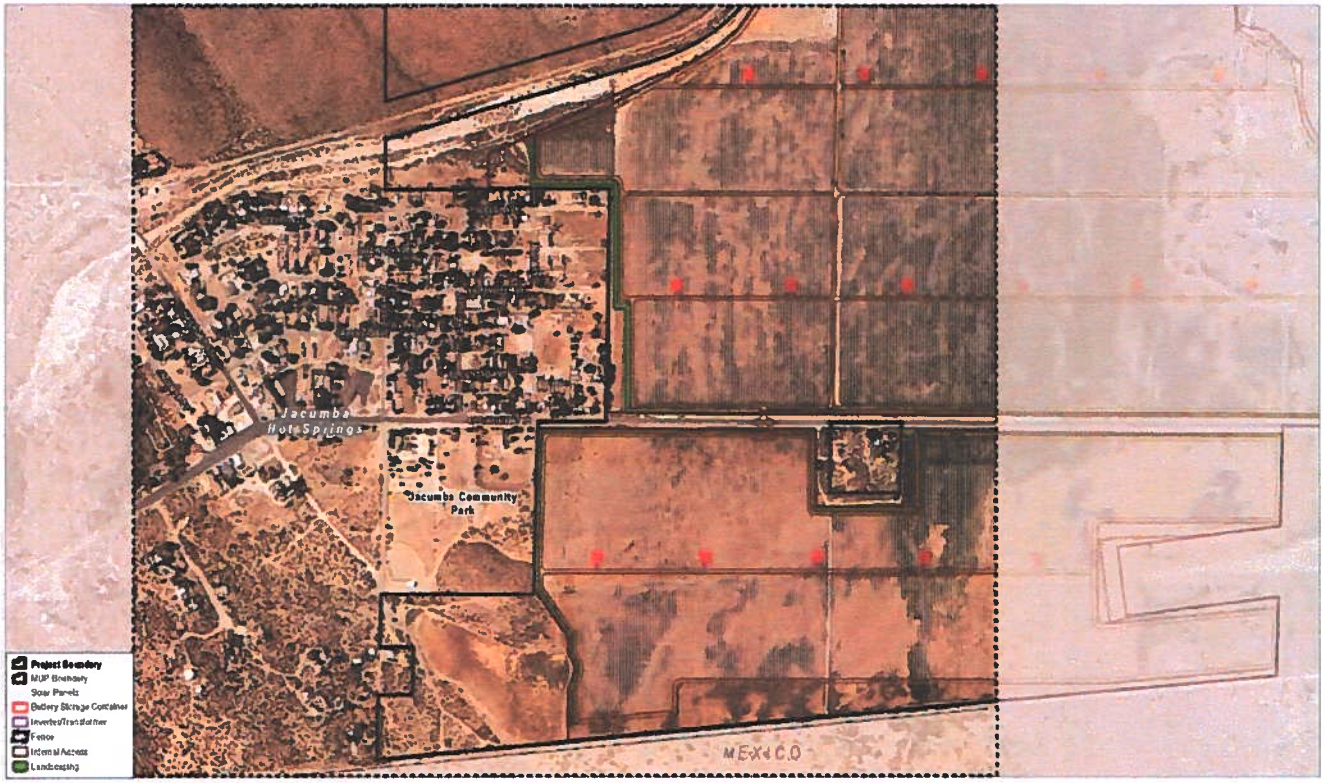


FIGURE 1-3C
Enlarged Site Plan

PV MODULES

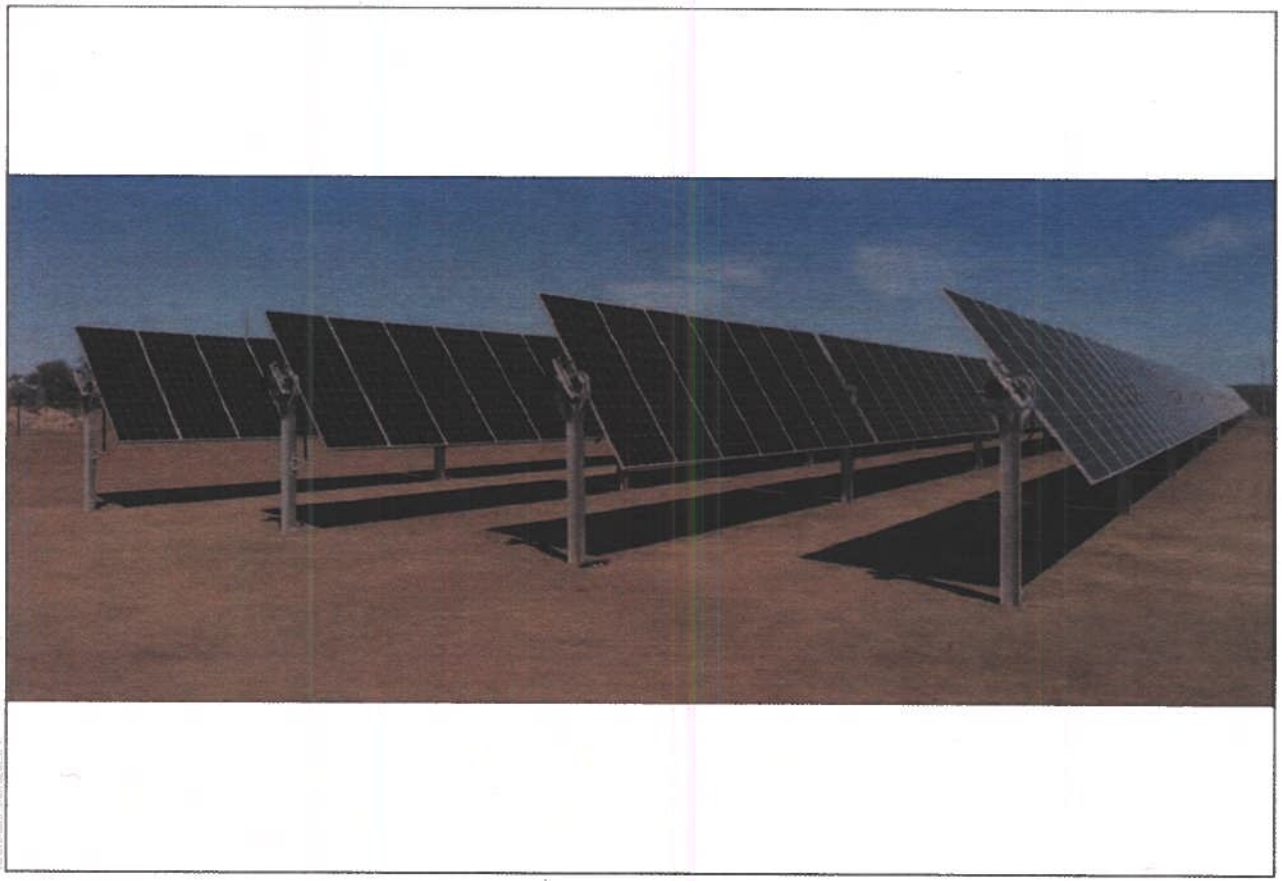


FIGURE 1-4
Photovoltaic Module and Support Structure
JVR Energy Park Project

DUDEK

HIGHEST AND BEST USE

Highest and best use may be defined as:

The reasonably probable and legal use of vacant land or improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value.[2]

We considered the four highest and best use tests, which are summarized as:

1. ***Legally Permissible:*** *What uses are permitted by zoning and other legal restrictions.*
2. ***Physically Possible:*** *To what use is the site physically adaptable.*
3. ***Financially Feasible:*** *Which possible and permissible use will produce any net return to the owner of the site.*
4. ***Maximally Productive.*** *Among the feasible uses, which use will produce the highest net return, (i.e., the highest present worth).*

HIGHEST AND BEST USE OF THE SITE

LEGALLY PERMISSIBLE

The subject is zoned S80 (Open Space), S88 (Specific Plan Area), S92 (General Rural), and RR (Rural Residential). Currently the project is working towards getting Major Use Permit which will allow for the development of the JVR Energy Park. Based on this zoning and the subject's planned major use permit, the subject site, as vacant, can be developed with a solar facility.

PHYSICALLY POSSIBLE

The subject site is physically able to support various types of development considering available utilities and surrounding infrastructure. Based on its adequate size, terrain, shape, frontage, and depth, the above referenced legally permissible use is also considered physically possible.

FINANCIALLY FEASIBLE / MAXIMALLY PROFITABLE

The financial feasibility of the legally permissible and physically possible uses is dependent on many variables including available construction financing, construction costs and impact fees, affordable and available land at price levels appropriate in the market, and overall sufficient demand. It is evident from my solar farm market research, that solar development is a probable use of the site that would generate a high residual land value. Surrounding land uses residential and vacant land. Therefore, based on the subject's location and current market conditions, a solar facility is financially feasible for the subject site.

2 *The Appraisal of Real Estate* 13th Edition, Page 279, (Chicago: Appraisal Institute, 2010).

HIGHEST AND BEST USE AS PROPOSED

In the analysis of the highest and best use as proposed, a determination is made as to the proposed project. The improvements were analyzed to determine the viability of the proposed project.

LEGALLY PERMISSIBLE / PHYSICALLY POSSIBLE

As noted, the subject site is mostly vacant land. As proposed the subject's usable site (1,345.85 acres) is legally and physically able to support the JVR Energy Park project. This type of land use is allowed by San Diego County with a major use permit. Therefore, the proposed improvements are considered legally permissible and physically possible.

FINANCIALLY FEASIBLE / MAXIMALLY PROFITABLE

The subject, as proposed, is considered financially feasible based on the demand for renewable energy in the state of California. This use also meets the criteria for the maximally profitable use.

MOST PROBABLE BUYER

Taking into account all of the physical and investment characteristics of the subject property, the likely buyer is a regional investor

Solar Studies and Comparable Specialized Industrial Studies

In this analysis, I have considered the national study conducted by University of Rhode Island, survey by University of Texas, and two studies regarding the impacts of landfills and wind energy on residential property values. Below is a discussion of each. I have considered each study and included them within my reconciled opinion.

University of Rhode Island Study- Property Value Impacts of Commercial-Scale Solar Energy In Massachusetts and Rhode Island

In this study, Vasundhara Gaur and Corey Lang from the University of Rhode Island observed 400,000 transactions within three miles of a solar site. The solar sites were located in Massachusetts and Rhode Island. The findings of the study concluded that suburban homes within one mile of a solar farm saw a depreciation of 1.7%. It is noted in the study this depreciation is largely due to the suburban location of the homes, and the loss of already minimal green space to solar farms construction. Green space or open space includes areas such as forests, parks, desert land, or natural open space, which is typically scarce in suburban areas and are recognized as an added amenity to the neighborhoods. When said green or open spaces were replaced with solar farms in suburban areas, the loss of the open space amenity resulted in a loss in residential property value. Alternatively, in rural residential areas, the impact of solar farms was nominal. It was concluded rural residential areas have an abundance of open space areas such as parks, forests, or desert land. Thus, when a solar farm was constructed on open space, there was not a large loss of open space, which resulted in a minimal impact on residential home values.

University of Texas at Austin- An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations

This survey completed by University of Texas at Austin asked 37 appraisers and assessors questions regarding residential property value impacts based on proximity to utility-scale solar projects. The results from residential home assessors and appraisers show that a majority believe a home's proximity to solar installation has no effect or a positive effect on value. The respondents to the survey noted that the impacts of solar farms on residential home values also rely on the distance between homes and the solar farm, as well as efforts to conceal the solar project with landscaping, and the size of the solar project.

Comparable Specialized Industrial Studies

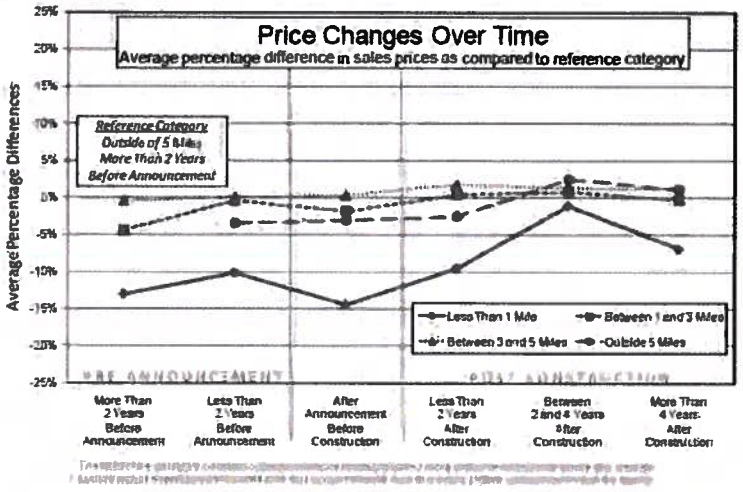
To further analyze and understand the impacts of industrial level projects on residential property values, I have considered the potential effects of landfills and wind farms on nearby residential property values. Comparatively, solar farms are less intrusive than landfills and wind farms. Landfills can have heights up to 135 feet above grade, are associated with a smell of garbage and

trash, and have workers and machinery frequenting the property. Wind farms have wind turbines ranging in height from 466 to 600 feet. These large turbines can block a residential property's view, create noise, and give off a "shadow flicker" from the blades. Generally, solar farms are less intrusive. The solar farms do not reach heights taller than a single-family residence, there are no sound impacts, and visually they can be covered through landscape designs. However, this analysis is shown to provide reference for "significant" industrial impacts on residential.

A study titled, *The Impact of Landfills on Residential Property Values,* conducted by Alan K. Reichert, Michael Small, and Sunil Mohanty determined the impact of five landfills near residential sites in Cleveland, Ohio. It was found that landfills had the greatest effect on expensive housing areas located within several blocks of the landfill site. The negative impact ranged from a 5.5%-7.3% decrease of the homes market value. For less expensive neighborhoods the effect of the landfill was "considerably less pronounced" with a decreased in property value ranging from 3%-4%. Finally, the impact of landfills in rural areas was "essentially nonexistent."

A study titled, *Wind Energy Facilities and Residential Properties: The Effect of Proximity and View on Sales Price,* by Ben Hoen, Ryan Wiser, Peter Cappers, Mark Thayer, and Gautam Sethi studied 7,500 sales of single-family homes near 24 existing U.S. wind facilities. Within the study, two important aspects were focused on. First was the single-family residences proximity to the wind farm, and second was the impact of the view. Sales prices of the studied homes were observed preannouncement of the wind farm, after announcement before construction, and post construction. A visual of the price changes over time is shown below.

Figure 2: Results from Model Four



Homes that sold prior to wind facility announcement, but situated within one mile of the eventual location of the turbines, sold, on average, for between 10% and 13% less than homes that sold in the same time period but located more than five miles away. Therefore, the homes nearest the wind facility's eventual location were depressed in value prior to the announcement of the facility in comparison to homes further away.

As seen above, the greatest loss in sales price occurred in homes less than one mile from the wind farms and it occurred during the "after announcement before construction" phase. The average depreciation was between 10%-13%. The long-term analysis concluded that "neither the view of the wind facilities nor the distance of the home to those facilities is found to have statistically significant effect on sales prices, yet further research is warranted."

CONCLUSION OF STUDIES

The studies discussed above support the low impact of solar farms on adjacent rural residential communities. While the impact is considered low, the studies did find a small downward trend in adjacent residential property values. For the studies which analyzed impacts on property values from nearby landfills and wind farms, the findings also observed a downward trend. We have considered that landfills and wind farms generally have a more obtrusive nature than solar farms. The greater impact from landfills is due to increase transportation (trucking), odors, and visual impacts. The greater impact from windmills is due to visual impacts from the towers and noise from nearby bladesAcross the studies it was universally concluded that any impact from sola farms was limited on rural residential properties.. Thus, when considering the studies discussed above, it is reasonable to conclude that the JVR Energy Park will have an effect of 0% to 1% decrease on adjacent residential property values.

SALES COMPARISON APPROACH- PAIRED SALES ANALYSIS

The Paired Sales Analysis considers two similar properties with only one difference of note to determine whether or not that difference has any impact on value. This method is a well-recognized method of measuring impact on value. Paired data analysis is defined as:

A quantitative technique used to identify and measure adjustments to the sale prices or rents of comparable properties. To apply this technique, sales or rental data on nearly identical properties, or adjusted data, is compared to isolate and estimate a single characteristic's effect on value or rent. Often referred to as paired sales analysis.

PAIRED SALES

I have researched eight solar farms for this analysis; these are documented on the following pages. Each solar farm exists adjacent to an urban, suburban, or rural residential community. The surrounding residential property values were then compared before and after the solar farm was constructed. Any impact on value (i.e. the property value increased, decreased, or did not change) after the solar farm was constructed was then noted and later considered and compared with the subject project. All of the solar farms and surrounding residential areas have been researched through numerous sources.

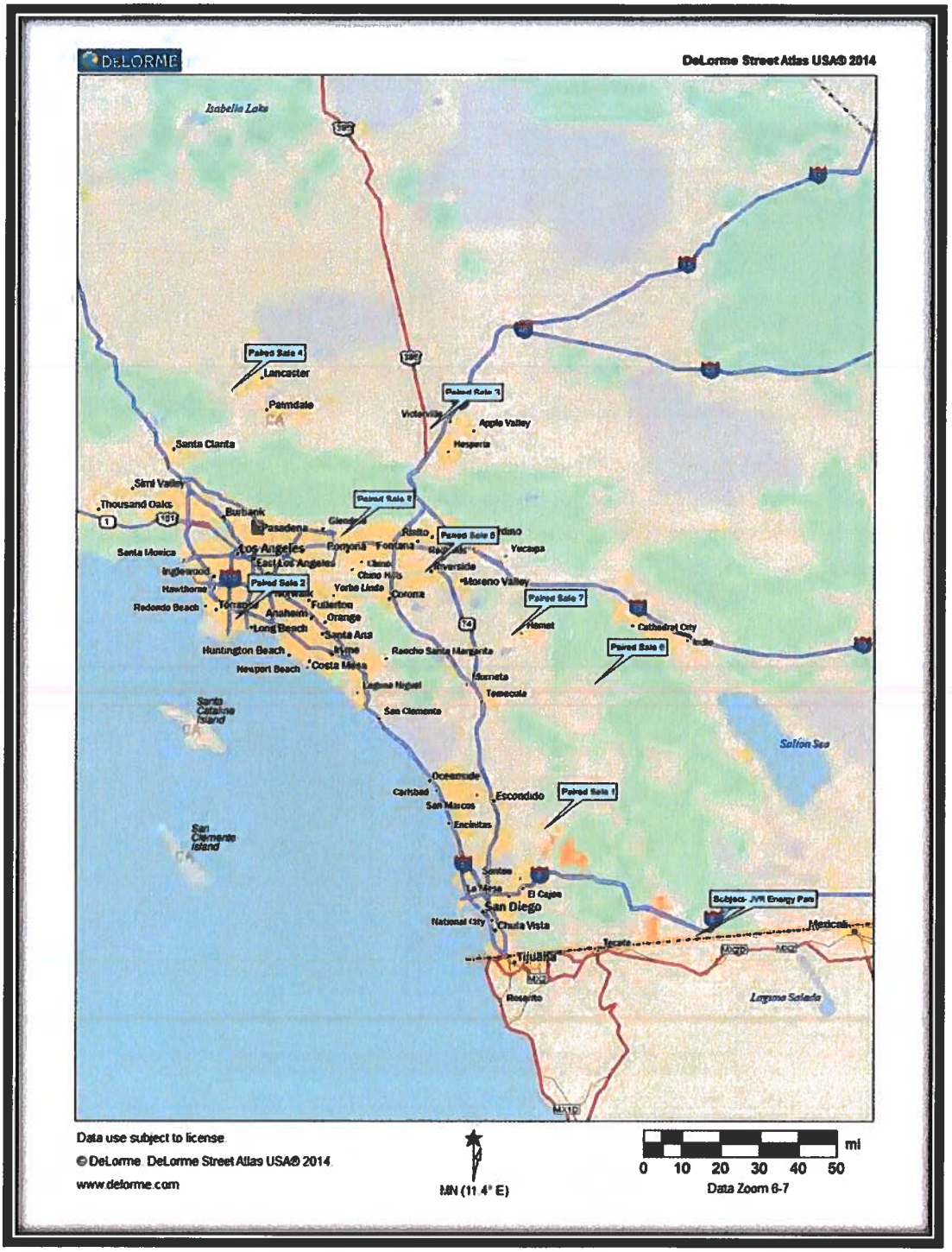
Of the solar farms, four were located in a rural residential area, two were located in suburban areas, and two were located in urban areas. We did not see a variance of impact on the property values based on the neighborhood designation.

PAIRED SALES SUMMARY TABLE

Paired Sales Summary								
No.	Project	Location	Residential Type	Year Constructed	MW	Avg. Property Value Before	Avg. Property Value After	% Change
1	Ramona Solar Farm 1	Ramona	Rural Res.	Mid-2016	4.3	$477,847	$478,794	0.20%
2	RS-C LADWP	Los Angeles	Urban	End 2014	2	$352,625	$362,667	2.77%
3	Victor Mesa Linda B2	Victorville	Rural Res.	Mid-2014	1.5	$199,980	$194,720	-2.70%
4	Antelope DSR I	Lancaster	Rural/Suburban	Mid-2016	50	$378,211	$380,642	0.64%
5	Tequesquite Landfill Solar PV	Riverside	Suburban	Late 2015	7.3	$326,676	$329,260	0.78%
6	Sunanza*	Anza	Rural Res.	End 2016	2	$212,065	$238,505	11.09%
7	AP North Lake I	Hemet	Suburban	Mid-2015	20	$196,199	$204,294	3.96%
8	Weymouth Solar Plant	La Verne	Urban	Early 2015	3	$486,688	$485,300	-0.29%
Total								0.77%

*Sunanza is considered an outlier which will be later discussed in this report. The total average shown in the table excludes this outlier.

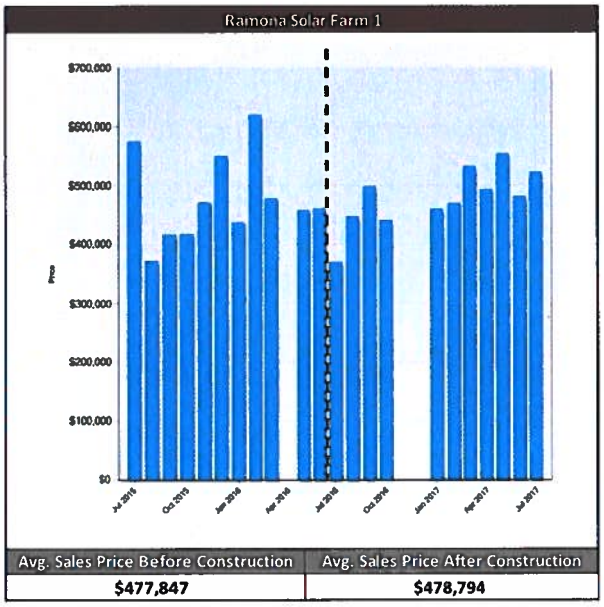
PAIRED SALE MAP



"RAMONA SOLAR FARM 1"- PAIRED SALE 1

Ramona Solar Farm 1 is located in San Diego County, in the southern portion of the Ramona community. The area surrounding Ramona Solar Farm 1 is considered rural residential. The solar facility was constructed in mid-2016 and went online in 2017. The project is a ground mounted, utility-scale, 4.3-megawatt solar facility. It is adjacent to rural residential homes.

Below the data chart shows the average value of homes within a 1-mile radius from the solar facility. The dotted black line indicates the approximate time of completion of solar farm construction. I have compared the residential property values one year before and one year after construction.

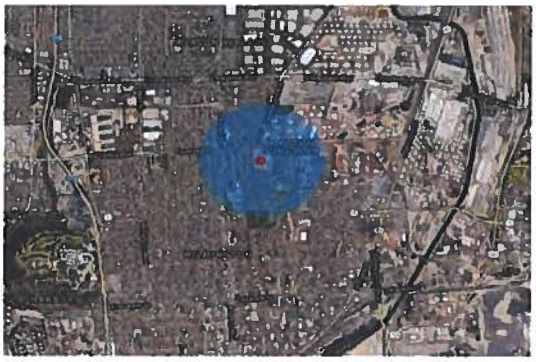


Avg. Sales Price Before Construction	Avg. Sales Price After Construction
$477,847	$478,794

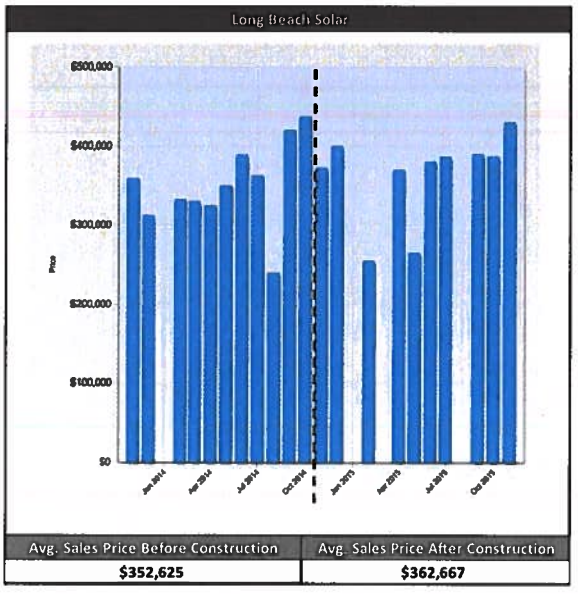
The indicated residential property value prior to the construction of Ramona Solar Farm 1 (July 2015 to June 2016) was $477,847. The indicated residential property value after the construction of Ramona Solar Farm 1 (July 2016 to July 2017) was $478,794. This shows an increase in residential property value of 0.20%. It can be concluded considering the market trends the solar project had nominal or no impact on adjacent residential values.

"RS-C LADWP"- PAIRED SALE 2

Long Beach solar or RS-C LADWP is a power site located in Los Angeles County, in the city of Los Angeles. The area surrounding RS-C LADWP is considered urban. Two ground mounted, utility-scale solar sites were developed on the grounds towards the end of 2014. It is adjacent to urban residential homes.



Below the data chart shows the average value of homes within a 1-mile radius from the solar facility. The dotted black line indicates the approximate time of completion of solar facility construction. I have compared the residential property values one year before and one year after construction.

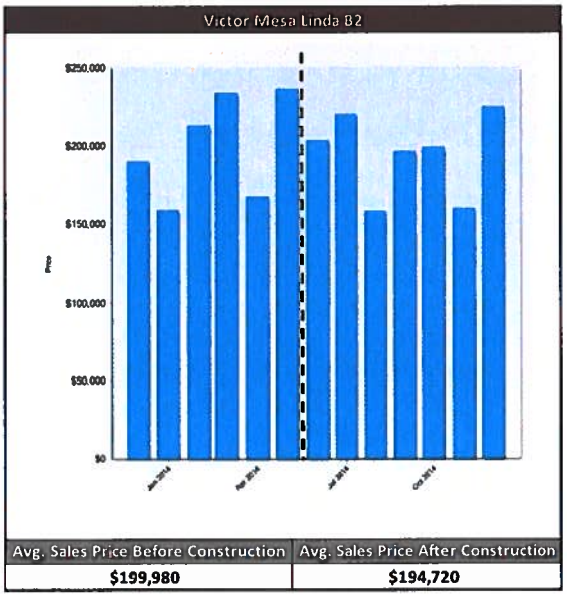


The indicated residential property value prior to the construction of RS-C LADWP (November 2013 to November 2014) was $352,625. The indicated residential property value after the construction of RS-C LADWP (December 2014 to November 2015) was $362,667. This shows an increase in residential property value of 2.77%. It can be concluded considering market trends the solar project had nominal or no impact on adjacent residential vales. Please note, this project came online during the end of the recession.

"VICTOR MESA LINDA B2"- PAIRED SALE 3

Victor Mesa Linda B2 is located in San Bernardino County, along Palmdale Road in the city of Victorville. The area surrounding Victor Mesa Linda B2 is considered rural residential. The solar facility was constructed in mid-2014 and went online that same year. The project is a ground mounted, utility-scale, 1.5-megawatt solar facility. It is adjacent to rural residential homes.

Below the data chart shows the average value of homes within a 1-mile radius from the solar facility. The dotted black line indicates the approximate time of completion of solar farm construction. I have compared the residential property values six months before and six months after construction.



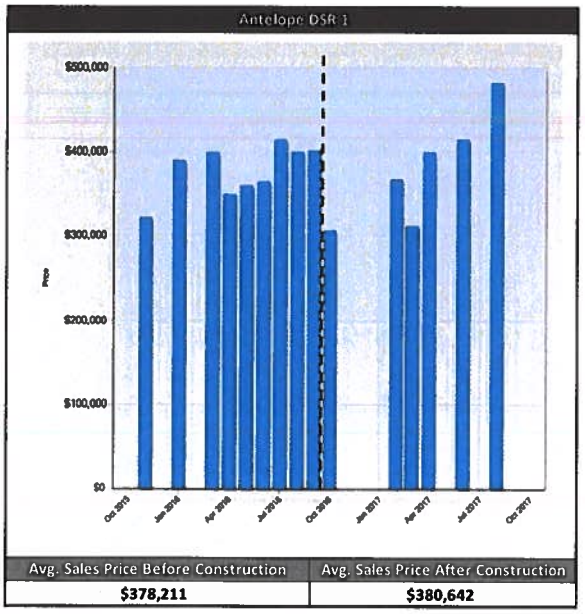
Avg. Sales Price Before Construction	Avg. Sales Price After Construction
$199,980	$194,720

The indicated residential property value prior to the construction of Victor Mesa Linda B2 (December 2013 to May 2013) was $199,980. The indicated residential property value after the construction of Victor Mesa Linda B2 (June 2014 to December 2014) was $194,720. This shows a decrease in residential property value of 2.7%. It can be concluded considering market trends the solar project has nominal or no impact on adjacent residential values. Please note this project came online during the end of the recession.

"ANTELOPE DSR I"- PAIRED SALE 4

Antelope DSR I is located in Los Angeles County, along West Avenue L in the city of Lancaster. There are subdivisions just east of Antelope DSR I. The solar facility was constructed in mid to late 2016 and went online that same year. The project is a ground mounted, utility-scale, 50-megawatt solar facility. It is adjacent to suburban residential homes.

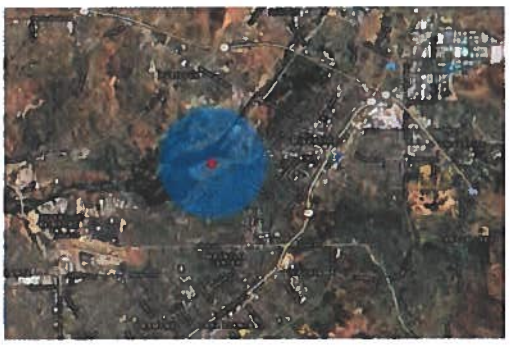
Below the data chart shows the average value of homes within a 1-mile radius from the solar facility. The dotted black line indicates the approximate time of completion of solar farm construction. I have compared the residential property values one year before and one year after construction.



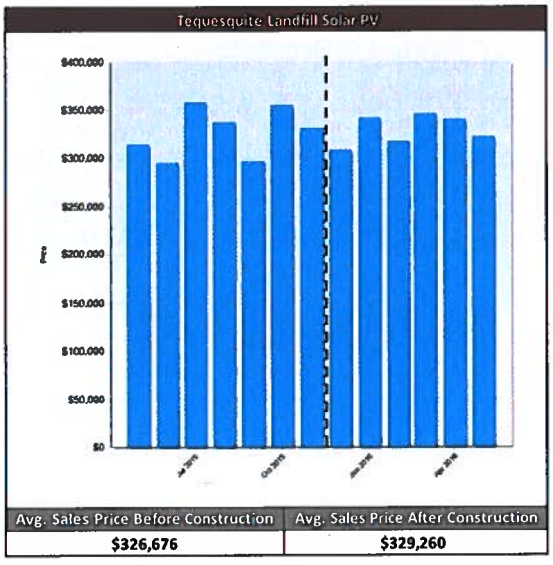
The indicated residential property value prior to the construction of Antelope DSR I (October 2015 to September 2016) was $378,211. The indicated residential property value after the construction of Antelope DSR I (October 2016 to October 2017) was $380,642. This shows an increase in residential property value of 0.64%. It can be concluded considering market trends the solar project has nominal or no impact on adjacent residential values.

"TEQUESQUITE LANDFILL SOLAR PV"- PAIRED SALE 5

Tequesquite Landfill Solar PV is located in Riverside County, along the Santa Ana River Trail in the city of Riverside. There are subdivisions north, east, and south of Tequesquite Landfill Solar PV. The solar facility was constructed on top of the decommissioned Tequesquite landfill in late 2015 and went online that same year. The project is a ground mounted, utility-scale, 7.3-megawatt solar facility. It is adjacent to suburban residential homes.



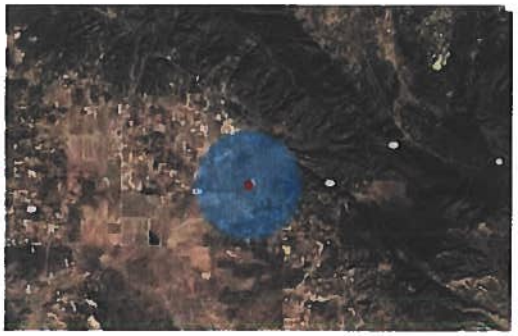
Below the data chart shows the average value of homes within a 1-mile radius from the solar facility. The dotted black line indicates the approximate time of completion of solar farm construction. I have compared the residential property values six months before and six months after construction.



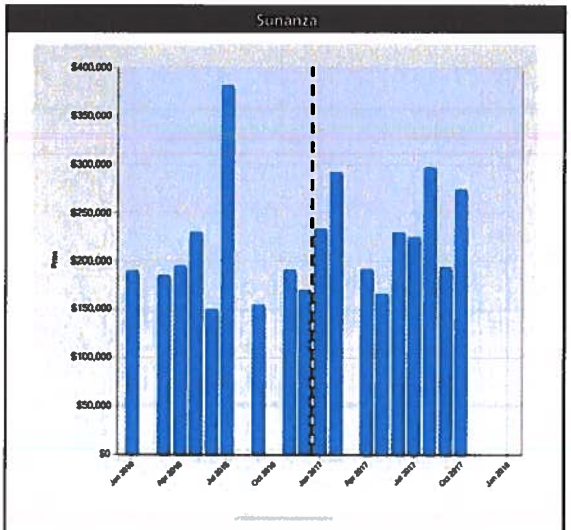
The indicated residential property value prior to the construction of Tequesquite Landfill Solar PV (May 2015 to November 2015) was $326,676. The indicated residential property value after the construction of Tequesquite Landfill Solar PV (December 2016 to May 2016) was $380,642. This shows an increase in residential property value of 0.78%. It can be concluded considering market trends the solar project has nominal or no impact on adjacent residential values.

"SUNANZA"- PAIRED SALE 6

Sunanza is located in Riverside County, along Highway 371 in the city of Anza. The area surrounding Sunanza is considered rural residential. The solar facility was constructed at the end of 2016 and went online later in 2020. The project is a ground mounted, utility-scale, 2-megawatt solar facility. It is adjacent to rural residential homes.



Below the data chart shows the average value of homes within a 1-mile radius from the solar facility. The dotted black line indicates the approximate time of completion of solar farm construction. I have compared the residential property values one year before and one year after construction.



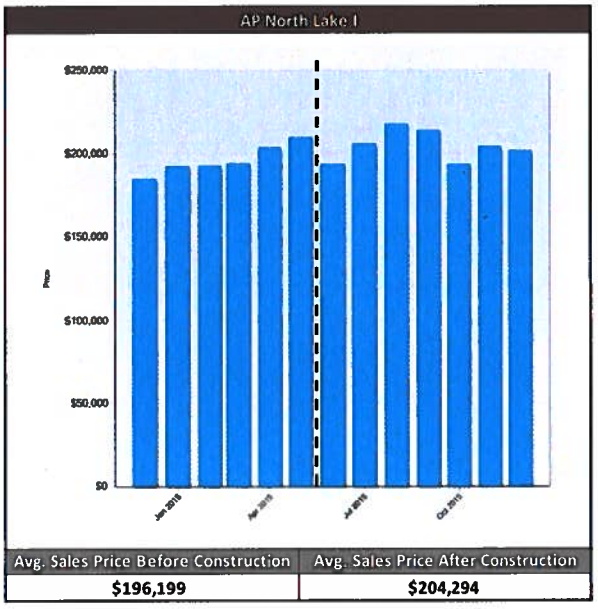
Avg. Sales Price Before Construction	Avg. Sales Price After Construction
$212,065	$238,505

The indicated residential property value prior to the construction of Sunanza (January 2016 to December 2016) was $212,065. The indicated residential property value after the construction of Sunanza (January 2017 to January 2018) was $238,505. This shows an increase in residential property value of 11.08%. It can be concluded considering market trends the solar project has nominal or no impact on adjacent residential values.

"AP North Lake I"- Paired Sale 7

AP North Lake I is located in Riverside County, along West Acacia Avenue in the city of Hemet. The area surrounding AP North Lake I is considered suburban. The solar facility was constructed in mid-2015 and went online later that year. The project is a ground mounted, utility-scale, 20-megawatt solar facility. It is adjacent to suburban residential homes.

Below the data chart shows the average value of homes within a 1-mile radius from the solar facility. The dotted black line indicates the approximate time of completion of solar farm construction. I have compared the residential property values six months before and six months after construction.



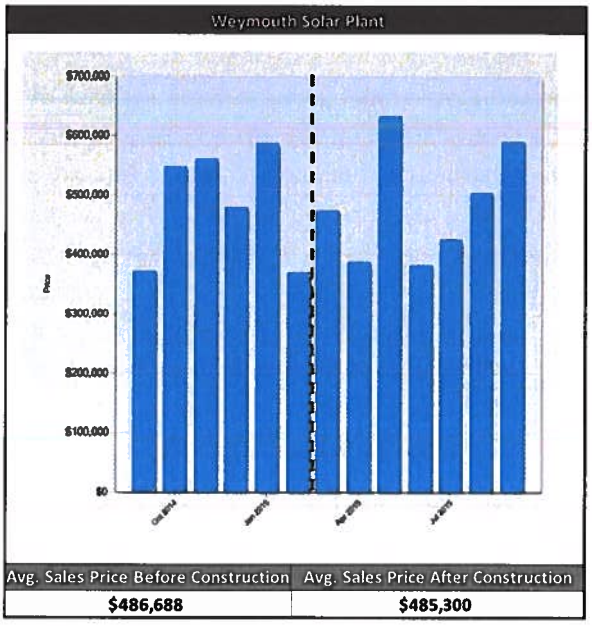
Avg. Sales Price Before Construction	Avg. Sales Price After Construction
$196,199	$204,294

The indicated residential property value prior to the construction of AP North Lake I (December 2014 to May 2015) was $196,199. The indicated residential property value after the construction of AP North Lake I (June 2015 to December 2015) was $204,294. This shows an increase in residential property value of 3.9%. It can be concluded considering market trends the solar project has nominal or no impact on adjacent residential values.

"Weymouth Solar Plant"- Paired Sale 8

Weymouth Solar Plant is located in Los Angeles County, along Sedalia Avenue and Wheeler Avenue in the city of La Verne. The area surrounding Weymouth Solar Plant is considered urban. The solar facility was constructed in early-2015 and went online in 2016. The project consists of two solar farms, both are ground mounted, utility-scale, and have a capacity of 3-megawatt. It is adjacent to urban residential homes.

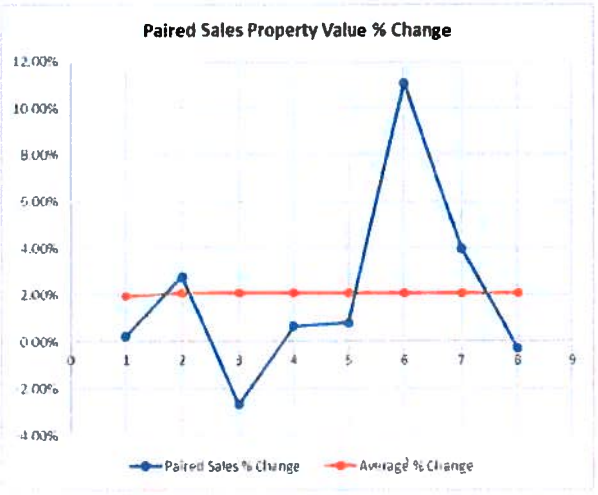
Below the data chart shows the average value of homes within a 1-mile radius from each solar farm. The dotted black line indicates the approximate time of completion of solar farm construction. I have compared the residential property values six months before and six months after construction.



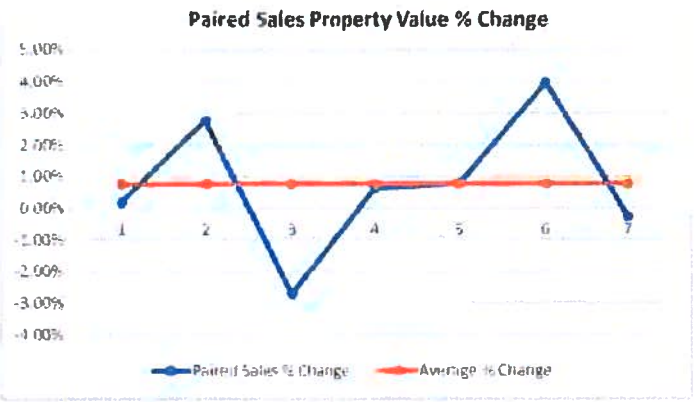
The indicated residential property value prior to the construction of Weymouth Solar Plant (September 2014 to February 2015) was $489,688. The indicated residential property value after the construction of Weymouth Solar Plant (March 2015 to September 2015) was $485,300. This shows a decrease in residential property value of 0.29%. It can be concluded considering market trends the solar project has nominal or no impact on adjacent residential values.

PAIRED SALES DISCUSSION

The paired sales detailed above showed that nearby solar farms had an impact on residential property values ranging from an increase of 11.09% to a decrease of 2.7%. I was not able to find any correlation between property value percentage impact and residential type (i.e: rural residential, suburban, and urban). The data showed a tight range between a decrease in value of 1% to an increase in value of 2%. Below the graphic shows each paired sale's property value impact and the average impact from the paired sales data set (increase of 2.06%).



Paired Sale 6, Sunanza, showed a residential property value increase of 11.09% after the solar farm was constructed. I have considered that this paired sale is an outlier. It is likely that this increase in residential property values from January of 2016 to January of 2018 is largely due to macroeconomics of the City of Anza and surrounding areas. Thus, we have excluded this paired sale from further analysis. Excluding Paired Sale 6 from the data set, the new range of impact from solar farm construction on residential property homes shows an increase of 3.96% to a decrease of 2.7%. Below the graphic shows each paired sale's property value impact (excluding Paired Sale 6) and the average impact from the paired sales data set (increase of 0.77%).



Paired Sales Conclusion

The seven paired sales (excluding Paired Sale 6) showed that nearby solar farms had an average impact on residential property values ranging from an increase of 3.96% to a decrease of 2.7%. Of the seven analyzed sales, five saw a slight increase in value, from 0.2% to 3.96%. Two of the seven comparables saw a slight decrease in value, from 0.29% to 2.7%.

Considering the paired sales data showed nominal results in property values affected by adjacent solar farms, it is reasonable to conclude that the JVR Energy Park will result in no impact on adjacent residential property values. Any upward trend is associated with market trends and cannot be attributed to a solar project. The rural residential nature of Jacumba Hot Springs and the abundance of open space surrounding the community further supports these results.

Opinion of Impact

Through the paired sales analysis, the expected impact of JVR Energy Park on adjacent residential property values in Jacumba Hot Springs is concluded to be:

NOMINAL TO NO IMPACT

Reconciled Opinion of Impact

In my analysis I have considered national studies, surveys, comparable specialized industrial studies, and 8 paired sales.

National Studies and surveys

The national studies and surveys supported the low impact of solar farms on adjacent rural residential communities. Our consensus of the study and survey described above is the homes within a one-mile radius of the proposed solar farm, JVR Energy Park, in **Jacumba Hot Springs will see a 0% to 1% decrease in residential property values.**

Comparable Specialized Industrial Studies

The two comparable specialized industrial studies observed the impacts of landfills and wind farm projects on adjacent property values. The anticipated impact of landfills and wind farms is much greater than the anticipated impact from solar farms. Landfills and wind farms impact the environment, view, and exposure. Due to the less intrusive nature of solar farms, it is our consensus from the comparable specialized industrial studies that homes within a one-mile radius of the proposed solar farm, JVR Energy Park, **in Jacumba Hot Springs will see a 0% to 1% decrease in residential property values.**

Paired Sales Analysis

The 8 paired sales were used to analyze solar farms impact on rural residential, suburban and urban property values. This analysis held the most weight when arriving at my reconciled opinion of impact. The data was sufficient in quality and quantity. The analysis revealed that residential property adjacent to solar farms saw an average of 0.77% increase in their property value. Considering the paired sales data showed nominal results in property values affected by adjacent solar farms, it is reasonable to conclude that **the JVR Energy Park will result in a nominal to no impact on adjacent residential property values.**

Reconciled Opinion of Impact

Considering all information gathered, the expected impact of JVR Energy Park on adjacent residential property values in Jacumba Hot Springs is concluded to be:

0% to 1% Decrease

Please note, while the paired analysis shows nominal impact consideration is given to the national studies which has a downward value of impact of approximately 1%.

CERTIFICATION STATEMENT

I certify that, to the best of my knowledge and belief:

- The statements of fact contained in this report are true and correct.
- The reported analyses, opinions and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, impartial, and unbiased professional analyses, opinions and conclusions.
- I have no present or prospective future interest in the property that is the subject of this report, and have no personal interest with respect to the parties involved.
- I have no bias with respect to the property that is the subject of this report, or to the parties involved with this assignment.
- My engagement in this assignment was not contingent upon developing or reporting predetermined results.
- My compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value estimate, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this appraisal.
- My analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the Uniform Standards of Professional Appraisal Practice (USPAP).
- I certify sufficient competence to appraise this property through education and experience, in addition to the internal resources of the appraisal firm.
- As of the date of this report, Lance W. Doré, MAI, FRICS has completed the continuing education program for designated members of the Appraisal Institute.
- I have performed no services, as appraiser, regarding the property that is the subject of this report within the three-year period immediately preceding acceptance of this assignment.
- Sophie Doré provided significant real property appraisal assistance to the person(s) signing this certification. Sophie Doré's contributions to this assignment included (but were not limited to) an exterior observation of the subject property, research and verification of subject physical and legal characteristics, market research and analysis, consideration of applicable approaches to value, comparable sale selection and analysis, exterior observations of comparable sales, report writing, and final value reconciliation. Market research was conducted via sources including but not limited to public records, CoStar data, LoopNet, government websites and personnel, and local brokers. Her contributions to this report were performed in conformity with the Uniform Standards of Professional Appraisal Practice (USPAP), and under the supervision and guidance of Lance W. Doré, MAI, FRICS who is the signer of this certification.
- Lance L. Doré, MAI, FRICS did not make an inspection of the subject property.

Respectfully submitted,

Lance Doré, MAI, FRICS
President / CEO
The Doré Group, Inc.
CA-AG002464
lwdore@thedoregroup.com

ADDENDA

QUALIFICATION

LANCE W. DORÉ, MAI, FRICS

Lance W. Doré is the President and CEO of The Doré Group. In this role, he directs all valuation assignments involving a wide variety of conventional and complex real properties, serves as litigation support to both public and private clients, provides expert advisory services (including forensic analyses and market and feasibility studies), and manages the overall operations of The Doré Group.

Mr. Doré has been a real estate appraiser since 1983, initially working for Bank of America as a staff appraiser then as a senior appraiser with a fee appraisal firm in Del Mar, California. In 1988, he formed L.W. Doré, Real Estate Consultants and grew the firm through the addition of two partners forming Doré & Curry, Inc. (1990) and Doré, Curry, & Marschall, Inc. (1997). In 1999, Doré, Curry, & Marschall, Inc. became the San Diego office for Integra Realty Resources with Mr. Doré serving as Managing Director. In the fall of 2005, Mr. Doré joined Cushman & Wakefield as the National Practice Leader of the Government Affairs and Energy division. In 2007, he pursued an opportunity to serve as the President of European Emerging Markets and Vice President of Client Services for PGP, Inc./Colliers International. Mr. Doré's unique depth of experience, coupled with his high personal standards of service, led him to found The Doré Group in 2010.

Experience

Mr. Doré's work experience spans a wide variety of property types with special expertise in the valuation of energy facilities, conservation land, open space corridors and ranches. In addition, he has also appraised planned-unit developments, residential income properties, senior housing, shopping centers, office, industrial, mixed-use properties, and a multitude of special purpose properties, including, but not limited to hotels, ski resorts, restaurants, hospitals, recreational camps, auto service and wrecking centers, equestrian facilities, and golf courses. He regularly serves as an expert advisor conducting appraisal reviews, forensic studies, and marketability and feasibility analyses. In addition, Mr. Doré is uniquely qualified and experienced in litigation testimony, consultation and advisory services for all real estate related issues. His geographical valuation expertise is focused in the western United States and extends to Tokyo (Japan), Central America, Mexico, Cyprus, and Moscow (Russia).

License/Certifications/Affiliations

Certified General Real Estate Appraiser – State of California (OREA No. AG002464)
California Licensed Real Estate Broker & Realtor member - San Diego Board of Realtors
Credentialed Mediator – National Conflict Resolution Center
Member of the Appraisal Institute (MAI No. 8471)
Fellow of the Royal Institute of Charter Surveyors (FRICS Designation)
Registered Valuer - Royal Institute of Charter Surveyors for International valuation
Member of the International Right of Way Association (IR/WA)
Member of the Family Firm Institute – FFI
Member of the Lambda Alpha International – Land Economic Society – LAI

Instructor Positions

National Instructor (*Real Estate Valuation Principles & Practice*) - Appraisal Institute
Adjunct Professor - Russian Federation Finance Academy
National Instructor – (*Business Development and Leadership*) – Royal Institute of Charter Surveyors
National Instructor - (Red Book Standards) - Royal Institute of Charter Surveyors
National Instructor - (Hotel Valuation) - Royal Institute of Charter Surveyors
National Instructor - (International Valuation and Property Measurement Standards) - Royal Institute of Charter Surveyors
National Instructor - (Subdivision Development) - Royal Institute of Charter Surveyors
National Instructor - (Automated Valuation Models) - Royal Institute of Charter Surveyors
National Instructor - (Bridging the Gap of IVSC v. USPAP) - Royal Institute of Charter Surveyors

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THE DORÉ GROUP
INTERNATIONAL REAL ESTATE CONSULTATION AND DISPUTE VALUATION

Leadership/Committees

Past President – **Appraisal Institute, San Diego Chapter**
Past member of *International Relations Committee* – **Appraisal Institute**
Past member of *Ethics & Standards Committee* – **Appraisal Institute**

Speaking Engagements

Appraisal Institute (National Seminar Series, Los Angeles, CA) - Land Valuation & Environmental Issues
The Trust for Public Land (San Diego, CA) - Natural Communities Conservation Plan
Pan Pacific Conference (Auckland, New Zealand) – Valuation of Submerged Lands
Government of Cyprus (Nicosia, Cyprus) – Valuation of Golf Courses and Marinas
The Russian Federation (Moscow, Russia) - Valuation of Land and Appraisal Principles
The Russian Federation (Goa, India) - Valuation of Oil and Gas and Power Plants
Royal Institute of Charter Surveyors (Montego Bay, Jamaica) – Government & Regulatory Risk
Graziadio School of Business & Management, Pepperdine (Los Angeles, CA)–2008 US & California Forecast
Appraisal Institute (San Diego, CA) – Unique Valuations in Real Estate
Appraisal Institute (San Diego, CA) – International Financial Reporting Standards (IFRS)
California Redevelopment Agency (Workshop Series, CA) – Real Estate Valuation for AB1X 26 & AB1484
Risk Management Association (RMA) – Appraisal Risk and the Valuation Process
University of San Diego – MBA program – Guest Lecturer
University of San Francisco – Geller Family Business Center – Family Office Valuation
NAI Global Conference – Real Estate Investment Pyramid

Publications

Appraisal Journal (October 2001) – "The Valuation of Submerged Land"
Energy Pulse (March 2006) – "The Highest and Best Use of Power Plants"
Union of Pan America Valuers (November 2010) – "Impact of Public to Private Partnerships in BRICS"
Wall Street Journal (August 2001) – "Power Plant Owners Fight to Lower Taxes"
The Secret of Real Estate – Revealed (2011)
IRWA Right of Way (July/August 2018) – "Conservation Easements – Unraveling the Mystery"

Representative Client List

Public Entities

United States Department of the Interior
United States Department of Navy
Government of Cyprus
State of California – Judicial Courts
State of California – Auditor
County of Riverside
County of Monterey
City of San Diego
Los Angeles Dept. of Water and Power
City of Monterey
United States Forest Service
United States Department of Justice
Russian Federation
County of San Diego
County of San Bernardino
County of Los Angeles
City of Riverside
Port of Long Beach
Port of Oakland
Port of Vancouver

Legal Clients – **Local, Regional, National and International Firms. Criminal, Transactional and Civil Litigation. Qualified Expert in Federal Bankruptcy Court, United States Judicial District Court, California Superior Court, San Diego Superior Court, Los Angeles Superior Court, Washington State Superior Court.**

Financial Institutions – **All Major Local, Regional and National Organizations. Savings and Loans, Banks, Insurance Companies, Investment Firms, Brokerage Firms and Insurance Companies.**

Non-Profit Conservation Groups – **Local, Regional and National Organizations.**

Family Offices – **Estate Planning, Tax Planning, Consultation**

EXHIBIT E

Dudek Memo on Avian Fatalities and Solar Projects

August 16, 2021

605 THIRD STREET
ENCINITAS, CALIFORNIA 92024
T 760 942 5147 F 760 632 0164

MEMORANDUM

To:	Geoff Fallon, BayWa
From:	Callie Amoaku and Janice Heller, Dudek
Subject:	Potential Project Impacts to Avian Species
Date:	August 13, 2021
cc:	
Attachment(s):	Attachment A, Resume

This memorandum provides an assessment of potential avian fatalities as analyzed in the Environmental Impact Report (EIR) for the JVR Energy Park Project (Proposed Project). Potential impacts to avian species due to collisions is addressed in the EIR as presented in Section 2.3, Biological Resources, and the Proposed Project's Biological Resources Technical Report, which is included as Appendix D to the EIR.

Potential Project Impacts to Avian Species

Impacts to avian species due to collisions is addressed in the EIR and both project design features and mitigation measures are provided to minimize impacts. The EIR states that "there is a potential for birds to collide with the gen-tie line during migration, but that risk was assessed to be low due to the minimal overhead line. The Proposed Project solar facility design shall incorporate Avian Power Line Interaction Committee (APLIC) standards to reduce or avoid the potential for impacts to avian species (PDF BIO-1). Certain types of solar panels may create a 'pseudo-lake effect,' and birds may collide with solar panels that appear like a body of water due to the sky's reflection. However, there is little scientific information available regarding the pseudo-lake effect, and a detailed discussion of the impacts would be speculative. Further, the following factors would minimize the risk of collision due to sky reflection: (1) the Project site is not located near bodies of water that would attract wetland-associated birds; (2) the locale is not considered to be a major contributor to the Pacific Flyway; and (3) the solar units would be uniformly dark in color, coated to be non-reflective, and designed to be highly absorptive of all light that strikes their glass surfaces, and may not appear like water from above, as water displays different properties by both reflecting and absorbing light waves. Therefore, glare and pseudo-lake effect are deemed to be low risk due to a number of factors, including the Proposed Project solar facility design and the Project site location." (EIR 2.3-80).

The Biological Resources Technical Report expands on this issue:

> *The proposed project could potentially increase the risk of collisions due to sky reflection (or "pseudo-lake effect"). Although avian collisions with towers and structures have been well documented, there are few published papers that study the possibility that large areas of solar PV panels in the desert environment may mimic water bodies and inadvertently attract migrating or dispersing wetland bird species. Polarized reflections from solar PV arrays have been observed to attract insects (Horvath et al. 2010), which could in turn attract other sensitive wildlife, such as bats, but the magnitude of this effect is unknown,*

> *since no comprehensive scientific studies have been conducted for this potential phenomenon.*
>
> *Anecdotal evidence suggests that wetland species, particularly those that require water to take flight (e.g., loons, grebes), may either collide with or become stranded in solar fields, resulting in fatalities. Two solar projects in the desert southwest had recent, publicized bird mortalities. One project is a different type of facility that does not rely on PV cells to generate electricity, instead using heat generated by mirrors reflecting and focusing sunlight on a central focal point to power a generator. Different types of effects might have killed the birds. Regardless, little is known about the actual percentage of species and individuals that are negatively affected by the hypothetical pseudo-lake effect of PV arrays. USFWS recognizes the lack of data on the effects of solar facilities on migratory bird mortality, and provides guidance on monitoring migratory bird mortalities at solar facilities (Nicolai et al. 2011). However, little scientific information is available to assess the magnitude or likely risk associated with such events, and a detailed discussion of the potential impacts would be speculative. Regardless, the following factors would minimize the risk of collision due to sky reflection: (1) the project is not located near bodies of water that would attract wetland-associated birds; (2) the locale is not considered to be a major contributor to the Pacific Flyway; and (3) the solar units would be uniformly dark in color, coated to be non-reflective, and designed to be highly absorptive of all light that strikes their glass surfaces, and may not appear like water from above, as water displays different properties by both reflecting and absorbing light waves.*
>
> *The gen-tie line would include two 138 kV 550-foot-long (1,100 feet total) overhead transmission lines to loop the switchyard into the existing SDG&E Boulevard-East County 138 kV transmission line. The potential for avian collisions with the gen-tie lines is considered a minor risk compared to the higher voltage, long distance transmission lines in the region such as the Southwest Powerlink and Sunrise Power link. Furthermore, the Project area is not an area where birds flock to wetlands or is part of migratory flyway or within a known eagle territory. Similarly, the four proposed utility poles would provide perches from which avian species may forage but are considered a minor risk for collision due to the small number of poles (only four poles are proposed). (Pp. 63-64.)*

Moreover, the EIR analyzes and concludes that the Project would result in potentially significant impacts to avian species, such as temporary and direct impacts to special-status avian species in the County (Impacts BI-W-1 and BI-W-2), nesting birds (Impacts BI-W-2 and BI-W-3), and potential foraging and breeding habitat for special-status avian species (Impacts BI-W-2, BI-W-5, BI-WLC-1, BI-WLC-2, BI-WLC-3) during Project construction and operation. The EIR imposes mitigation measures to ensure these impacts are less than significant, such as Mitigation Measure M-BI-3, which requires preservation of 435 acres in open space easements, and Mitigation Measure M-BI-4, which requires the preparation of a Resource Management Plan to manage the preserved land. Mitigation Measure M-BI-5 also requires the preparation of a Nesting Bird

Management, Monitoring, and Reporting Plan if construction proceeds during the nesting bird breeding season.

Comment on Avian Fatalities

One commenter expressed concern that the EIR does not "adequately disclose that individual birds of all species may be injured or killed due to collisions or interactions with the solar panels themselves, or other infrastructure to be built on the site." The commenter stated: "Solar farms that may kill or injury all species of birds not only due to their transmission lines, but also through PV panels and poles, trough systems, fencing buildings and more. In fact, at solar facilities collision hazards to birds are greatest not due to the utility lines but due to the solar field arrays." The commenter cited several other solar projects and claimed that data from those projects "indicate that birds are susceptible to collisions with solar panels and structures as well as lines." In particular, the commenter cited to the Crimson Solar Project environmental review documents, which allegedly found that the project will cause "some level of avian fatalities." The commenter also cited to a study by Walston (2016), which purportedly estimated that "hundreds of utility-scale solar farms around the US may kill nearly 140,000 birds annually." The commenter states that the EIR is insufficient because the EIR "does not adequately discuss the well-known impacts to birds from collision with solar panels themselves."

The following information in this memorandum responds to this comment. This assessment is primarily based on data and studies from regional solar projects. The information below is assessed using data and metrics from recent publications, including Kosciuch et al. (2020[1]).

Avian Fatalities

Dudek has reviewed the information provided by the commenter, including each of the environmental review documents cited. However, the study performed by Kosciuch et al. (2020) is the most recent study on avian fatalities at photovoltaic (PV) utility-scale energy (USSE) facilities and is one of only 3 peer-reviewed research articles on the subject to date. Between 2013 and 2018, Kosciuch et al. (2020) identified fatality monitoring studies at 10 PV USSE facilities across 13 site-years located in Imperial, Riverside, San Bernardino, and San Luis Obispo counties in California, and Clark and Mineral counties in Nevada. The project sites were grouped into their respective Bird Conservation Regions – California Coast, Great Basin, and Sonoran and Mojave Desert. The study found the following:

1. Composition of the water associated avian species was higher for solar projects closer to the Salton Sea. The sites further from the Salton Sea showed almost no "contribution of water associates and water obligates to [the] adjusted composition." The composition of the avian species at sites in the Sonoran and Mojave Desert had significantly more water associated birds than the projects located in the Great Basin and the California Coast. (P. 5.)

[1] Kosciuch, K., D. Riser-Espinoza, M. Gerringer, and W. Erickson. 2020. A Summary of Bird Mortality at Photovoltaic Utility Scale Solar Facilities in the Southwestern U.S. PLoS ONE 15(4): e0232034. doi: 10.1371/journal.pone.0232034, https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0232034.

2. "The majority of detections in the site-years were feather spots, and a cause of mortality could not be attributed for most detections . . . Feather spots could occur from a number of sources, including background mortality." (P. 8.)

3. "Fatality estimates were standardized relative to the nameplate MW capacity of each PV USSE facility . . . Estimates ranged from 0.08 birds/MW/year . . . to 9.26 birds/MW/year . . . with a mean of 2.49 birds/MW/year. Excluding CC1-2, which could be considered an outlier in the dataset as 42.70% of the detections were unknown-cause mourning dove feather spots and the estimate was more than 1.5 times higher than the next estimate, the average annual fatality rate was 1.82 birds/MW." (P. 6.)

4. "Based on the dataset assembled . . . we updated the solar fatality estimate from Walston et al . . . We calculated the average annual fatality estimate of known and unknown cause per MW at PV USSE facilities in desert BCRs to be 1.82 birds/MW/year . . . the result is an estimate of 10,920 fatalities/year in southern California, compared to Walston et al.'s known and unknown cause estimate of 59,400 fatalities/year in southern California. Including the estimate from CC1-2 raises the average fatality rate to 2.49 birds/MW/year, or 14,940 bird fatalities/year in Southern California." (P. 7.)

5. "[N]one of the studies provide insight into the causal mechanism responsible for the presence of water obligates at PV USSE in the SMD BCR, and we avoid speculating about possible causes given the relative lack of important information (e.g., how water obligates perceive polarized light reflected from PV solar panels). Rather, we focus our review on summarizing the spatial and temporal patterns of occurrence . . . at a broad scale among BCRs, the concentration of water obligates in the SMD BCR at the Salton Sea is a plausible explanation for the variability in occurrence as concentrations of water obligates at similar stop-over areas are not known in the CC or GB BCRs near the sites . . . Therefore, variation among BCRs appears associated with an abundance of migratory and over-wintering water obligates at the Salton Sea and the proximity of the sites to the Salton Sea, but we cannot readily interpret the variation among site-years within the SMD BCR given the absence of local exposure data at each site."

6. "Walston et al. included data from the California Solar One and Ivanpah Solar Electric Generating System (Ivanpah) where the concentrating solar flux has been shown to singe migratory birds in fall and spring, and singeing does not occur at PV USSE . . . the only PV USSE facility included in Walston et al. is CC1-2 in our study, which had an average annual fatality estimate 5.1 times higher than the average among the other 12 site-years, possible due to the contribution of background mortality of mourning doves."

7. Of the 669 documented fatalities across the 13 monitoring site-years in California and Nevada, approximately 54.17% of the avian fatalities were common songbirds after adjusting carcass counts for detection bias. The identifiable species that had the highest percentage of bias-adjusted composition across all studies were mourning dove (12.92%), horned lark (11.93%), house finch (8.41%), and western meadowlark (7.78%). These species are known to have populations that number in the millions in the regions where the studies took place. Additionally, these species are primarily ground dwelling, inhabit landscapes with relatively low-growing vegetation, and mourning dove associate with anthropogenic structures. The study concluded that although PV USSE facilities provide

structure and an environmental microclimate that attracts birds and other species, none of the studies reviewed compared mortality data to live bird count data. Therefore, it is unknown if mortality at PV USSE facilities is associated with increased localized use. (Pp. 7-8.)

8. "Given that mortality risk is not well understood in different habitat contexts, we do not recommend extrapolating the average annual fatality estimates we calculated out to the current and projected buildout of the U.S., or to other [areas] with markedly different habitats . . . In order to predict whether water-associated and water-obligate birds will occur at PV USSE outside of the SMD BCR, studies investigating the underlying causal mechanisms are needed."

With respect to the Crimson Solar Project, the Final Environmental Impact Statement (January 22, 2021) for the Project stated the following with respect to avian fatalities:

> *Data from other photovoltaic solar projects in Southern California (Desert Sunlight and California Valley Solar Ranch) indicate that birds are also susceptible to collisions with solar panels (Watson et al. 2016; Ironwood Consulting, Inc. 2014). The causal mechanism for bird collisions with panels is not clear. While the causal mechanism is not known and is under investigation at other facilities, what is known is there is some kind of attractant or risk at solar facilities that results in avian mortalities at a higher rate at solar facilities as compared to background mortality rates on non-developed desert lands. Presently, one hypothesis regarding why birds may collide with panels is the idea that birds, particularly water-dependent species, may be attracted to solar panels, mistaking them for water features. These occurrences could lead to collision or other harm (e.g., strandings of water birds). However, this hypothesis has not yet been tested. Therefore, the causal mechanism for bird collisions with solar panels is presently unknown and it is not possible to determine if the conditions present at the Project site would facilitate an attraction by water-dependent birds and/or what level of impacts may occur. While the causes of avian injuries and fatalities at commercial-scale solar projects are being evaluated, uncertainty remains because: (1) mortality data has been collected over a relatively short period and still is being evaluated; (2) in many cases, the cause of death is not clear; and (3) mortality information from one project location is not necessarily indicative of the mortality information that might be found at another project location. Collectively and conservatively in light of related uncertainty, these effects would be substantial and adverse without mitigation. These potential effects would be reduced by Mitigation Measures BIO-31 (Nesting Bird Management and Monitoring Plan) and BIO-32 (BBCS). These plans are provided in Appendix I.5 and I.7. The BBCS requires a minimum of three years of post-construction mortality monitoring to study avian mortality impacts and inform adaptive management for this Project as well as mitigation and adaptive management for future projects.*

Proposed Project Impacts

Collisions with the Project's transmission infrastructure are considered a minor risk to avian species due to the project design. Direct and indirect impacts to avian species may occur with most human development activities during operation and maintenance through individual collisions with project facilities and equipment including transmission wires, fencing, array structures, and heavy equipment. However, the structures that have been empirically demonstrated to result in elevated collision risk at various types of facilities (e.g., tall buildings, communication towers, wind turbines, or concentrating solar thermal towers) are not present at the Project site, which consists of low height PV arrays, and a few other structures, like the Project's transmission poles. For taller structures, the Project will employ established best management practices, including following the APLIC guidelines and using minimal lighting designed to avoid attracting avian species and limit visual impacts.

Additionally, the EIR states that only the proposed utility poles "would provide perches from which avian species may forage, this is considered a minor risk for collision due to the small number of poles and less than significant impacts" (EIR 2.3-102). As stated in Appendix D to the EIR, the Proposed Project's gen tie line would include "overhead transmission lines to loop the switchyard into the existing SDG&E Boulevard-East County 138 kV transmission line. The potential for avian collisions with the gen-tie lines is considered a minor risk compared to the higher voltage, long distance transmission lines in the region such as the Southwest Powerlink and Sunrise Power link. Furthermore, the Project area is not an area where birds flock to wetlands or is part of migratory flyway or within a known eagle territory. Similarly, the four proposed utility poles would provide perches from which avian species may forage but are considered a minor risk for collision due to the small number of poles (only four poles are proposed)" (Section 5.3.2 of Appendix D of the EIR).

Furthermore, based on Kosciuch et al. (2020), which is the most current and relevant study on avian fatality at PV solar sites, the EIR's conclusion remains accurate—a detailed discussion of avian collision risk with the Project's solar panels is speculative. The Project is not located near or in a similar habitat to the projects studied in the Kosciuch et al. (2020) study. The Project is located nearly 150 miles south of the Mojave Desert and about 10 miles west of the Sonoran Desert. The Sonoran Desert is much lower in elevation (approximately 0 feet to 400 feet compared to the 2,700 feet elevation of the Project site) with different vegetation and habitat types; and the Project site is not located near a body of water or in the Pacific Flyway. Given the data provided in Kosciuch et al. (2020), namely that a cause of mortality could not be assigned to most detections, the lack of a causation analysis, and the lack of data concerning increased avian use of projects, the potential for the Project to cause avian collisions with the solar panels is too speculative to analyze.

This conclusion is supported by additional studies. For example, a fatality monitoring study conducted by H. T. Harvey and Associates (2015[2]) at the California Valley Solar Ranch project site concluded that a reference plot estimated only slightly less than the estimates in the solar fatalities, suggesting some of the mortality in the solar arrays may not be caused by the project. Since the majority of the detections found at the solar project were mourning dove, a prey species, it is estimated that predation, or background mortality, was determined to be a leading cause of death for avian species. Similarly, the Crimson Solar Project

[2] H. T. Harvey & Associates. 2015. California Valley Solar Ranch San Luis Obispo County, California Avian Activity Surveys Final Report October 2011-October 2014. Prepared for HPR II, LLC, California Valley Solar Ranch, Santa Margarita, California. Prepared by H. T. Harvey and Associates. Project # 3326-03. February, 2015.

Environmental Impact Statement concluded that uncertainty remains regarding analysis of avian fatalities at utility scale solar projects.

Therefore, the information provided by the commenter does not contradict the conclusion in the EIR that there is little scientific information available regarding avian collisions into solar panels, and that a detailed discussion of such impacts would be speculative.

ATTACHMENT A

Resume

Callie Amoaku

Senior Biologist/Project Manager

Callie Amoaku is a biologist with 15 years' experience as an environmental analyst specializing in field surveys and report preparation. Ms. Amoaku is committed to professional management of environmental resources, including land conservation. As a biologist with Dudek, she has coordinated large survey efforts; and research and prepared biological sections for environmental impact reports (EIRs), biological technical reports (BTRs), and focused survey reports. She has also performed wildlife and plant surveys, vegetation mapping, and jurisdictional delineations throughout Southern California.

Callie Amoaku

Education

California Polytechnic State University, San Luis Obispo
BS, Environmental Management and Protection/ GIS Minor, 2006

Certifications

USFWS Federal 10a Survey Permit No. TE-36118B-1

Quino Checkerspot Butterfly Surveys

Casey's June Beetle

CDFW Plant Voucher Collecting Permit No. 2081(a)-15-108-V

Professional Affiliations

The Western Section of the Wildlife Society

Xerces Society

Project Experience

Development

Ivanhoe Ranch, Pv Ivanhoe LLC, El Cajon, California. Currently serves as project manager for the biology-related tasks. Conducted vegetation mapping, habitat assessment and host plant mapping for Quino checkerspot butterfly (*Euphydryas editha quino*) and Hermes copper (*Lycaena hermes*) butterfly, conducted focused protocol surveys for Quino checkerspot butterfly and Hermes copper butterfly, and conducted habitat assessment and focused protocol surveys for burrowing owl (*Athene cunicularia*) and least Bell's vireo (*Vireo bellii pusillus*). Prepared a biological analysis letter report for the Major Project Pre-Application package; attends County of San Diego meetings; assists client with mitigation planning.

Camelot, The Camelot Project Owner LLC, San Diego County, California. As project assistant, conducted a formal wetlands jurisdictional delineation and mapped wetlands and stream channels. Conducted general biological reconnaissance surveys throughout the 67-acre site. Several special-status species were mapped, including white-tailed kite (*Elanus leucurus*), northern harrier (*Circus cyaneus*), loggerhead shrike (*Lanius ludovicianus*), and California adolphia (*Adolphia californica*).

West Oaks Due Diligence, Carlsbad West Oaks Project Owner LLC, San Diego County, California. Conducted a formal wetland delineation and vegetation mapping for a 12.5-acre project site in Carlsbad.

Estero Trail, County of Sonoma, California. Conducted a formal wetland delineation in Sonoma County for a proposed residential project. Mapped a variety of wetland meadow habitats, including *Carex obnupta* Herbaceous Alliance, *Juncus (balticus, mexicanus)* Herbaceous Alliance, and *Salix lasiolepis* Shrubland Alliance.

Silveira Property, Marin County, California. Conducted a formal wetland delineation in Marin County. Mapped a variety of seasonal wetlands, an estuarine wetland, and isolated wetlands.

Borrego Springs Gildred Site, The Gildred Companies, San Diego County, California. Conducted field work for this project (vegetation mapping and formal jurisdictional delineation); prepared BTR per the County of San Diego's guidelines. Responded to public comments on the biology section of the EIR.

Bonita Glen Drive Project Studies, Silvergate Development, Chula Vista, California. As project manager, prepared a BTR in accordance with the City of Chula Vista's Subarea Plan and manages other technical studies supporting the Mitigated Negative Declaration (MND). Assists client with City coordination and mitigation planning.

Grapevine Project, Tejon Ranch, Kern County, California. Served as project task manager and field lead to conduct least Bell's vireo, special-status mammals, wildlife camera studies, bat surveys, and habitat assessments for a variety of federally and state-listed wildlife species. Served as project task manager and field lead to conduct a formal wetlands jurisdictional delineation and mapped wetlands and waters in accordance with regulations and guidance from the U.S. Army Corps of Engineers (ACOE), Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW). The jurisdictional delineation and determination included extensive literature review of historic aerials and topographic maps, the National Hydrography Dataset, and the National Wetlands Inventory; field surveying a 15,315-acre study area; and delineating approximately 130 acres of potentially jurisdictional features. Also performed vegetation mapping, rare plant surveys, and habitat assessments for a variety of federally and state-listed wildlife species. Ongoing duties include preparation of a detailed BTR and 20 associated reports and appendices, data management and review, and project management.

Grandview Street Project, Axelson and Corn, San Diego County, California. As project manager, coordinated wildlife surveys, prepared the BTR, and assisted the client with additional regulatory issues.

Tejon Mountain Village, Kern County, California. As project assistant and biologist, performed surveys for special-status plants, including population counts and mapping with GPS units on the 28,000-acre project site. Assisted in preparation of the biological resources report for California Environmental Quality Act (CEQA) documentation, including wildlife species, and portions of the draft EIR.

Proctor Valley Village 14 and Preserve, Jackson Pendo Development, San Diego County, California. Assisted in the jurisdictional delineation; rare plant surveys, including mapping of the federally threatened and state-endangered Otay tarplant (*Deinandra conjugens*); habitat mapping and focused Hermes copper butterfly surveys; and preparation of the BTR in accordance with the County of San Diego guidelines.

Newhall Biological and Environmental Documentation, Newhall Land and Farming Company, Santa Clarita, California. As project assistant, assisted in writing numerous BTRs and biological sections of EIRs with detailed information about special-status wildlife species. Assisted in preparing the Comprehensive Mitigation Implementation Plan, which consisted of organizing multiple data sets and mitigation measures. Coordinated and performed biological surveys for spineflower (*Chorizanthe*), a state-endangered and sensitive plant species, which included population counts and using GPS coordinates to locate the boundaries of the populations. Also performed biological monitoring of known spineflower populations, including population counts and point-intercept transects, and performed vegetation mapping for multiple vegetation classes.

Newland Sierra, San Diego, California. As field biologist, conducted vegetation mapping, a jurisdictional wetlands delineation, and focused rare plant surveys. Assisted in preparation of the BTR and biology section of the EIR; responded to public comments on the Draft EIR.

Lone Oak Road, The Marker Company, Vista, California. As project task manager and field lead, conducted a formal wetlands jurisdictional delineation and mapped wetlands and waters under the jurisdiction of ACOE, RWQCB, and CDFW; performed vegetation mapping; prepared the biological resources letter report; and coordinated additional field surveys.

Bear Valley Parkway Project, Spieth-Wohlford, Escondido, California. As project task manager and field lead, conducted a formal wetlands jurisdictional delineation and mapped wetlands and waters under the jurisdiction of ACOE, RWQCB, and CDFW; performed vegetation mapping; and prepared the biological resources letter report.

Warner Ranch, WHP Warner Ranch LP, San Diego County, California. As project assistant, conducted a formal jurisdictional wetland delineation and surveys for special-status plants over approximately 80 acres within the 566-acre project site. Primary author of the BTR, written in compliance with the County of San Diego's guidelines for format and determining significance. Prepared the Conceptual Resource Mitigation Plan. Attended multiple County of San Diego meetings and assisted in additional research. Coordinated field surveys. Assisted in the preparation of the biological section of the EIR and response to comments on the EIR.

Otay Ranch, JPB Development, San Diego County, California. As project assistant, assisted in writing a multi-project BTR and preparing permits for 401 Water Quality Certification, 404 Pre-Construction Notification for a Nationwide Permit, and 1600 Streambed Alteration Agreement. Organized data from multiple years of focused surveys and coordinated graphics for the permit applications. Assisted in general biological surveys, including focused Quino checkerspot butterfly surveys; rare plant surveys focused on mapping the federally threatened and state-endangered Otay tarplant; and construction monitoring.

Rough Acres Ranch, Hamann Companies, San Diego County, California. Conducted two focused survey passes for rare plants, and mapped large populations of Jacumba milk-vetch (*Astragalus douglasii*). Also mapped sticky geraea (*Geraea viscida*) and Tecate tarplant (*Deinandra floribunda*). Conducted vegetation mapping to Holland classification system.

Sycuan Slope Repair Project, Sycuan Band of Kumeyaay Nation, El Cajon, California. Served as field biologist to conduct a formal wetlands jurisdictional delineation and mapped wetlands and waters under the jurisdiction of ACOE.

Yokohl Ranch, Yokohl Ranch Company, Visalia, California. Performed quadrat surveys along 50-meter (164-foot) transects to collect species density information for spiny-sepaled button celery (*Eryngium spinosepalum*).

City of San Marcos, County of San Diego, California. As project biologist, conducted focused surveys for least Bell's vireo along San Marcos Creek. Several special-status species were detected, including least Bell's vireo, yellow-breasted chat (*Icteria virens*), and yellow warbler (*Dendroica petechia*). Assisted in preparation of a Regional General Permit for the City of San Marcos.

Hallmark Project, Hallmark Communities, San Diego County, California. As project lead, conducted biological reconnaissance surveys and prepared a biological constraints analysis and BTR for the proposed residential development project.

ARCO AM/PM, Bonsall Service Station, San Diego County, California. As project assistant, conducted general biological reconnaissance surveys throughout the site. Prepared a biological resources letter report summarizing the results and proposed impacts from the project.

Sumida Property, San Diego County, California. As field biologists, conducted general biological reconnaissance surveys throughout the site. Prepared a biological resources letter report summarizing the results and proposed impacts from the project. Mapped the extent of CDFW riparian habitat.

Colton Reclamation Facility, CalPortland Company, Riverside County, California. Served as project manager for collecting vegetation data for future reclamation of the mining facility. Conducted vegetation mapping for the undeveloped project site and collected data for density, percentage cover, and species richness along 50-meter transects. Prepared a summary memorandum describing the methods and results.

Focused Wildlife Surveys, Yaqui Pass and Viking Farms, Borrego Springs, California. As field assistant, conducted general nocturnal and diurnal surveys with a focus on special-status wildlife species on two proposed development properties. Conducted general plants surveys with a focus on special-status plant species.

Mid-County Parkway Project, County of Riverside, California. Field biologist for study area (approximately 1.1 to 4 miles in width and approximately 32 miles in length). Performed multiple focused surveys for least Bell's vireo and other special-status wildlife surveys for the mitigation areas. Identified nests for Cooper's hawk (*Accipiter cooperi*) and red-tailed hawk (*Buteo jamaicensis*). Conducted general plants surveys with a focus on special-status plant species for the mitigation areas.

Trabuco Canyon, The Planning Center, County of Orange, California. As project biologist, conducted focused surveys for least Bell's vireo on the 1,110-acre site in Orange County. Involved hiking in steep, rough terrain and collecting standardized data on field maps.

Ferber Ranch (Trabuco Canyon), Orange County, California. As project assistant, assisted with special-status plant surveys and focused surveys for least Bell's vireo. Involved steep, rough terrain and collecting standardized data on field maps.

High Tech Project, High Tech High Learning, City of Chula Vista, California. As field assistant, reviewed southwestern willow flycatcher (*Empidonax traillii extimus*) and least Bell's vireo survey records and assisted with writing the focused survey report.

Mid-Coast Corridor Transit Project, San Diego Association of Governments and California Department of Transportation, San Diego County, California. Conducted a jurisdictional delineation for the proposed project.

Brown-Headed Cowbird Trapping Program, The Crossings at Carlsbad Golf Course, City of Carlsbad, California. Responsible for daily operation and maintenance of brown-headed cowbird (*Molothrus ater*) trapping within the golf course. The trapping program is a U.S. Fish and Wildlife Service (USFWS) requirement as mitigation for impacts to habitat for federally listed species, including least Bell's vireo, southwestern willow flycatcher, and California gnatcatcher (*Polioptila californica*).

Energy

Jacumba Valley Ranch energy Park, BayWa, San Diego County, California. Serves as the lead biologist for the Jacumba Valley Ranch Solar project which is located within the County of San Diego. Conducted and/or managed biological surveys for Quino checkerspot butterfly, burrowing owl, rare plants, jurisdictional resources, vegetation mapping, bats, and more. Prepared a County biological technical report and appendices following the County's reporting guidelines and attended meetings with the County staff and resource agencies. Assisted with preparation of the project's Environmental Impact Report.

Campo Wind Energy Environmental Surveys, Western Natural Resources LLC, San Diego County, California. Conducted a formal wetland delineation and vegetation mapping in eastern San Diego County on tribal lands. This delineation included mapping of numerous ephemeral drainages as well as herbaceous wetlands.

Dodge Flat Solar Environmental Licensing, NextEra Energy Resources, Washoe County, Nevada. Conducted a formal wetland delineation and determination based on the regulations and guidance of the Wetland Delineation Manual (Environmental Laboratory 1987), the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Version 2.0) (ACOE 2008) and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual* (Lichvar and McColley 2008). While not required by the state of Nevada, the *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants* (CEC 2014) were

also reviewed as part of the delineation because the project site has similar geomorphic processes as those addressed in the CEC 2014 guidelines.

Sanborn Solar Energy Project, Kern County, California. Served as field lead for the formal jurisdictional delineation. Specifically, the wetland delineation included mapping waters defined in the Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants (CEC 2014) in addition to the ACOE methods. Also conducted vegetation mapping and focused rare plant surveys.

Edwards Solar, Terra-Gen Power LLC, Edwards Air Force Base (AFB), California. Served as field lead for the formal jurisdictional delineation at Edwards AFB. Specifically, the wetland delineation included mapping waters defined in the Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants (CEC 2014). Prepared the jurisdictional delineation report describing the methods and results of this survey.

Jacumba Solar, NextEra Energy Resources, San Diego County, California. Served as project assistant for biology-related tasks. Conducted vegetation mapping in accordance with County of San Diego guidelines; a habitat assessment and focused surveys for Quino checkerspot butterfly; mapped rare plants during focused surveys; and conducted a formal wetland delineation and determination based on the regulations and guidance of ACOE, RWQCB, and CDFW. The delineation included mapping waters defined in the *Methods to Describe and Delineate Episodic Stream Processes on Arid Landscapes for Permitting Utility-Scale Solar Power Plants* (CEC 2014) in addition to the ACOE methods. Prepared the County of San Diego BTR and associated reports; assisted with the biological resources section of the EIR and response to public comments. Successfully permitted the 304-acre solar project and the project applicant was issued a Nationwide Permit Verification through NWP 51, Land-Based Renewable Energy Generation Facilities through ACOE; a Stream Alteration Agreement through CDFW; and a Water Quality Certification through RWQCB. The permitting process included obtaining a linear foot waiver through ACOE and coordination with the State Historic Preservation Office (SHPO).

Tierra Del Sol Solar Project, Tierra Del Sol Solar Farm, San Diego County, California. As project assistant and field biologist, conducted vegetation mapping and focused rare plant surveys, and assisted the permitted Quino checkerspot butterfly biologist during focused surveys for the 420-acre solar development site located within an unincorporated section of San Diego County. Prepared the biological resources technical report in accordance with the County of San Diego's guidelines, and attended public outreach meetings.

Rugged Solar Farm, San Diego County, California. As project assistant and field biologist, conducted a formal wetland delineation and determination based on the regulations of ACOE, RWQCB, and CDFW for the 765-acre solar development site located within an unincorporated section of San Diego County. Conducted vegetation mapping, prepared the biological resources technical report in accordance with the County of San Diego's guidelines, and attended public outreach meetings.

Tehachapi Renewable Transmission Project, Southern California Edison (SCE), Los Angeles and San Bernardino Counties, California. As biologist, assisted senior botanists in conducting surveys for special-status plant species and vegetation mapping. This included mapping vegetation communities and plant species using the Trimble Yuma geographic information system (GIS)/GPS Data Collection System. Served as biological monitor for construction-related activities. Attended construction-monitoring workshop and Worker Environmental Awareness Program/safety training. Construction-monitoring activities included morning and evening sweeps of the construction areas, and monitoring crews for compliance during vegetation removal, mobilization, and tower setup activities. Other activities included establishing Environmentally Sensitive Areas for active nests, and monitoring and updating active nests. Reported new nests observed. Field Reporting Environmental Database reports were completed each day to record daily monitoring activities and nest updates.

Devers Transmission Line, SCE, Riverside County, California. As field assistant, performed mapping of jurisdictional drainages and vegetation for future transmission line towers in the Sonoran Desert. Task included familiarity with the flora and fauna of the desert, vegetation keys, and field mapping forms. More than 500 towers were mapped in a 4-month period. Also conducted monitoring for geotechnical testing over a 3-month period to assist with avoidance of sensitive areas and monitor for desert tortoise (*Gopherus agassizii*), Coachella Valley fringe-toed lizard (*Uma inornata*), and nesting raptors.

Ocotillo Wells Solar Farm, The Gildred Companies, San Diego County, California. As project task manager and field biologist, performed a formal jurisdictional delineation and mapped a series of ephemeral stream channels throughout the property. Prepared the biological resources technical report in accordance with the County of San Diego's guidelines.

East County (ECO) Substation/Tule Wind/Energia Sierra Juarez Gen-Tie Project EIR/Environmental Impact Statement (EIS), San Diego Gas and Electric, San Diego County, California. As project assistant, assisted in review of environmental and focused survey reports for multiple years and various project sites. Assisted in the preparation of EIR/EIS biological resources section as required by the California Public Utilities Commission and Bureau of Land Management. Project includes a substation, approximately 14 miles of new transmission line, and rebuild of the Boulevard Substation. In addition to addressing the new substation project, the EIR/EIS also addressed, as "connected actions," a wind energy project encompassing approximately 15,000 acres, and a generation tie-in required for a transmission line to connect to a wind energy project in Baja California, Mexico. Also attended project planning meetings and provided guidance on key biological issues. Assisted in response to comments and revisions to the Draft EIR/EIS.

Hazard Tree Removal Project, SCE, San Bernardino and San Jacinto Mountains, San Bernardino and Riverside Counties, California. The project area encompasses 106 square miles, an estimated 62,000 acres of tree removal, more than 22,000 power poles, and 538 linear miles of utility lines. As biologist, performs biological monitoring for trees affected by bark beetle infestations, including special-status plant surveys and nesting wildlife species, and provides recommendations for removing trees in environmentally sensitive areas (i.e., riparian zones). In addition, assisted in biological monitoring for trees affected by the 2007 fires in the Lake Arrowhead area.

Focused Field Surveys and Monitoring, SCE, San Bernardino County, California. As a field assistant, performed focused surveys for special-status species, including burrowing owl and desert tortoise in areas designated for new tower construction. Served as a construction monitor for pole removal and replacement, conducting an environmental tailboard meeting, documenting special-status species, avoiding vegetation and special-status species, and ensuring removal of all trash, including microtrash.

Daggett Ridge Wind Energy Project EIS/EIR, Bureau of Land Management and County of San Bernardino, San Bernardino County, California. Served as project assistant for preparation of the joint EIS/EIR for the proposed Daggett Ridge Wind Energy Project, which involves an 82.5 MW wind energy-generating facility on approximately 2,000 acres of federal and private lands in the Barstow/Daggett unincorporated area of San Bernardino County.

Prado 12 Kilovolt, SCE, Riverside County, California. As field biologist, conducted a general biological reconnaissance survey for a series of proposed pole maintenance activities. Conducted a formal wetlands jurisdictional delineation for ACOE wetlands and waters. Prepared a preliminary jurisdictional report.

Fingal Transmission Line, SCE, Riverside County, California. Assisted with special-status plant species surveys along an existing transmission line to provide data in cases where emergency work that impacted special-status plant species would need to be conducted.

Holcomb Valley Boy Scout Ranch Emergency Tower Repair, SCE, San Bernardino County, California. Served as biological monitor for pole installation activities in biologically sensitive areas to ensure avoidance of impacts to potentially occurring U.S. Forest Service threatened, endangered, and sensitive species such as ash-gray paintbrush (*Castilleja cinerea*), southern mountain buckwheat (*Eriogonum kennedyi* var. *austromontanum*), and California dandelion (*Taraxacum californicum*).

Resource Management

Casey's June Beetles Project, USFWS, Riverside County, California. Conducted trapping surveys for Casey's June beetle (*Dinacoma caseyi*) in Palm Springs Wash for the USFWS. Handled and documented Casey's June beetles.

Foss Lake Vector Habitat Remediation Plan, Center of Natural Lands Management, San Diego County, California. As project task manager for biological resource tasks, conducted vegetation mapping and a formal wetlands jurisdictional delineation, and assisted with least Bell's vireo surveys. Prepared the BTR.

Habitat Assessment, Riverside Conservation Agency, Riverside County, California. As field assistant, performed a habitat assessment for Quino checkerspot butterfly, a federally endangered species. The habitat assessment consisted of documenting butterfly species and surveying for Quino host plants.

Salton Sea Species Conservation Habitat Project, Cardno ENTRIX, Imperial County, California. As project assistant, assisted in species research for designing a series of ponds adjacent to the Salton Sea that will provide habitat for target bird species. Assisted in preparing the biological assessment.

Rancho Mission Viejo, Orange County, California. Conducted focused coastal cactus wren (*Campylorhynchus brunneicapillus*) surveys within suitable habitat. Multiple cactus wrens were observed and mapped.

Morro Bay National Estuary Program, Morro Bay, California. As a water quality testing volunteer, performed water quality testing, including testing for nitrogen, phosphates, dissolved oxygen, turbidity, pH, and flow (using FloMaster).

Multiple Species Conservation Program Section, City of San Diego, California. Performed biological surveys for native vegetation using a hand-held GIS unit and uploaded new GIS information into the database. Reviewed plans for properties within the Multiple Habitat Plan area, ensuring that the correct guidelines were followed for a given plan (e.g., riparian buffer zones, landscape plans). Revised management plans per comments from local organizations and agencies. Organized property information for land put into a trust as part of mitigation measures.

Championship Off-Road Racing Project, City of Chula Vista, California. Conducted monitoring during races to assess the impacts of race activity on known occurrences of special-status bird species. Yellow-breasted chat was observed.

Transportation

Brown-Headed Cowbird Trapping Program, Oceanside-to-Escondido Rail Project, North County Transit District, City of Oceanside, San Diego County, California. Responsible for daily operation and maintenance of a brown-headed cowbird (*Molothrus ater*) trapping program along Loma Alta Creek in the City of Oceanside. The trapping program is a USFWS requirement as mitigation for impacts to habitat for federally listed species, including least Bell's vireo, southwestern willow flycatcher, and California gnatcatcher.

Water/Wastewater

North Avenue Channel Protection Project, Oceanside, California. As field biologist and project assistant, performed a formal wetlands jurisdictional delineation and mapped wetlands and waters under the jurisdiction of ACOE, RWQCB, and CDFW, and also mapped vegetation. Additional duties included preparation of the BTR; preparation of the joint permit applications for a 404 Pre-Construction Notification for a Nationwide Permit, 401 Water Quality Certification, and 1600 Streambed Alteration Agreement; attending site visits and meetings with ACOE, RWQCB, and CDFW; and ongoing coordination to obtain project authorizations.

Buena Vista Creek, San Diego County, California. Served as a field biologist to conduct a formal wetlands jurisdictional delineation and mapped wetlands and waters under the jurisdiction of ACOE, RWQCB, CDFW, and the California Coastal Commission. Conducted weekly nesting bird surveys during invasive species removal. Identified the nest of Anna's hummingbird (*Calypte anna*) and established a buffer around the nest until it was inactive.

City of San Diego, Pamo Valley Control Site, San Diego County, California. Conducted riparian bird and nesting bird surveys along Santa Ysabel Creek. Additional duties included preparation of the BTR.

Upper Santa Ana River Wash Plan, Riverside County, California. As field assistant, revised the BTR and response to comments for the Upper Santa Ana River Wash Plan. This included compiling data from multiple sources, conducting habitat suitability models for special-status species, coordinating graphics, and writing the report.

City of Carlsbad Sewer Extension, City of Carlsbad, California. As project manager, managed and conducted the jurisdictional delineation and biological reconnaissance survey, and prepared the BTR for two sewer extension projects within San Diego Multiple Species Habitat Conservation Plan areas. Coordinated monitoring during construction activities to avoid impacts to nesting birds, jurisdictional waters, and California adolphia.

Newhall Land and Farming Company Project, Santa Clara River Watershed Basin Analysis, Counties of Ventura and Los Angeles, California. As project assistant, researched permits issued by ACOE and CDFW, and other documents related to the Santa Clara River Watershed Basin Analysis project regarding impacts to jurisdictional waters and sensitive plant and wildlife species and the mitigation for these impacts.

San Joaquin Marsh Natural Treatment System, Irvine Ranch Water District, Orange County, California. As a field biologist and project assistant, assisted in preparation of agency permit applications. Performed surveys for special-status wildlife species, and mapped white-tailed kite, Caspian tern (*Hydroprogne caspia*), and osprey (*Pandion haliaetus*).

Cañada Gobernadora Multipurpose Basin Project, Santa Margarita Water District, Rancho Santa Margarita, California. As project assistant, assisted writing the BTR for the Cañada Gobernadora Multipurpose Basin project, which is located next to the Cañada Gobernadora Creek and north of the Gobernadora Ecological Reserve Area.

South Orange County Wastewater Authority, Laguna Niguel, Orange County, California. Conducted biological construction monitoring for the emergency repair of export sludge, force main pipelines adjacent to Aliso Creek to ensure compliance with conditions within the Coastal Development Permit and Regional General Permit.

San Timoteo Creek Alternative Discharge Outfall, Yucaipa Valley Water District, Riverside and San Bernardino Counties, California. Conducted biological monitoring for construction of the non-potable water outfall on San Timoteo Creek to ensure compliance with conditions within the Section 1602 Streambed Alteration Agreement. Monitoring included photo documentation and completion of a Site Observation Report.

San Vicente Dam Project, San Diego County, California. Served as a biological monitor and conducted environmental training for new employees. Performed construction monitoring for removal of vegetation, including relocating snakes and common poorwill (*Phalaenoptilus nuttallii*).

Miramar Trunk Sewer Replacement and Permanent Access Project, City of San Diego Metropolitan Wastewater Department (MWWD), San Diego, California. As field assistant, performed construction monitoring for special-status wildlife species for the sewer replacement in Rose Canyon.

As-Needed Biological Services, San Diego MWWD, San Diego, California. Served as project assistant. Reviewed and analyzed plant survey forms and incorporated pertinent information into a biological report.

Aliso Creek Water Quality SUPER Project, South Orange County Wastewater Authority, Laguna Niguel, California.
As project assistant, reviewed southwestern willow flycatcher and least Bell's vireo survey records and assisted with writing the focused survey report.

Specialized Training

- The Western Section of the Wildlife Society Annual Conference. February 2017. Reno, Nevada.
- The Western Section of the Wildlife Society Annual Conference. February 2016. Pomona, California.
- The Western Section of the Wildlife Society Annual Conference. January 2015. Santa Rosa, California.
- The Western Section of the Wildlife Society Annual Conference. January 2013. Sacramento, California.
- Desert Washes and Waters Training and Field Workshop. January 2013. Coachella Valley, California.
- San Joaquin Kit Fox Ecology, Conservation, and Survey Techniques. The Western Section of the Wildlife Society. July 2013.
- Arid Saline Wetlands Training and Field Workshop. March 2012. Coachella Valley, California.
- Introduction to Desert Tortoise Surveying, Monitoring, and Handling Techniques Workshop. Desert Tortoise Council Workshop. November 2011. Ridgecrest, California.
- 40-Hour Wetland Delineation Training, Wetland Training Institute. July 2011.
- The Western Section of the Wildlife Society Annual Conference. February 2011. Riverside, California.
- The Western Section of the Wildlife Society Annual Conference. January 2010. Visalia, California.
- Plant Families Identification: Series IV. Rancho Santa Ana Botanical Garden. Claremont, California. 2010.
- Flora of Joshua Tree. Desert Institute. 2010. Joshua Tree National Park, California.
- Orange County Trackers. Basic Tracking and Observing Class. Orange County Trackers. October 2009. Irvine, California.
- San Diego Natural History Museum. "*Rhamnaceae*." February 2009. San Diego, California.
- Basic Raptor Identification: Southern California Diurnal Raptors. Sea and Sage Audubon Society. February 2009. Huntington Beach, California.
- Birds of Southern California. Sea and Sage Audubon Society. November 2008–January 2009.Huntington Beach, California.
- Plant Terminology and Identification in San Diego County. San Diego State University and Field. April 2008. California.
- Observing Birds Workshop. Sea and Sage Audubon Society. January–March 2008. Huntington Beach, California.
- Introduction to the Morphology and Identification of Flowering Plants. Friends of the Jepson Herbarium. March 2007. University of California, Berkeley.
- Association of Environmental Professionals CEQA Workshop. November 2006.

EXHIBIT F

Dudek Response to Save Our Heritage Organisation Comments

August 13, 2021

DUDEK

August 13, 2021

Geoff Fallon, EVP Development
BayWa r.e. Solar Projects LLC
18575 Jamboree Road, Suite 850
Irvine, CA 92612

RE: Response to July 8, 2021 letter from Save Our Heritage Organization

Dear Mr. Fallon,

Dudek acknowledges the receipt of the comment letter dated July 8, 2021, from Save Our Heritage Organisation (SOHO). In the comment letter, SOHO presents multiple comments regarding the Historical Resources Technical Report (Report) for the JVR Energy Park and the evaluation of the Mountain Meadow Dairy Complex (Dairy Complex or the property).

Dudek's original finding and the Historical Resources Technical Report (see Draft EIR, Appendix D to Appendix E), was prepared by primary author Nicole Frank, MSHP, and reviewed by Historic Built Environment Lead, Sarah Corder, MFA. In this response, the Historical Resources Technical Report will be referred to as the Report, or the HRTR.

The following response to the SOHO letter was prepared by Ms. Corder, with contributions from Ms. Frank and senior architectural historian Allison Lyons, MSHP. Ms. Corder is an architectural historian with 17 years' experience throughout the United States in all elements of cultural resources management, including project management, intensive-level field investigations, architectural history studies, and historical significance evaluations in consideration of the California Register of Historical Resources (CRHR), the National Register of Historic Places (NRHP), and local-level evaluation criteria. Ms. Corder has conducted hundreds of historical resource evaluations and developed detailed historic context statements for a multitude of property types and architectural styles, including private residential, commercial, industrial, educational, and agricultural properties. Additionally, Ms. Corder has prepared multiple NRHP nominations for agricultural properties throughout the United States. She meets the Secretary of the Interior's Professional Qualification Standards for both Architectural History and History. She has experience preparing environmental compliance documentation in support of projects that fall under the California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA), and Sections 106 and 110 of the National Historic Preservation Act. Additional qualifications for Ms. Corder and her team are included in Attachment A.

Dudek upholds the original finding in the Report that the Dairy Complex is not eligible for listing under any designation criteria due to a lack of significant historical associations and compromised integrity. The following provides a detailed response to each comment presented by SOHO in their letter.

Local Criterion 1 Comments and Responses

SOHO Comment:

> Under Criterion 1, the HRTR identifies this dairy facility, totaling 750 acres, was "one of the only large dairy product organizations in San Diego's southwest region that both produced its own milk and then

distributed it." The report also acknowledges the "increasing demand for dairy farms in San Diego in the 1920s," and the new option to "to establish a dairy far away from Mission Valley," but fails to identify or evaluate the development and population impact this large dairy certainly had on Jacumba, its largest local employer to date. The report additionally discusses the development of the sanitary milk bottle top in 1933, noting it was "more likely to have occurred" at the Sixth Street creamery, but no documentation or evidence is provided to support this assumption nor is there an evaluation of how this invention impacted the dairy/ranch or its association with larger changes in the dairy industry" (SOHO 2021).

Dudek Response:

The Report finds that the Dairy Complex is not associated with events that have made a significant contribution to the broad patterns of our history:

- *Archival research did not find any associations with events that have made a significant contribution to the broad patterns of local or regional history . . . Although the property was associated with one of the largest producers of milk in San Diego County from 1930 until 1945, there is no indication that this had any large-scale effect on the broad patterns of history. The production and delivery of milk during this period of time was part of the population growth of the area and is not associated with a historic event of importance. (P. 45.)*

- *The major development made by the Mountain Meadow Dairy and Creamery was the invention of a more sanitary milk bottle top in 1933. There is no evidence to suggest that this invention was made at Sunshine Ranch, rather it was more likely to have occurred at the urban creamery located on the Sixth Street extension constructed in 1933, which focused on the latest technologies in pasteurizing, cooling, testing, and bottling milk under sanitary conditions. (P. 47.)*

These findings remain accurate. According to a *San Diego Union* article from March 12, 1934, 40 employees were employed at the Mission Valley Creamery and an additional 40 were "engaged in the operation of the Mountain Meadow Sunshine Ranch." The company also operated twelve retail and three wholesale routes (SDU 1934). Despite stating that the company employed "an average of 65 employees," archival research indicates that number can be divided into the Mission Valley Creamery, Mountain Meadow Sunshine Ranch, and delivery truck drivers (SDU 1933). In January 1935, the population of Jacumba totaled approximately 800 people; therefore, the Dairy Complex employed approximately 5% of the population (LAT 1935). While it is accurate that the Dairy Complex was a large employer throughout the 1930s and 1940s, there is no evidence that the Dairy Complex was substantially tied to the population growth of the town or a historic event of significance. Rather, the Dairy was one of multiple employers that hired local people from Jacumba and San Diego County in a year-round capacity. As discussed in the Report, the population of the town was tied to tourism and declined after the end of World War II as a result of competition from hot springs to the north, the construction of Interstate 8 and the invention of air conditioning.

- *Visitors often came from the Imperial Valley to escape the summer heat, allowing the normal population of 500 to rise to 5,000 during the summer months. The resort also attracted travelers on the highway through town, specifically Old Highway 80, then known as Imperial Avenue . . . However, after the end of WWII, as the southernmost California hot spring, Jacumba began to feel the competition from more norther ones, including Murrieta and Palm Springs. Along with the invention of air conditioning, which allowed residents of the Imperial Valley comfort when staying home during the summers, the construction of a new Interstate 8 that bypassed the town in 1967, most roadside businesses folded and the community entered into economic decline. (P. 18.)*

With respect to the sanitary milk bottle, the technology was a sanitary sealing metal bottle cap that allowed for fresh home-delivered milk and cream. According to a San Diego Union article from February 5, 1933, the management of Mountain Meadow Creameries "made a large investment to secure the exclusive San Diego use of the Dacro patented milk bottle and the Dacro sanitary metal cap seal" (SDU 1933). The original Dacro (Dairy Crown) was patented by Harvey Coale on April 11, 1911, as an adaptation of a crown finish from 1892. A bottle finish is the top of the bottle above the neck, including the lip and the collar. In 1932, the Dacro finish was modified by Frank L. Wright so that the reinforcing ring became cup-shaped, allowing for space between sealing and reinforcing rings. Dairies throughout the United States utilized the Dacro finish and Dacro caps, though these required specialized capping equipment that was more expensive and slower than other closure mechanisms available at that time. In other words, the Report's original conclusion that there is no evidence that the technology was developed at the Dairy Complex is accurate. The technology was not developed by Mountain Meadow Creameries; it was licensed by the business. Further, despite Mountain Meadow Creameries securing the exclusive rights to use the Dacro milk bottle and cap seals in 1933, this use of the technology does not indicate a larger change in the dairy industry in San Diego. Rather, the use of this bottle and seal technology was utilized throughout the United States and was a mere continuation of advancing technology (Lockhart 2011). Archival research failed to indicate any improvements or advancement of the technology by Mountain Meadow Creameries, thus there is not a strong enough association between innovation in dairy industry milk bottling technology and the property to warrant listing under local Criterion 1.

Local Criterion 2 Comment and Response

SOHO Comment:

> "The HRTR also does not adequately evaluate Criterion 2, for significance of the ranch's longest-running owner and company manager, Edwin Oscar Adams [Sic]. Beginning in 1918, under his leadership, the ranch reached 750 acres, was one of the only large dairy product organizations in San Diego's southwest region to produce and distribute its own milk, and one of the largest San Diego County milk producers from 1930 until 1945. Adams' [Sic] tenure saw the urban creamery constructed in 1933 with various new technologies in the dairy industry, a fleet of 80 employees over two locations, two early morning deliveries, painted delivery trucks, and a 100% sanitary bottle cap that won a gold medal at the California State Fair in 1934. Known as Sunshine Ranch at the time, the dairy closed in 1945 upon Adam's retirement. A revised HRTR should evaluate Adams' [Sic] impact as Jacumba's largest employer and his retirement, such as a decline in population or development due to this temporary loss of local industry." (SOHO 2021).

Dudek Response:

The Report states that: "Edwin Oscar Adams, a native of Michigan, owned and managed the Mountain Meadow Dairy and Creamery of Jacumba, also known as Mountain Meadow's Sunshine Ranch (SDU 1958, 1981). Adams moved to Jacumba in 1918 and acted as both owner and manager of the property until his retirement in 1945." (Report, p. 19.) Based upon further investigation, Adams was not involved in the Dairy Complex during the entirety of period from 1918 to 1945. Rather, in 1918, Edwin Oscar Adams was working as a farmer in Jacumba, not at the Dairy Complex. In 1928, Adams's brother-in-law, John Hartley Taylor of the Taylor Milling Company of Los Angeles, purchased a small dairy in Jacumba and expanded its operations, and made Adams the local dairy manager of Jacumba Farms. In 1930, Taylor became the sole shareholder of the creamery and created a new company called Mountain Meadows Creameries. Taylor made Adams a partner and manager of their San Diego dairy/creamery operations. From 1932 until the mid-1940s, Edwin Adams acted as the manager of the Mountain Meadow Creamery in San Diego while J.H. Wist was the manager of the Mountain Meadow Dairy operations in Jacumba. Based on this information, Adams was only associated with the Dairy Complex from 1928 to 1945 (Diefenbach 2020; SDU 1958).

In order for a property to be listed under Criterion 2, the persons associated with the property must be individually significant within a historic context. It must be shown that the person gained importance within his or her profession or group. Regardless of the length of his involvement in the Dairy Complex, archival research failed to reveal that Adams gained importance within the profession of dairy owners and managers. There is no indication that during the time he was directly associated with the Jacumba Dairy Complex that he made any large-scale advancements that had an effect on the broad patterns of history or his professional group. Therefore, his role in the dairy industry does not rise to the level for Adams to be considered an important individual. (See Report, pp. 45-47.)

The SOHO comment lists several events that allegedly occurred during Adams' tenure at the Dairy Complex. However, as discussed above, these events at the Dairy Complex did not make a significant contribution to the broad patterns of local or regional history. Therefore, to the extent Adams was associated with the Dairy Complex, Adams is not considered an important individual for historical significance and does not rise to the level to be considered an important individual. Due to Adams' lack of individual significance and lack of importance within his profession, the Report remains accurate and the property does not warrant listing under local Criterion 2. (See Report, pp. 45-47.)

Local Criterion 3 Comment and Response

SOHO Comment:

> "Last, under Criterion 3, of the 14 extant resources, there are several significant historical structures [Sic] that compose the Mountain Meadow Dairy and Creamery's Sunshine Ranch complex, which continue to retain integrity and embody distinctive characteristics of the dairy/ranch building typology during the 1918-1945 period for the San Diego County region. Although Dwellings A, B, C and D; the Milking Barn, Barns A, B, and C; Tank Room, Silos, Reservoir, Cow Pens, Office, and Weigh Station are utilitarian structures, this is irrelevant as they demonstrate the practical nature of their construction with integrity of location and setting. Further, the report states the "Silos, Reservoir, Weigh Station, Milking Barn, Tank Room, Cow Pens, Barns A, B, C and Office, Dwellings A, B and C retain enough integrity to warrant listing on the NRHP, CRHP [Sic] or County of San Diego Local Register of Historic Resources," (HRTR p.51). This collection of 14 existent historical resources continues to illustrate the cultural landscape and architecture of a dairy ranch by their location and proximity to each other on the ranch, circulation patterns, and the types of buildings constructed. Together, these are the distinctive characteristics of the dairy/ranch type from a 1918-1945 period of significance for the San Diego County region." (SOHO 2021).

Dudek Response:

Integrity is defined as the authenticity of a historical resource's physical identity evidenced by the survival of characteristics that existed during the resource's period of significance, and the historical resource's ability to convey that significance. To be listed in the National Register of Historic Places (NRHP), a property must not only be shown to be significant under the NRHP criteria, but it also must have integrity. The evaluation of integrity is sometimes a subjective judgment, but it must always be grounded in an understanding of a property's physical features and how they relate to its significance. Historic properties either retain integrity or they do not. Within the concept of integrity, there are seven aspects or qualities that, in various combinations, define integrity, including: location, design, setting, materials, workmanship, feeling, and association (NPS 1990). To retain historic integrity, a property will generally possess several, if not most, of the aspects. The retention of specific aspects of integrity is paramount for a property to convey its significance.

The County of San Diego's Ordinance No. 9493 pertaining to the County local register of historical resources echoes the NRHP's position that integrity is the authenticity of a historical resource's physical identity evidenced by the survival of characteristics that existed during the property's period of significance. The ordinance further states that historical resources eligible for listing in the Local Register must retain enough of their historic character or appearance to be recognized as historical resources and to convey the reasons for their significance (CSD 2002). The criteria for eligibility for the Local Register are comparable to the criteria for eligibility for the California Register of Historical Resources (CRHR) and NRHP, but significance is evaluated at the local level.

The Dairy Complex must be evaluated as one resource and one property type (dairy) that comprises multiple buildings and structures. No building or structure in isolation could reflect the significance of a property with a form and function that required multiple buildings and structures. Significance must be established prior to analyzing whether or not the Dairy Complex as a whole retains integrity. Despite some buildings and structures on the site retaining aspects of integrity, the Dairy Complex as a whole does not retain enough integrity to convey significance as an early twentieth century dairy due to demolitions and alterations.

Following the initial analysis in 2018, the Report stated:

- *The Mountain Meadow Dairy and Creamery complex buildings are not important for their design or construction value. The architects of the fourteen buildings and structures still extant are unknown, as are the architects for the six collapsed and nonexistent buildings. However, it is unlikely that they would be associated with the work of a master architect due to their ubiquitous and utilitarian nature as a complex. The Mountain Meadow Dairy and Creamery complex does not possess characteristics that suggest that it is an important example of the variation, evolution, or transition of vernacular construction of dairy and ranch buildings in the Jacumba area or San Diego County. (p. 46.)*

- *Six of the twenty buildings and structures located on the Mountain Meadow Dairy and Creamery's Sunshine Ranch in Jacumba Hot Springs have lost integrity due to their subsequent collapse. The remaining fourteen buildings, including Dwellings A, B, C and D, the Milking Barn, and Barns A, B, and C, and Tank Room, Silos, Reservoir, Cow Pens, Office, and Weigh Station, do not embody distinctive characteristics of a type, period, San Diego County region, or method of construction. The buildings that comprise the dairy complex are simple utilitarian type structures that are commonly found throughout San Diego County, California, and the nation in agricultural areas and were constructed as early as the 1910s up until today. (p. 48.)*

- *The Silos, Reservoir, Weigh Station, Milking Barn, Tank Room, Cow Pens, Barns A, B, C and Office, Dwellings A, B and C retain enough integrity to warrant listing on the NRHP, CRHP or County of San Diego Local Register of Historic Resources. While Collapsed Barn A, and Barn Foundations A, B, C, and D, Dwelling D, and the Collapsed Shed do not retain enough integrity to warrant listing on the NRHP, CRHR, and County of San Diego Local Register of Historic Resources. (p. 51.)*

Although at the time thirteen of the buildings and structures, when reviewed separately, appeared to reflect sufficient integrity to warrant listing, the property historically functioned as a singular entity. Therefore, the Dairy Complex's integrity should be assessed as a whole. When reviewing at the property as a whole, the essential physical features that define and reflect both why the Dairy Complex could be significant and the period in which it could be significant are no longer extant. The property does not retain its character to present as a functioning dairy ranch that operated between the 1920s and the 1940s. The primary reason for this finding was the demolition of the large barns and cow pens in the northern section of the Dairy Complex (Figure 3 below; building foundations 15 and 18 in the HRTR Figure 2). While the HRTR stated that Milking Barn (Building 1) and the Tank House (Building 2) retain integrity of location, setting, association, and feeling, they have diminished structural integrity, including integrity of materials, design and

workmanship (HRTR p. 49-50). The demolition and structural failure of these key dairy buildings and cow pens that were located at the center of the property directly north of the Milking Barn compromised the property's ability to convey its original function as a dairy (Figure 1). Furthermore, without the fundamental buildings that made housing, feeding, and milking the cows and their circulation across the property possible, the property no longer retains its ability to convey its historic identity and function as an early twentieth century dairy. Finally, even if the complex as a whole retained integrity, the Dairy Complex still lacks historical significance and would not be designated a historical resource, as discussed further above.

Figure 1. Aerial comparison of Mountain Meadow Dairy Complex from 1928 with the barns (left) and 2021 with the former location of the barns (right) circled in red (Diefenbach 2020; Google 2021)

Figure 2. Detail of Structural Failure Tank House West Elevation, 2018.

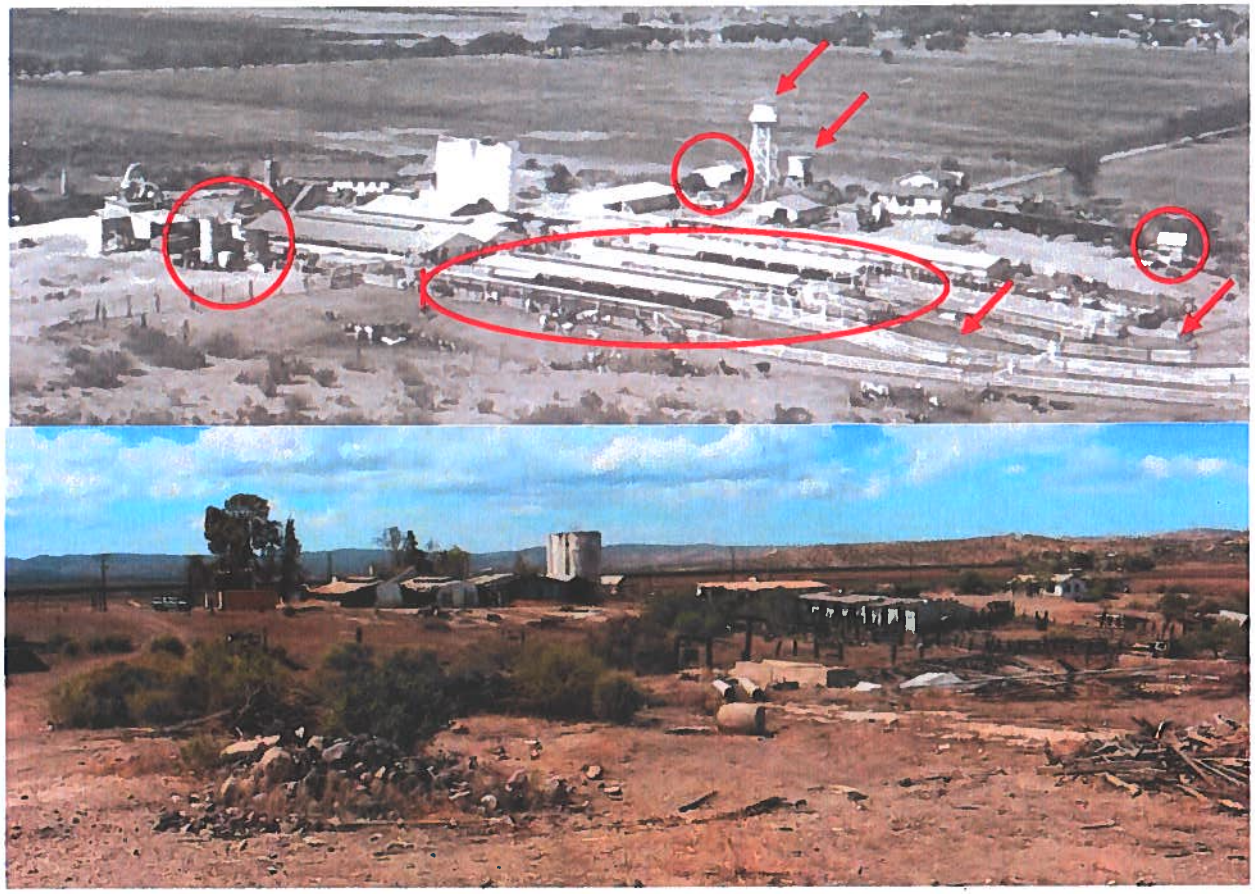


Figure 3. Comparison between the Mountain Meadow Dairy Complex from 1934 (top) and 2018 (bottom) with circles and arrows indicating the location of demolished or collapsed buildings and structures, view to southwest (Diefenbach 2020; IMG_3462).

The following table presents the observed conditions and alterations for the extant buildings and structures at the Dairy Complex observed during the August 2018 site visit conducted by Dudek.

Table 1. Conditions of Dairy Complex 2018

Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
1	**Milking Barn**  (IMG_3475)	c. 1928	Altered	• Removal of exterior materials • Addition of non-original, incompatible exterior materials • Removal of roofing materials • All interior equipment removed
2	**Tank Room**  (IMG_3763)	c. 1928	Altered	• Removal of all original glazing • Destruction of multiple concrete masonry units throughout • Infill of multiple original openings

Table 1. Conditions of Dairy Complex 2018

Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
3	**Silos**  (IMG_3672)	c. 1928	Intact	• Not applicable
4	**Dwelling A**  (IMG_3767)	c. 1928	Altered	• Replacement cladding on the east elevation • Replacement window sash on the south elevation • Removal of original glazing in multiple windows • Replacement entry door on the north elevation • Reroofing

Table 1. Conditions of Dairy Complex 2018

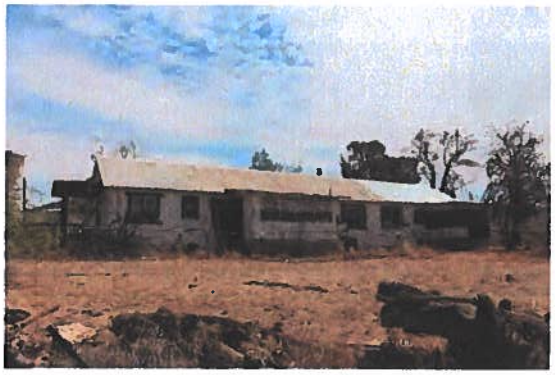
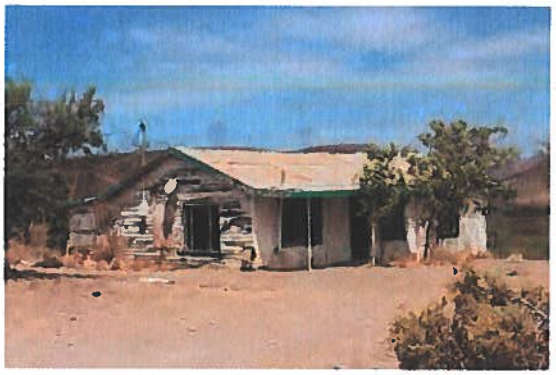
Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
5	**Dwelling B**  (IMG_3708)	c. 1934	Altered	• Shed roof additions to the southwest elevation clad with a mixture of wood siding, vertical boards, and plywood • Awning addition to the northwest elevation • Replacement entry door on the northeast elevation • Replacement windows • Reroofing
6	**Dwelling C**  (IMG_3575)	c. 1928	Altered	• Addition to the west elevation • Overhang addition to the east elevation • Removal of the main entry door on the east elevation • Replacement windows • Removal of original glazing in multiple windows • Reroofing

Table 1. Conditions of Dairy Complex 2018

Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
7	**Dwelling D**  (IMG_3629)	c. 1928	Altered	• Removal of exterior cladding throughout • Removal of all entry doors • Removal of all original glazing • Removal of roof shingles
8	**Reservoir**  (IMG_3644)	c. 1928	Altered	• Removal of original materials including wood and concrete • Patches using incompatible, non-original materials • Addition of non-original pipes

Table 1. Conditions of Dairy Complex 2018

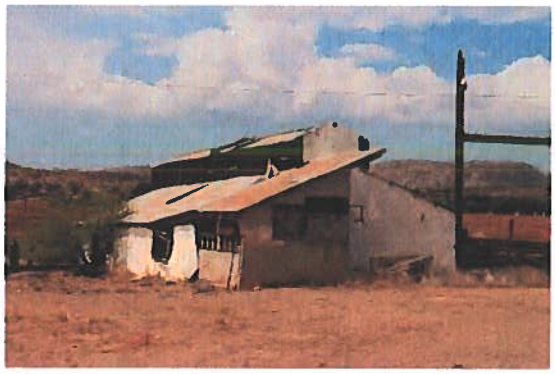
Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
9	**Barn A**  (IMG_3669)	c. 1928	Altered	• Removal of exterior materials • Addition of non-original, incompatible exterior materials • Removal of multiple awning openings on the south elevation • Removal of metal sliding doors on the east and west elevations • Reroofing
10	**Barn B**  (IMG_3681)	c. 1934	Altered	• Addition to northeast elevation • Removal of exterior materials • Addition of non-original, incompatible exterior materials • Removal of barn door on the southwest elevation • Reroofing

Table 1. Conditions of Dairy Complex 2018

Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
11	**Barn C**  (IMG_3562)	c. 1934	Altered	• Addition to the south elevation • Removal of exterior materials • Addition of non-original, incompatible exterior materials • Removal of roofing sections • Removal of all entry doors
12	**Cow Pens**  (IMG_3477)	c. 1934	In Ruins	• Not applicable

Table 1. Conditions of Dairy Complex 2018

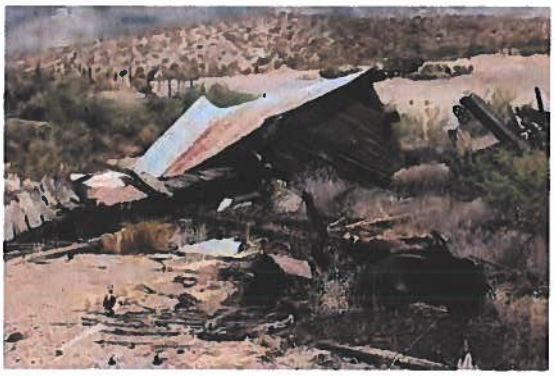
Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
13	**Collapsed Shed**  (IMG_3587)	c. 1934	In Ruins	• Not applicable
14	**Collapsed Barn A**  (IMG_3658)	c. 1934	In Ruins	• Not applicable

Table 1. Conditions of Dairy Complex 2018

Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
15	**Barn Foundation B**  (IMG_3472)	c. 1934	Demolished	• Not applicable
16	**Barn Foundation C**  (IMG_3427)	c. 2009	Demolished	• Not applicable

Table 1. Conditions of Dairy Complex 2018

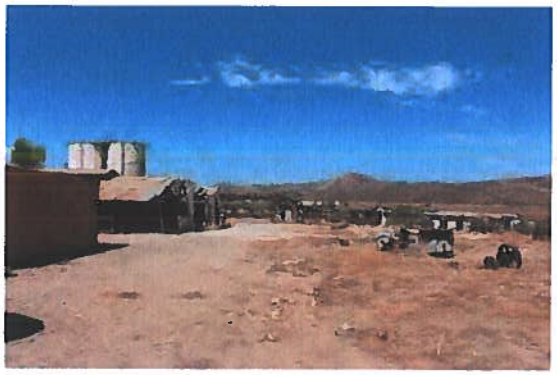
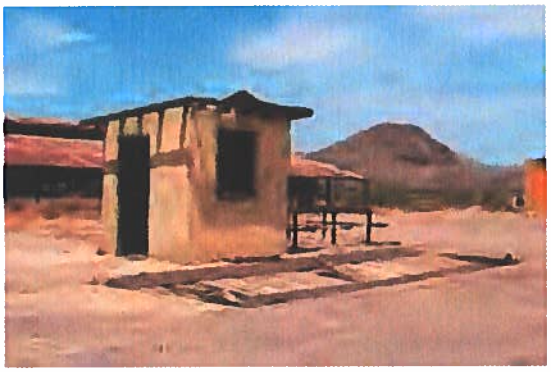
Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
17	**Barn Foundation D**  (IMG_3880)	c. 2009	Demolished	• Not applicable
18	**Barn Foundation E**  (IMG_3435)	c. 1934	Demolished	• Not applicable

Table 1. Conditions of Dairy Complex 2018

Building Number	Building Name	Year Built	Current Condition (intact, altered, in ruins, demolished)	Observed Alternations (if applicable)
19	**Office**  (IMG_3865)	c. 2005	Altered	• Removal of exterior materials • Addition of non-original, incompatible exterior materials • Replacement windows throughout • Replacement entry doors throughout • Installation of a security door • Reroofing
20	**Weigh Station**  (IMG_3868)	c. 1934	Altered	• Removal of all fenestration • Removal of roofing sections

In summation, Dudek upholds the original finding in the Report that the Dairy Complex is not eligible for listing under any designation criteria due to a lack of significant historical associations and compromised integrity.

Sincerely,

Sarah Corder

Sarah Corder, MFA
Historic Built Environment Lead

Attachment A: Preparers' Qualifications

Attachment A

Preparers' Qualifications

Sarah Corder, MFA

Historic Built Environment Lead

Sarah Corder (*SARE-uh COR-der; she/her*) is an architectural historian with 17 years' experience throughout the United States in all elements of cultural resources management, including project management, intensive-level field investigations, architectural history studies, and historical significance evaluations in consideration of the California Register of Historical Resources (CRHR), the National Register of Historic Places (NRHP), and local-level evaluation criteria. Ms. Corder has conducted hundreds of historical resource evaluations and developed detailed historic context statements for a multitude of property types and architectural styles, including private residential, commercial, industrial, educational, and agricultural properties. She has also provided expertise on numerous projects requiring conformance with the Secretary of the Interior's Standards for the Treatment of Historic Properties.

Education

Savannah College of Art and Design
MFA, Historic Preservation, 2004

Bridgewater College
BA, History, 2002

Professional Affiliations

National Trust for Historic Preservation

Los Angeles Conservancy

California Preservation Foundation

Society for Architectural Historians

Ms. Corder meets the Secretary of the Interior's Professional Qualification Standards for both Architectural History and History. She has experience preparing environmental compliance documentation in support of projects that fall under the California Environmental Quality Act (CEQA)/National Environmental Policy Act (NEPA), and Sections 106 and 110 of the National Historic Preservation Act.

Relevant Project Experience

Mira Mesa Community Plan Area Historic Context Statement and Focused Reconnaissance Survey, City of San Diego Planning Department, California. Dudek was retained by the City of San Diego to prepare a historic context statement identifying the historical themes and associated property types important to the development of Mira Mesa, accompanied by a reconnaissance-level survey report focused on the master-planned residential communities within the Mira Mesa Community Plan Area (CPA). While the historic context statement addressed all development themes and property types within the community, the scope of the survey was limited to residential housing within the CPA constructed between 1969 and 1990. This study was completed as part of the comprehensive update to the Mira Mesa CPA and Programmatic EIR. Served as project manager leading the survey efforts, senior architectural historian, and co-author of the historic context statement and survey reports. Also provided quality assurance/quality control (QA/QC) of survey information. (2020–Present)

University CPA Historic Context Statement and Focused Reconnaissance Survey, City of San Diego Planning Department, California. Dudek was retained by the City of San Diego to prepare a historic context statement identifying the historical themes and associated property types important to the development of University City, accompanied by a reconnaissance-level survey report focused on the master-planned residential communities within the University CPA. While the historic context statement addressed all development themes and property types within the community, the scope of the survey was limited to residential housing within the CPA constructed between the 1960s and 1990s. Served as project manager leading the survey efforts, senior architectural

historian, and co-author of the historic context statement and survey reports. Also provided QA/QC of survey information. (2020–Present)

The Enclave at Ivanhoe Ranch Project, Rancho San Diego, San Diego County, California. Dudek was retained by the applicant to complete a Historical Resources Technical Report (HRTR) in support of a residential development project totaling approximately 121.9 acres in unincorporated San Diego County. The project site includes the Ivanhoe Ranch, an historic-era complex of horse ranch buildings and accompanying residences located at 3256, 3261, 3263, 3267, and 3269 Ivanhoe Ranch Road. The Ivanhoe Ranch was evaluated for historical significance in consideration of potential impacts to historical resources under CEQA, the County of San Diego Historic Preservation Ordinance, and County of San Diego Resource Protection Ordinance. The Ivanhoe Ranch was recommended eligible under NRHP, CRHR and County of San Diego Criteria B/2/2 and C/3/3 for its association with important historical figure John P. Scripps, architectural merit, and association with master designer Cliff May. A detailed impacts assessment with associated protective mitigation was included in the HRTR. Responsibilities included archival research and co-authorship of the report. (2020)

Sycuan Fee to Trust Project, Sycuan Band of Kumeyaay Nation Reservation, San Diego County, California. Dudek was by the Sycuan Band of the Kumeyaay Nation Reservation to complete a Historic Properties Inventory and Evaluation Report for the proposed Sycuan Fee to Trust Project, located on the within the vicinity of El Cajon, California in unincorporated San Diego County. The Project proposes a fee-to-trust transfer of five (5) parcels that cumulatively total approximately 40 acres. The transfer of land from Sycuan to the Bureau of Indian Affairs (BIA), the federal lead agency. Responsibilities for the project included building permit research, background research, and co-authoring the report. (2020)

Draft Historical Resources Technical Report for the Ranch at River Bend Project, Community of Pala, San Diego, California. Dudek was retained by Save Gregory Canyon Hills LLC to complete a Historical Resources Technical Report in support of the proposed Ranch at River Bend Project. The proposed project is to develop a new, mixed-use community. The Project area is located to the west of Pala, located in the County. Five built environment resources were identified within the project's Area of Potential Effect (APE) as a result of the records search, background research, and pedestrian survey: the San Diego Aqueduct (Property 1), the Lucio Dairy (Property 2), the Pete Verboom Dairy (Property 3), 34468 Jamies Lane (Property 4), and 34440 Jamies Lane (Property 5). Three of these resources have been previously recorded/evaluated. As a result of the new and updated historical significance evaluations, one historical resource/historic property was identified within the Project area: the San Diego Aqueduct. The San Diego Aqueduct was evaluated for the NRHP, CRHR, the County of San Diego Designation criteria, and the County's RPO, and was assessed for integrity. As a result of the updated evaluation, the San Diego Aqueduct is recommended eligible under NRHP, CRHR and County of San Diego Criteria A/1/1 due to significant associations with events and patterns of San Diego's water history and a high level of integrity. SHPO has previously concurred on its eligibility (Ref: COE110329C). Responsibilities included senior level oversight for field work and all project deliverables. (2020)

Coronado Citywide Historic Resources Inventory and Historic Context Statement, City of Coronado, California. Dudek is currently preparing a historic context statement and historic resources inventory survey for all properties at least 50 years or older within city limits. Following current professional methodology standards and procedures developed by the California Office of Historic Preservation and the National Park Service (NPS), Dudek will (1) develop a detailed historic context statement for the city that identifies and discusses the important themes, patterns of development, property types, and architectural styles prevalent throughout the city and (2) conduct a reconnaissance-level survey of all properties within city limits that are at least 50 years old to identify individual properties and groupings of properties (i.e., historic districts) with potential for historical significance under City Criterion C (properties that possess distinctive characteristics of an architectural style; are valuable for the study of a type, period, or method of construction; and have not been substantially altered). To date, Dudek has conducted a public kick-off meeting, conducted local

stakeholder outreach meetings, submitted a draft historic context statement to the city for review, and began the citywide survey component of the project. Responsible for managing the project, leading the citywide field survey component of the project, QA/QC of the historic context statement and will provide QA/QC for all field data and co-authorship of the final survey report. (2019–Present)

City of Coronado As-Needed Historic Research Consultant, City of Coronado, California. Dudek is currently working with the City of Coronado Community Development Department to provide historic preservation services on an as-needed basis. Services scoped under the current contract include historic resources surveys; archival research; preparation of evaluation reports in consideration of NRHP, CRHR, and City of Coronado designation criteria; attendance at Historic Resource Commission and City Council hearings; and review of projects for conformance with the Secretary of the Interior's Standards for Rehabilitation. Since January 2019, Dudek has completed 20 work orders for the city. Serves as a senior architectural historian for the tasks orders and is responsible for QA/QC of specific deliverables. (2019–Present)

San Diego Dam and Reservoir Citywide Inventory, City of San Diego Public Utilities Department, California. Dudek was retained to prepare a historic context statement and evaluate 10 dam complexes and a flume for the San Diego Public Utilities Department. A detailed historic context was developed after extensive archival research efforts and resources were evaluated for historical significance in consideration of NRHP, CRHR, and City of San Diego designation criteria and integrity requirements. The project also required pedestrian survey of all facilities. Dudek then prepared detailed impacts assessments for proposed modifications to the Dulzura Conduit, Lower Otay Dam, and Morena Dam. Responsibilties included archival research, co-authorship of the historic context statement, preparation of DPR forms, assisting in the creation of a public brochure, and primary authorship of multiple dam significance evaluations. (2017–2020)

Historical Resource Evaluation for the Normal Street Department of Motor Vehicles, State of California Department of General Services, San Diego, California. Dudek was retained to complete an HRTR for a project that proposes demolition and replacement of the Department of Motor Vehicles building located at 3960 Normal Street in the City of San Diego. To comply with California Public Resources Code, Section 5024(b), the Department of General Services must submit to the State Historic Preservation Officer (SHPO) an inventory of all structures over 50 years of age under their jurisdiction that are listed in or that may be eligible for inclusion in the NRHP, CRHR, and California Historical Landmark. The Department of Motor Vehicles was found not eligible. Responsibilities included archival research and co-authorship of the HRTR. (2017)

Village 3 HomeFed Otay Park Swap, Otay Ranch, Chula Vista, California. Dudek was retained to prepare a Constraints Analysis for the development of approximately 100 acres of land south of the Otay River as an active recreation site. Responsibilities included background research and assistance in the preparation of the historic context for the report. (2017)

Nicole Frank, MSHP

Architectural Historian

Nicole Frank (nih-COHL FRAYNK; she/her) is an architectural historian with 4 years' professional experience in the historic preservation field. Ms. Frank's professional experience encompasses a variety of projects for local agencies, private developers, and homeowners in both highly urbanized and rural areas, including reconnaissance-level surveys, preparation of resource-appropriate and citywide historic contexts, and historical significance evaluations in consideration of the NRHP, CRHR, and local designation criteria. She has experience conducting historic research, writing landmark designations, performing conditions assessments, and working hands-on in building restoration projects throughout the United States. Ms. Frank also has governmental experience with the City of San Francisco's Planning Department and the City of Chicago's Landmark Designations Department. She meets the Secretary of the Interior's Professional Qualification Standards for Architectural History.

Education

The School of the Art Institute of Chicago, MS
Historic Preservation, 2018
The College of Charleston, BA,
Historic Preservation and Art History, 2016

Professional Affiliations

California Preservation Foundation
Association for Preservation Technology (APT)
Encinitas Preservation Association

Relevant Project Experience

Mira Mesa and University Community Plan Area Historic Context Statements and Mira Mesa and University Community Plan Area Focused Reconnaissance Surveys, City of San Diego Planning Department, San Diego California (In Progress). Dudek was retained by the City of San Diego to prepare a historic context statement identifying the historical themes and associated property types important to the development of Mira Mesa and University, accompanied by a reconnaissance-level survey report focused on the master-planned residential communities within the Mira Mesa and University Community Plan Areas. These studies were completed as part of the comprehensive update to the Mira Mesa CPA and Programmatic Environmental Impact Report and University CPA and Programmatic Environmental Impact Report. While the historic context statement addressed all development themes and property types within the community, the scope of the survey was limited to residential housing within the CPA constructed between 1969 and 1990. Acting as architectural historian the historic context statement and survey document and all associated archival research efforts was co-authored/completed by Ms. Frank.

Coronado Citywide Historic Resources Inventory and Historic Context Statement, City of Coronado, California (In Progress). Dudek is currently in the process of preparing a historic context statement and historic resources inventory (HRI) survey for all properties at least 50 years or older within city limits. Following current professional methodology standards and procedures developed by the California Office of Historic Preservation and the National Park Service (NPS), Dudek will: (1) develop a detailed historic context statement for the City that identifies and discusses the important themes, patterns of development, property types, and architectural styles prevalent throughout the city; and (2) conduct a reconnaissance-level survey of all properties within city limits that are at least 50 years old to identify individual properties and groupings of properties (i.e., historic districts) with potential for historical significance under City Criterion C (properties that possess distinctive characteristics of an

architectural style; are valuable for the study of a type, period, or method of construction; and have not been substantially altered).

As Needed Historic Research Consulting Services, City of Coronado, Coronado, California (2019-present). Dudek was retained by the City of Coronado to provide as-needed historic consulting services for projects in Coronado. Each evaluation involved the creation of an occupancy timeline, supplemental research on occupants, architect/ builder, and property, building development research, a pedestrian survey of the project area, a description of the surveyed resource, and completion of a historical significance evaluation report in consideration of designation criteria and integrity requirements. Acting as project manager and architectural historian, Ms. Frank authored historical resource evaluation reports for the following properties: 936 J Avenue; 310 2nd Street; 718 B Avenue; 1027-1029 Orange Avenue; 735 Margarita Avenue; 519 Ocean Boulevard; 1901 Monterey Avenue; 269 Palm Avenue; 1113 Adella Avenue; 1519 4th Street; 745 A Avenue; 451-55 Alameda Boulevard; 503 10th Street; 121 G Avenue; 1152 Glorietta Boulevard; 711 Tolita Avenue; 951 G Avenue; 817 A Avenue; 625 B Avenue.

Historic Resource Evaluation Report for a Battery Storage Project, Confidential Client, San Diego, California (2021). Dudek was retained by the applicant to prepare a Historic Resource Evaluation Report for a project that proposes to develop a battery energy storage system located in San Diego, California. This report includes a pedestrian survey by one qualified architectural historian for the presence of historic built environment resources. All buildings and structures over 45 years old identified within the project area were recorded and evaluated for historical significance. The significance evaluation included conducting archival and building development research for the project area, and completion of an appropriate historic context. Acting as architectural historian, conducted pedestrian surveys and authored the Historic Resource Evaluation Report.

Phase 1, Cultural Resources Inventory Report for the San Diego County Water Authority Southern First Aqueduct Structures Rehabilitation Project, San Diego County Water Authority, San Diego County, California (2021). Dudek was retained by the San Diego County Water Authority to conduct a Phase I Cultural Resources (including both archaeological and built-environment) Inventory for the Southern First Aqueduct Rehabilitation Project, located along a 21-mile stretch of the First San Diego Aqueduct, east of Interstate 15 from the City of Escondido in the north, to the Goodan Ranch/Sycamore Canyon County Preserve west of San Vicente Reservoir. As part of this effort, the Water Authority will be applying for a Letter of Permission under their Programmatic Master Plan Permit with the United States Army Corps of Engineers, pursuant to Section 404 of the Clean Water Act. The United States Army Corps of Engineers is the federal lead agency responsible for overseeing compliance with Section 106 of the National Historic Preservation Act, as this project is exempt from review under CEQA. Acting as architectural historian, co-authored the Phase I Cultural Resources Inventory Report and authored the analysis of potential adverse effects.

Historic Properties Inventory Report for the Senior Residences at Hillcrest Project, 3900 Cleveland Avenue, San Diego, California (2020). Dudek was retained by DFA Development to prepare a Historic Properties Inventory Report for the Senior Residences at Hillcrest Project, which proposed to develop a 68-unit, senior affordable housing community located at 3900 Cleveland Avenue in the Hillcrest neighborhood of San Diego, California. The Project site is partially developed with existing buildings for pre-school services associated with the adjacent University Christian Church and a parking lot. The Project is proposing to receive U.S. Department of Housing and Urban Development project vouchers issued to the San Diego Housing Commission, and is therefore, is required to undergo a National Environmental Policy Act analysis for receiving federal funding. Acting as architectural historian, Ms. Frank co-authored the technical report and conducted a pedestrian survey of the site.

Draft Historical Resources Technical Report for the Ranch at River Bend Project, Community of Pala, San Diego, California (2020). Dudek was retained by Save Gregory Canyon Hills LLC to complete a Historical Resources Technical Report in support of the proposed Ranch at River Bend Project. The proposed project is to develop a new, mixed-use community. The Project area is located to the west of Pala, located in the County. Five built environment resources were identified within the project's Area of Potential Effect (APE) as a result of the records search, background research, and pedestrian survey: the San Diego Aqueduct (Property 1), the Lucio Dairy (Property 2), the Pete Verboom Dairy (Property 3), 34468 Jamies Lane (Property 4), and 34440 Jamies Lane (Property 5). Three of these resources have been previously recorded/evaluated. As a result of the new and updated historical significance evaluations, one historical resource/historic property was identified within the Project area: the San Diego Aqueduct. The San Diego Aqueduct was evaluated for the NRHP, CRHR, the County of San Diego Designation criteria, and the County's RPO, and was assessed for integrity. As a result of the updated evaluation, the San Diego Aqueduct is recommended eligible under NRHP, CRHR and County of San Diego Criteria A/1/1 due to significant associations with events and patterns of San Diego's water history and a high level of integrity. SHPO has previously concurred on its eligibility (Ref: COE110329C). Acting as architectural historian, Ms. Frank co-authored the technical report and conducted a pedestrian survey of the site.

Historical Resources Technical Report for the Enclave at Ivanhoe Ranch Project, Rancho San Diego, San Diego County, California (2020). Dudek was retained by Vance & Associates to complete a Historical Resources Technical Report (HRTR) in support of the proposed Enclave at Ivanhoe Ranch Project (project). The proposed project is a residential development project. The project site totals approximately 121.9 acres in an unincorporated San Diego County, south of the City of El Cajon, California. Included in the 121.9-acre project site is a historic-era complex of horse ranch buildings and accompanying residences, located at 3256, 3261, 3263, 3267, and 3269 Ivanhoe Ranch Road (APNs 518-030-41, 518-030-43, 518-030-44, and 518-030-45) which was evaluated for historical significance. This study was conducted in accordance with Section 15064.5(a)(2)-(3) of the CEQA Guidelines, and the project site was evaluated in consideration of National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), and County of San Diego Historic Preservation Ordinance and RPO requirements. Acting as architectural historian, Ms. Frank co-authored the technical report and conducted a pedestrian survey of the site.

Historic Context Statement for Reservoirs, City of San Diego Public Utilities Department, California (2020). Dudek was retained by the City of San Diego Public Utility Department to complete a survey and historic context statement for the city's surface water storage system, including 10 dam complexes and the Dulzura Conduit. Dudek also prepared detailed impacts assessments for proposed modification to dams, as required by the Department of Safety of Dams. The project involves evaluation of 10 dam complexes and conduit for historical significance in consideration of National Register of Historic Places, California Register of Historic Resources, and city designation criteria and integrity requirements, and required extensive archival research and pedestrian survey. Evaluated five resources including the Dulzura Conduit, Upper Otay Dam, Murray Dam, Sutherland Dam, and Miramar Dam.

Allison Lyons, MSHP

Senior Architectural Historian

Allison Lyons (*AL-ih-suhn LYE-ons; she/her*) is an architectural historian with 12 years' experience throughout the western United States in all elements of cultural resources management. Her expertise includes the preparation of environmental compliance documents in accordance with the California Environmental Quality Act (CEQA) and Section 106 of the National Historic Preservation Act, focusing on the evaluation of historical resources and analysis of project impacts. As a historic preservation consultant, she has been involved in the preparation of numerous large-scale historic resources surveys, Historic American Buildings Survey/Historic American Engineering Record recordation, Federal Rehabilitation Tax Credit and Mills Act Historic Property Contract applications, local landmark nominations, and evaluations of eligibility for a wide variety of projects and property types throughout California. She is highly experienced in writing National Register of Historic Places (NRHP) nominations and historic context statements for local governments.

Ms. Lyons meets the Secretary of the Interior's Professional Qualifications Standards for history and architectural history pursuant to Title 36, Part 61, of the Code of Federal Regulations, Appendix A.

Education

Columbia University, 2010
M.S., Historic Preservation,

Scripps College, 2006
B.A., European Studies,

Professional Experience

Dudek, Senior Architectural Historian, 2021–Present

GPA Consulting, Associate Architectural Historian, 2015-2019, Senior Architectural Historian, 2019–2021

Chattel Inc., Associate Architectural Historian, 2013–2015

Architectural Resources Group, Architectural Historian, 2010–2013

Mellon Graduate Fellowship in Primary Sources, Columbia University, 2009–2010

Selected Experience

As-Needed Historic Research Consultant On Call Services, Coronado, California. Dudek is currently working with the City of Coronado Community Development Department to provide historic preservation services on an as-needed basis. Services scoped under the current contract include historic resources surveys; archival research; preparation of evaluation reports in consideration of National Register of Historic Places, California Register of Historical Resources, and City of Coronado designation criteria; attendance at Historic Resource Commission and City Council hearings; and review of projects for conformance with the Secretary of the Interior's Standards for Rehabilitation. Since January 2019, Dudek has completed 20 work orders for the city. Ms. Lyons serves as a senior architectural historian for the historical resource evaluation task orders and is responsible for quality assurance/quality control of specific deliverables. (2021–Present)

Coronado Citywide Historic Resources Inventory and Historic Context Statement, City of Coronado, California. Dudek is currently preparing a historic context statement and historic resources inventory survey for all properties at least 50 years or older within city limits. Following current professional methodology standards and procedures developed by the California Office of Historic Preservation and the National Park Service (NPS), Dudek will (1) develop a detailed historic context statement for the city that identifies and discusses the important themes, patterns of development, property types, and architectural styles prevalent throughout the city and (2) conduct a reconnaissance-level survey of all properties within city limits that are at least 50 years old to identify individual

properties and groupings of properties (i.e., historic districts) with potential for historical significance under City Criterion C (properties that possess distinctive characteristics of an architectural style; are valuable for the study of a type, period, or method of construction; and have not been substantially altered). To date, Dudek has conducted a public kick-off meeting, conducted local stakeholder outreach meetings, submitted a draft historic context statement to the city for review, and began the citywide survey component of the project. Ms. Lyons has contributed to the project management, approach to citywide field survey component of the project, QA/QC of the historic context statement and will provide QA/QC for all field data and co-authorship of the final survey report. (2021–Present)

Mira Mesa Community Plan Area Historic Context Statement and Focused Reconnaissance Survey, City of San Diego Planning Department, California. Dudek was retained by the City of San Diego to prepare a historic context statement identifying the historical themes and associated property types important to the development of Mira Mesa, accompanied by a reconnaissance-level survey report focused on the master-planned residential communities within the Mira Mesa Community Plan Area (CPA). While the historic context statement addressed all development themes and property types within the community, the scope of the survey was limited to residential housing within the CPA constructed between 1969 and 1990. This study was completed as part of the comprehensive update to the Mira Mesa CPA and Programmatic EIR. Served as senior architectural historian, providing quality assurance/quality control (QA/QC) of the historic context statement and survey reports. (2021–Present)

University CPA Historic Context Statement and Focused Reconnaissance Survey, City of San Diego Planning Department, California. Dudek was retained by the City of San Diego to prepare a historic context statement identifying the historical themes and associated property types important to the development of University City, accompanied by a reconnaissance-level survey report focused on the master-planned residential communities within the University CPA. While the historic context statement addressed all development themes and property types within the community, the scope of the survey was limited to residential housing within the CPA constructed between the 1960s and 1990s. Served as senior architectural historian, providing quality assurance/quality control (QA/QC) of the historic context statement and survey reports. (2021–Present)

Los Angeles Department of Water and Power Century Trunk Line, Los Angeles Department of Water and Power, City of Los Angeles, California. Dudek was retained by Los Angeles Department of Water and Power to prepare an Avoidance and Protection Plan for Air Raid Siren No. 150. The resource is eligible for the NRHP and California Register of Historical Resources and as a City of Los Angeles Historic-Cultural Monument under Criteria A/1/1 and C/3/3 for its association with World War II and Cold War military infrastructure, and is a historical resource under CEQA. Ms. Lyons is serving as a senior architectural historian, providing quality assurance/quality control for the Post-Construction Monitoring Report. (2021–Present)

San Joaquin Rapid Transit District Solar Installation Project Section 106 Review, Stockton, California. The San Joaquin Rapid Transit District proposed to add solar charging stations and electric buses to support the sustainability of the transit system. Ms. Lyons helped to analyze potential impacts to historical resources at the transit district's three proposed solar installation locations across the City of Stockton. She conducted fieldwork and identified potential impacts to historical resources for the Environmental Impact Report. (2020)

2862 S. Campus Avenue Redevelopment Site Historical Resource Evaluation and Impacts Analysis (for CEQA), Ontario, California. A new residential development was proposed for a site occupied by a dairy farm with buildings dating to the early 1920s. Ms. Lyons completed a historic resource evaluation of the dairy farm to determine if the development would result in impacts on historical resources. (2020)

676 Moss Street Redevelopment Site Historical Resource Evaluation and Impacts Analysis (for CEQA), Chula Vista, California. Ms. Lyons completed a historical resource evaluation and impacts analysis for a redevelopment site of industrial buildings in Chula Vista. She also identified the potential for the project to cause indirect and/or cumulative impacts to adjacent historical resources. (2020)

Rives Mansion Rehabilitation Project Historical Resource Treatment Plan, Impacts Analysis (Secretary of the Interior's Standards Compliance Review), and Construction Monitoring, Downey, California. Working with the City of Downey, Ms. Lyons collaborated with the project architect for a renovation and rehabilitation project at the Rives Mansion, a historic mansion and walnut farm. In advance of the development of project plans, Ms. Lyons prepared a Preservation Plan for the property to establish the opportunities and constraints for the rehabilitation. After project plans were prepared, Ms. Lyons reviewed the plans for compliance with the Secretary of the Interior's Standards for Rehabilitation and made recommendations for modifications to ensure the project plans complied with the Standards. Ms. Lyons also performed periodic construction monitoring. (2019–2021)

Caltrans District 10, McHenry Avenue Widening Historical Resource Evaluation Report, Modesto, Stanislaus County, California. The County of Stanislaus proposed to widen the existing two-lane McHenry Avenue to a total of five lanes (two northbound lanes, two southbound lanes, and one continuous left turn/median lane) from the intersection of Ladd/Patterson Road to 0.25 miles south of the intersection with East River Road. Conducted research, site visits, and photographic documentation for the purposes of the HRER, which evaluated properties in the APE to determine if the project had the potential to impact historic resources. Property types in the APE included agricultural-related properties from the 1910s through 2000, historic designed landscapes, a country club, and ranch-style houses. Also completed DPR Forms for the project. (2016–2017)

Vista Irrigation District Reservoirs E2 and F Historical Resource Evaluation Historical Resource Evaluation Report, Vista, California. Ms. Lyons evaluated components of a historic irrigation district in northern San Diego County. Two concrete reservoirs dating to the early twentieth century were recorded and evaluated for historical significance. The significance evaluation included conducting fieldwork and archival research for the reservoirs and completion of a historic context. The reservoirs were evaluated for historical significance and determined not eligible for inclusion in the National Register of Historic Places, California Register of Historic Resources, or the County Register. (2015)

San Diego Veterans Administration (VA) Master Plan Historical Resource Technical Report, San Diego, California. Leo Daley worked with the Veterans Administration to develop a master plan for the campus of the VA San Diego Healthcare System. Working with Chattel, Inc., Ms. Lyons assisted with research, historic resource survey, and fieldwork documentation of the Main Building and Administration Building as part of an evaluation of potential historical resource impacts for the new master plan. (2014)

West Los Angeles Veteran's Administration Solar Photovoltaic System, Section 106 Review, Los Angeles, California. Ms. Lyons co-conducted fieldwork, research, and assisted with the preparation of the historic resource evaluation to determine impacts of Solar Photovoltaic System installation on the Veterans Administration campus in West Los Angeles. (2012)

EXHIBIT G

Barron-Gafford Heat Island Study

University of Arizona

May 2018

BARRON-GAFFORD RESEARCH GROUP
BIOGEOGRAPHY - ECOSYSTEM SCIENCE

Response to Technical Queries Associated with Permit NO: 2017-301
for the Proposed Solar Farm at:
1190 and 1220 Cosgrove-Lemnos Road,
260 Tank Corner East Road,
875 Boundary Road and
85 Crooked Lane LEMNOS VIC 3631

STATEMENT OF EVIDENCE BY GREG BARRON-GAFFORD ON SOLAR HEAT ISLANDING ISSUES

Prepared for Neoen Australia Pty Ltd

MAY 2018

Greg Barron-Gafford, PhD
4th Floor, 1064 E. Lowell Street
University of Arizona
Tucson, Arizona, USA
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CONTENTS

1 INTRODUCTION: PRACTICE NOTE – EXPERT EVIDENCE

Name and Address of Expert

Greg Barron-Gafford, PhD
Associate Professor and Associate Director
School of Geography & Development;
B2 Earthscience, Biosphere 2, College of Science;
Adjunct Faculty in School of Natural Resources & the Environment
Office: ENR2 - S439; University of Arizona
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Qualifications of Expert

PhD, Ecosystem Ecology, University of Arizona, 2010
MS, Natural Resources & Ecology, University of Georgia, 2001
BS, Environmental Science, Texas Christian University, 1998
Member, American Geophysical Union
Member, Ecological Society of America
Member, American Association of Geographers
Refer Curriculum Vitae at Attachment 1.

I have authored or co-authored 71 peer-reviewed publications that have been cited more than 1,900 times, and I have led research in ecosystem ecology and plant-atmosphere interactions for more than 17 years. I maintain an active research program in assessing the impacts of land use and climatic change in terms of plant function, ecosystem response, and local climate conditions. My team, under my supervision, produced the first experimental and empirical examination of the presence of a heat island effect associated with PV power plants.

Any Private or Business Relationship between the Expert Witness and the Party for Whom the Report is Prepared

None.

Instructions

Written instructions from White & Case Lawyers acting on behalf of Neoen Australia Pty Ltd dated 16 April as follows:

"*We would like you to prepare an expert witness statement for the panel in which you:*

(a) set out your background and expertise relevant to this issue;

(b) provide further information in relation to the Arizona study the subject of the paper that you co-authored titled The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures published in Nature Scientific Reports on 13 October 2016. In particular, we ask that you detail the following:

(i) brief description of study methodology;

(ii) radius of the measured heat effects in that study, including those that were not outlined in the final paper. Explain the editing process that resulted in measured effects being excluded from study;

(iii) analysis of your conclusions around the measured effects, including simple descriptions of energy pathways relevant to the 'heat island effect';

(iv) outline contextual factors that may be relevant to the 'heat island effect', including environmental factors such as local landscape, humidity, cloud cover, fixed or rotating tilt panels, etc; and

(v) briefly comment, if possible, on your understanding of the possible effect of wind on the heat island effect.

(c) comment on your findings to date in other research work that you have been involved with relating to the PVHI effect and co-location of photovoltaics and agriculture;

(d) comment on the general implications of the above studies and literature for the Project and the interface between it and any established or future agricultural uses. Where possible, please include:

(i) comparative characteristics of the Arizona and Shepparton sites (e.g. presence of vegetation);

(ii) your opinion as to whether the Project would change any onsite or offsite temperature;

(iii) associated with that, your opinion as to how any change, if identified, would impact on bird and insect populations in the area;

(iv) mitigating factors or measures that exist or could be implemented.

We would also like you to consider the objections to the Project that are relevant to your area of expertise and respond to any relevant matters in your witness statement."

Facts, Matters and Assumptions

Facts, matters and assumptions on which opinions expressed in the report are based are set out in the report.

Documents and Materials Taken Into Account

The documents and any literature or other materials taken into account in preparing the report are identified in the report.

Methodology to prepare Witness Statement

In preparing this expert report I developed the following process:

(i) I reviewed the application and noted the submissions raising concerns about the potential negative impacts of the proposed solar farm on neighboring properties, environmental conditions, and birds, pollinators and other insects.

(ii) I reviewed the scientific literature on PVHI and collated the findings.

Examinations, Tests and Investigations

All examinations, tests, and investigations have been undertaken by me.

Summary of Opinion

A summary of opinion is included in the Conclusion.

Provisional Opinion

There are no provisional opinions.

Relevant Questions Outside of Expertise

There are no matters of relevance outside of my expertise.

Whether the report is incomplete or inaccurate in any respect

As far as I am aware the report is not incomplete or inaccurate in any respect.

Declaration

I have made all the inquiries that I believe are desirable and appropriate and no matters of significance, which I regard as relevant, have to my knowledge been withheld from the Panel.

2 MY WORK ON THE PHOTOVOLTAIC HEAT ISLAND (PVHI) EFFECT

2.1 Background and Expertise Relevant to Solar Projects

I have led a team from January 2013 to present to assess the impacts of land use for renewable energy production in terms of plant function, ecosystem response, and local climate conditions. My colleagues in this work include faculty and students from the Department of Physics and Atmospheric Science and from the Department of Hydrology at the University of Arizona. We took continuous measurements (described below) for more than 18 months, and I then led a publication of the results in a co-authored, peer-reviewed manuscript entitled *The Photovoltaic Heat Island Effect (PVHI): Larger solar power plants increase local temperatures* published in ***Nature Scientific Reports*** on 13 October 2016. The paper details an objective look at the degree to which a PV power plant might alter local climate conditions. The paper is attached at Annexure 2. The study was conducted in response to requests from the Pima County (Arizona) Chief Building Official for Development Services for an assessment of the potential for a PVHI beyond the few studies previously presented in the literature.

2.2 Further Information on the Published Study of the Photovoltaic Heat Island (PVHI) Effect in Arizona

Brief description of methodology used to determine the presence of a PVHI within a solar farm

Early work on the detection of the presence of a PVHI in solar farms has been mostly theoretical or based upon simulated models. Furthermore, past empirical work had been limited in scope to a single biome. In order to determine whether or not a PV array elevated ambient air temperatures (°C) relative to native surroundings, we used shaded and aspirated temperature probes 2.5 m (manufacturer details can be found in *Barron-Gafford et al. (2016)*; Figure 1) at the following representative sites, all within a 1km^2 area:

- natural landscape (semiarid desert ecosystem);
- PV solar farm, where the probe was centrally located within the PV array; and
- within a traditional built environment (parking lot and commercial buildings).

Temperature probes were cross-validated for precision (closeness of temperature readings across all probes) at the onset and the conclusion of the experiment. We set the dataloggers to save the measurements of temperature at 30-minute intervals throughout a 24-hour day. We installed the weather stations in April 2014 and began simultaneously monitoring the three sites throughout an entire yearlong cycle to capture variations in temperatures across seasonal periods. We defined a PVHI effect as the difference in ambient air temperature between the PV solar farm and the natural landscape.

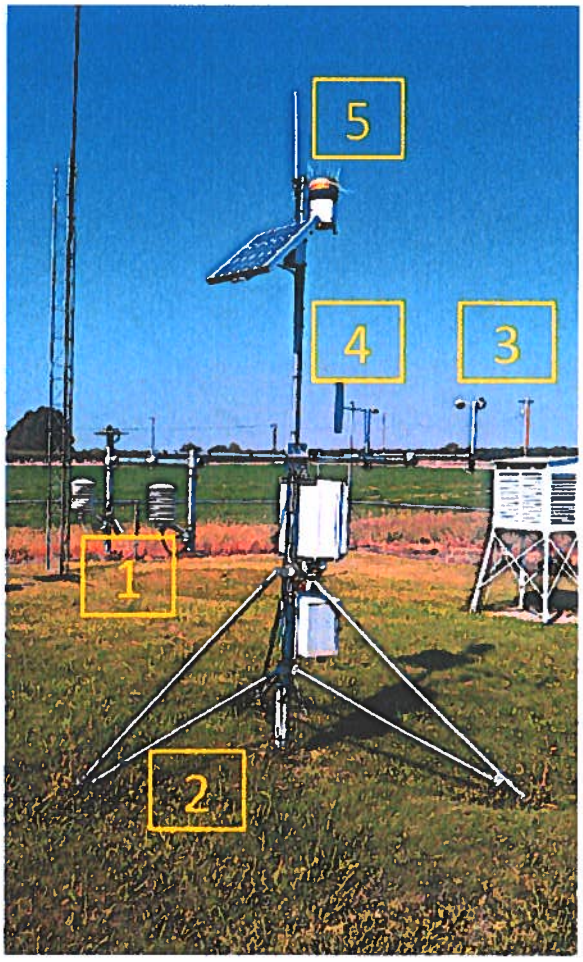

Figure 1. Weather stations were used to measure the local microclimate of an area. Each weather station used captured (1) ambient air temperature, (2) soil temperature, (3) wind speed, (4) wind direction, and (5) precipitation. All data were monitored every 30 minutes, and average conditions were saved by the datalogger. Cumulative precipitation was summed for each 30 minute period.

This type of weather station was installed at each of three sites: the photovoltaic array of a solar farm, the natural landscape, and a parking lot, to represent a typical built environment.

Photo credit: Campbell Scientific Instruments

Results illustrating the presence of a PVHI within a solar farm

Ultimately, we found that air temperatures within a PV solar farm are higher than those in nearby natural settings, and we referred to this as the PVHI effect (Figure 2). We found the PVHI effect to be much greater within the solar farm at night, with the greatest impacts being within the spring and summer months. Additionally, we found that presence of a PVHI effect to be much less significant during the day, and that the effects were least prominent in the winter and fall, regardless of time of day.

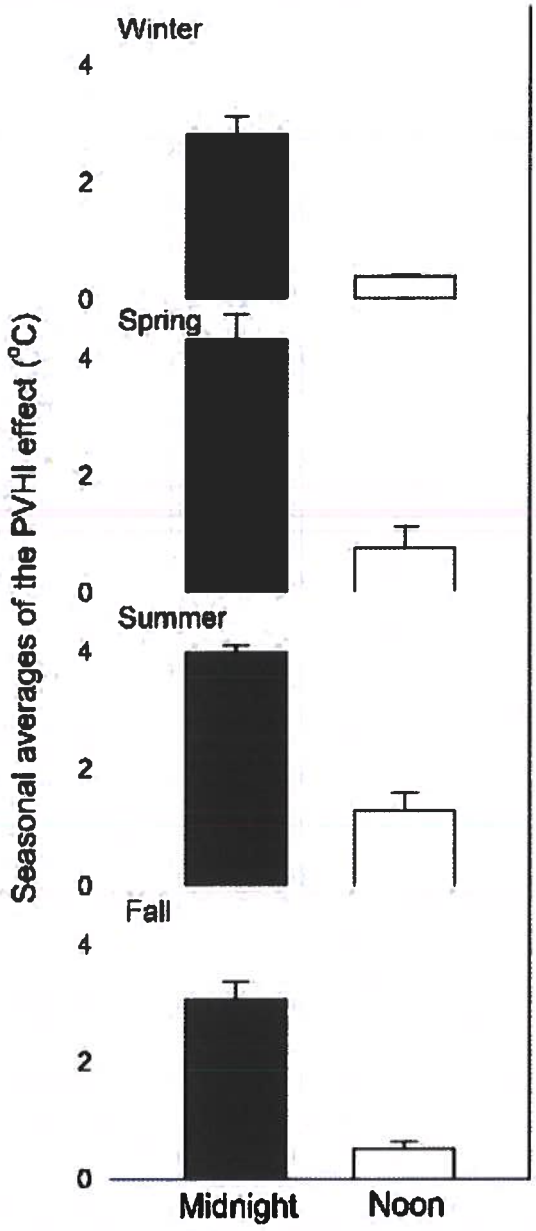

Figure 2. Through continuous monitoring of air temperatures within the center of a solar field for more than a year, we detected the presence of a PVHI effect. The effect was greatest in the nighttime hours (black bars indicate averages at midnight) and lowest during the day (white bars). The degree of the PVHI effect in the center of the solar farm was also seasonally variable with the warm season months experiencing greater impacts than the cool season months.

Figure recreated from Barron-Gafford et al. (2016).

Analysis of conclusions on the presence of a PVHI within a solar farm

As described in *Barron-Gafford et al. (2016*; in Annexure 2), incoming sun energy typically is either reflected back to the atmosphere or absorbed, stored, and later re-radiated in the form of latent or sensible heat. Within natural ecosystems, vegetation reduces heat gain and storage in soils by creating surface shading; this also occurs within PV arrays, but less so in the rows between the panels. Energy absorbed by vegetation and surface soils can be released as latent heat in the transition of liquid water to water vapor to the atmosphere through water loss from soils (evaporation) and vegetation (transpiration). This heat-dissipating latent energy exchange is dramatically reduced within a PV installation that does not have an "understory" of vegetation. PV panels convert ~20% of absorbed energy into usable electricity and also allow some light energy to pass, which, in unvegetated soils will lead to greater heat absorption. This greater sensible heat efflux from the soil becomes trapped under the PV panels, much like clouds trap the energy radiating from the Earth's surface. On cloudy nights, air temperatures do not cool off as much as they do on clear nights. This is the same principle in the PVHI, and I believe the reason that the PVHI dissipates so quickly as one moves away from the edge of the panels. Under the panels, it is analogous to a cloudy night, and away from the array, where those panels are absent, conditions are analogous to a clear night sky.

2.3 Determining the Spatial Extent of the PVHI

Methods for measuring the radius of the measured heat effects in the study

In addition to measuring the degree of the photovoltaic heat island (PVHI) effect within the solar farm, we measured the extent to which the heat island effect extended outward from the PV array (Figure 3). We installed the weather stations with the same air temperature probe described in Section 2.2 to measure temperature:

- inside the array at 20m and 40m in from the edge of the array;
- at the edge of the array (0m); and
- outside the array at 10, 20, 30, 40, and 50m out from the edge of the array.

We installed these weather stations in April 2015, and we maintained them throughout a six-month period to capture variation in the relative differences in temperatures across seasonal periods. While this was a part of our original study design once we had identified the presence of the PVHI effect, this data and associated graphic were cut from our final manuscript by the *Nature Scientific Reports* editor due to space constraints. This is quite unfortunate because the distance of the PVHI effect is one of the primary questions I continue to receive since the publication of this manuscript.

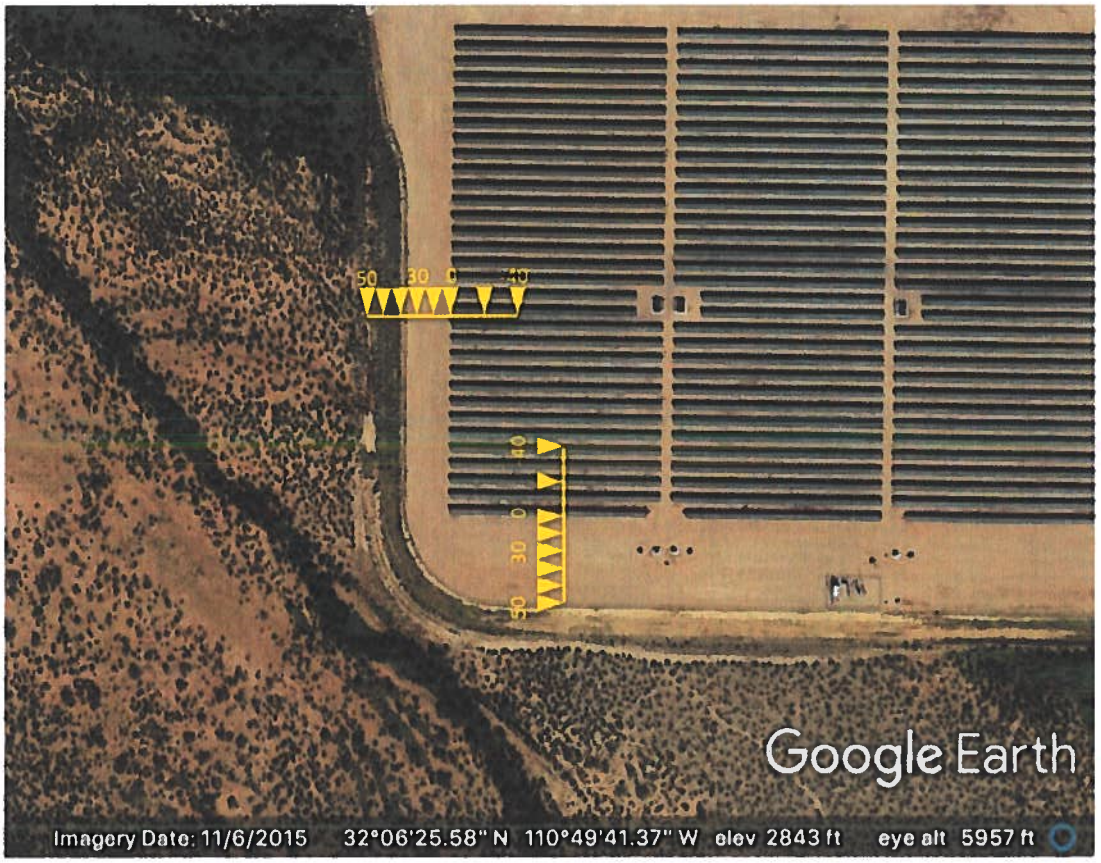

Figure 3. Locations of additional measures of air temperature are marked with yellow triangles. Stations were placed inside the array at 20m and 40m in from the edge of the array, at the edge of the array (0m), and outside the array at 10, 20, 30, 40, and 50m out from the edge of the array to quantify the spatial extent of the PVHI effect.

Results on the radius of the measured heat effects

We found that the PVHI was indistinguishable from air temperatures over native vegetation when measured at a distance of 30m from the edge of the PV array (Figure 4). This pattern held true for both daytime and nighttime conditions. Because the PV panels themselves trap the energy from diffuse sunlight that was able to reach the ground underneath them, air temperatures remain elevated within a PV array. As you leave this "overstory" of PV panels, energy is able to radiate back towards the atmosphere, as it does in a natural setting, and the PVHI quickly dissipates.

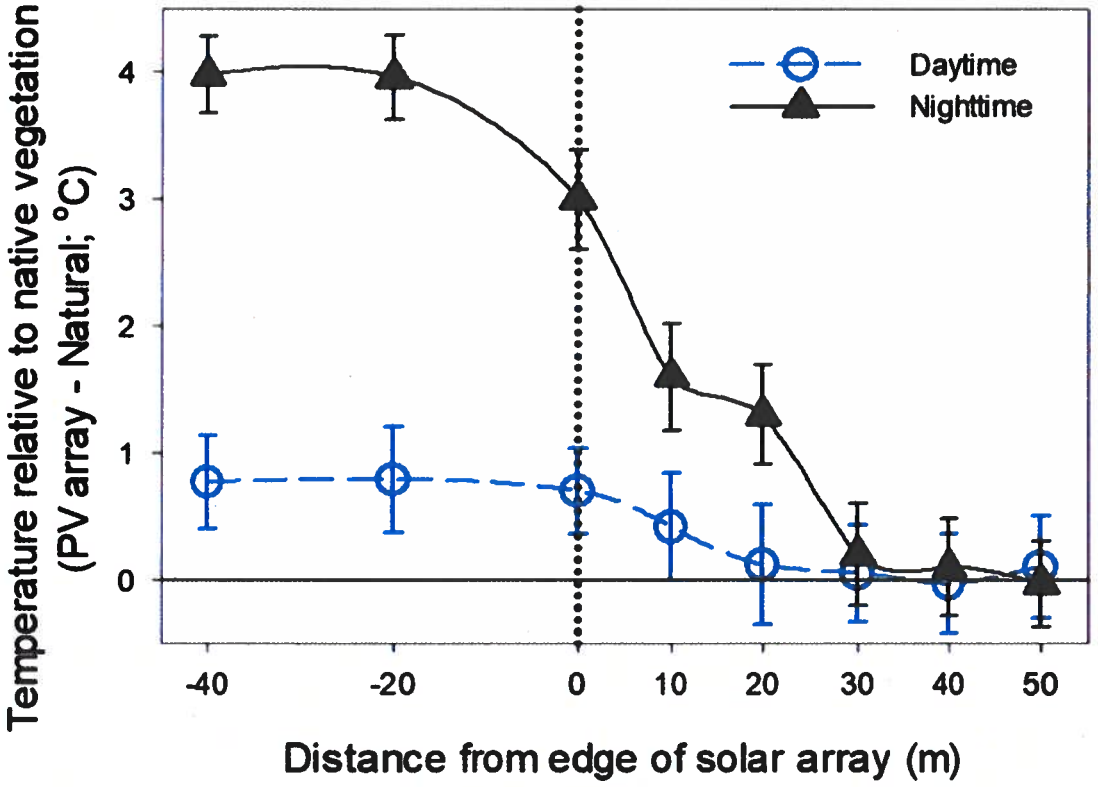

Figure 4. Measures of air temperature within (negative values on the X-axis) and outside of the PV array (positive values on the X-axis) were used to quantify the spatial extent of the PVHI effect. The dotted line represents the edge of the PV array.

The solid line at 0 on the Y-axis illustrates when there is no difference between a measurement along the transect and ambient air temperatures over native vegetation. At night, the PVHI effect of 3-4°C directly above the solar panels is reduced to 1.5 °C at 10m and to 0°C at 30m. There is a lesser PVHI effect by day. Error bars represent 1 standard error around the mean.

3 COMMENT ON THE GENERAL IMPLICATIONS OF THE ABOVE AND OTHER STUDIES IN THE LITERATURE

3.1 CONSIDERATION OF OTHER TECHNICAL PAPERS EXAMINING THE PVHI EFFECT

One of the other primary research articles in the literature on the presence and extent of the PVHI comes from *Fthenakis and Yu (2013)*. This paper links both field data and computational fluid dynamics simulations. Ultimately, *Fthenakis and Yu* found that (*i*) ambient temperatures can be up to 1.9°C greater within a solar farm, and (*ii*) temperatures dissipate rapidly with increased distance from the solar farm, with no detectable effect by at about 300m (Figure 5). In my opinion, the approach and simulations appear sound. However, my critique is tied to the accuracy of the sensors used. For the paper published by *Fthenakis and Yu (2013)*, the accuracy of the Hawk weather station air temperature probe is only ± 0.5°C, but no data on the uncertainty or variation are presented. Please see: https://www.weatherhawk.com/wp-content/uploads/2016/06/Signature-Series-Comprehensive-Manual-V7.pdf

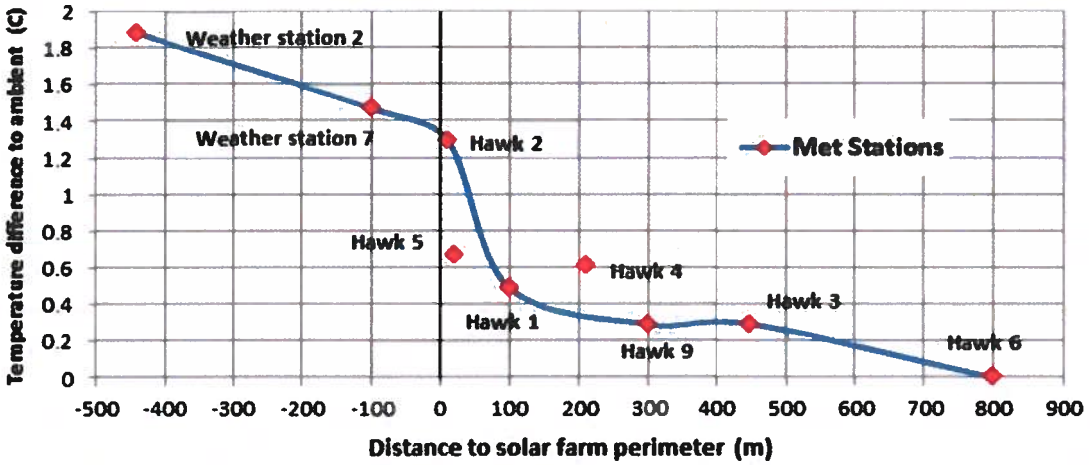

Figure 5. Measures of air temperature within (negative values on the X-axis) and outside of the PV array (positive values on the X-axis), as presented by *Fthenakis and Yu (2013)* to quantify the spatial extent of the PVHI effect. The solid line at 0 on the X-axis represents the edge of the PV array. The data illustrate that the PVHI dissipates rapidly with increasing distance away from the edge of the PV array.

In my opinion, then, if we added this uncertainty to their Figure 8 (shown here as Figure 5 within this report), all measures of air temperature beyond 200m may actually be indistinguishable from ambient air temperatures. Additionally, I do not consider "Hawk 4" to be evidence of a spike in the PVHI away from the PV array. *Fthenakis and Yu* suggest that the higher values at Hawk 4 might be due to the fact that they are on the downwind side of the solar farm. However, I interpret this more as a singular measure that is anonymously higher than those around it, which are on a downward trend as one moves away from the array. Finally, there are no measures of uncertainty on any of these measurements. From maintaining our research sites for more than a year, I know there are day-to-day variations in temperature. *Fthenakis and Yu* also dismiss another one of their sensors as showing "higher temperatures likely due to a calibration inaccuracy", which leads me to wonder if the same might be true for Hawk 4. Taken together, I wonder if this is anything more than an anomaly.

More recently, *Yang et al.* (*2017*) have added an additional manuscript to this body of literature through a detailed suite of measurements on air and soil temperatures at depth. Ultimately, *Yang et al.* found that the degree of PVHI in terms of daytime air temperatures was nearly absent during winter, but during the other seasons the daytime air temperature in the solar farm was higher than that in areas without PV. As in our study, the maximum PVHI effect was detected during their summer. *Yang et al.* found that the PVHI was present during nighttime hours during all four seasons; again this parallels our own research, which examined the seasonal variation in daytime and nighttime PVHI effect. *Yang et al.* did not mention any data on the spatial extent and dissipation of the PVHI effect in their paper.

3.2 Contextual factors that may be relevant to the PVHI effect

To date, no empirical or experimental studies have explicitly examined correlations between environmental factors such as local landscape, humidity, cloud cover, fixed or rotating tilt panels, and either the degree or spatial extent of a PVHI. However, we can look to literature on the analogous Urban Heat Island (UHI) effect and on Human Thermal Comfort (HTC) for potential indicators. Increases in wind speed has been shown to reduce the UHI (*Rajagopalan et al. 2014*), including work conducted

in Australia (*Santamouris et al. 2017*), however, there are less clear patterns in terms of the impacts of humidity on the UHI. Increased cloud cover is likely to exacerbate the PVHI because clouds trap any re-radiation of sun energy back towards the atmosphere, whether in a built or natural environment. Importantly, recent work has shown that the UHI effect is greater in locations with higher background temperatures (*Taha 2017).*

3.3 Possible Effect of PV Angle tilt on the PVHI Effect

To date, no empirical or experimental studies have investigated the impacts of PV panel angle on the degree of PVHI within an array. A greater degree of tilt would allow for greater loss of heat trapped under the panels, but this should be considered in concert with potential reflection from panels at the end of the day, in which a more severe angle might lead to greater horizontal reflection. Our work (*Barron-Gafford et al. 2016*) was conducted within a PV array in which panels pivoted east-to-west tracking the sun, but maximum angles only approached 45°. The work of *Yang et al.* (*2017*), which found a similar contained PVHI effect within a PV array, was conducted within a PV array with panels at a fixed tilt angle of 36°, and the panels within the solar farm studied by *Fthenakis & Yu* (2013) had a tilt angle of 25°. I have been informed that the PV panels in the proposed Project will be single-axis tracking and could, therefore, be left at an angle to dissipate heat overnight. Together, the existing body of research suggests to me that further research on the linkage between PV angle tilt and the degree of the PVHI warrants more study, but I would predict that maintaining a PV panel angle overnight of 45-50° would aid in nighttime dissipation of any PVHI effect that is created within the array.

3.4 Findings Relating to the PVHI effect and Co-Location of Photovoltaics and Restoration or Agriculture (Agrivoltaics)

Grass + Photovoltaics

The notion of "either-or" between green spaces and solar farms has been progressively more challenged in recent years as companies move towards either restoring solar farms with grasses after installation or leaving grasses in place instead of blading the soil during installation. Co-locating grasses under PV arrays

can yield multiple ecosystem services (tangible and non-tangible amenities) including continued carbon dioxide sequestration from our atmosphere, localized cooling from the transpiration of the plants, grazing forage, and storm-water regulation. In my team's own preliminary work on the effects of revegetating PV solar farms with grasses, we found significant cooling of the local atmosphere (Figure 6). In addition to illustrating the positive effect of vegetation on PV solar farm temperatures, the fact that the plants did so well in such close proximity to the PV panels (around and under the panels) suggests to me a lack of a negative impact of PV installations on local vegetation.

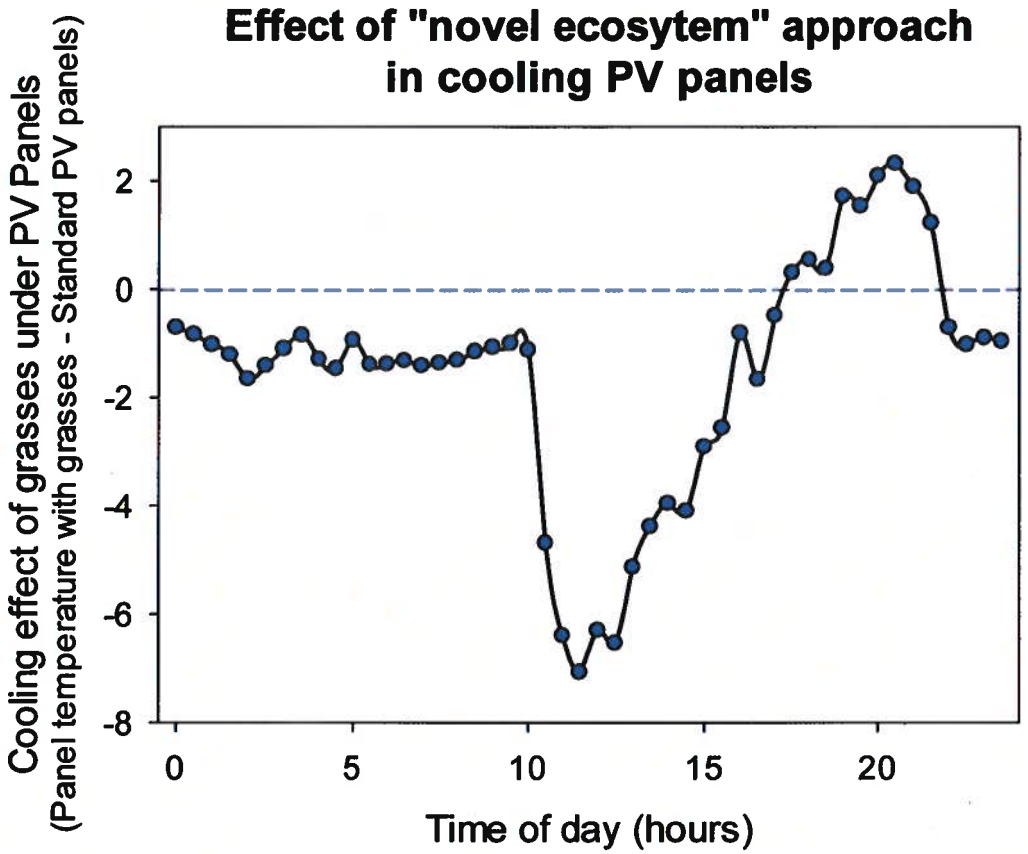

Figure 6. Measures of air temperature within a PV array restored with an understory of grasses versus a PV installation with only bare soil. The dotted line at 0 on the Y-axis illustrates when there is no difference between these measurements, and a negative value indicates the cooling effect of having a PV array restored with grasses. At night, the PVHI effect was cooled by about 1.5 °C, and the daytime PVHI effect was reduced by up to 7°C within the solar array. The reduced impacts in the early evening are likely due to the vegetation being 'shut down' for the day and, therefore, not providing any transpirational cooling.

Closer to the proposed Project site, co-location of grazing of sheep beneath an overstory of PV panels have illustrated a lack of quantifiable evidence of detrimental effects on livestock:
https://parkessolarfarm.com.au/Library/sheep-grazing-under-neoen-solar-farm/

I understand that grasses will be retained at the proposed Project site. While no published research to date measures the impacts at such a large spatial footprint, I believe that leaving the grasses under the panels should greatly reduce the PVHI effect within the solar farm, which will serve to only assist in any reductions in the spatial extent of the PVHI effect outside of the array.

Agriculture + Photovoltaics

Recently, my colleagues and I have been investigating a novel approach to co-located "green" agriculture and "grey" solar PV infrastructure, where crops are grown in the shade of the PV panels within a solar farm – a practice we call 'agrivoltaics'. We suggest that this novel energy and food generating ecosystem may become an important - but as yet under investigated - mechanism for maximizing crop yields, efficiently delivering water to plants, and generating renewable energy (Figure 7). Similar pilot studies in France and Germany have also suggested that this co-location can have beneficial effects on a balanced approach to food and renewable energy production. Beyond illustrating innovative applications in renewable energy systems, the co-location of an agriculture and PV arrays suggests that there are no ill effects of PV arrays on food production. Through our extensive measures of photosynthetic rates, transpirational water loss, and total fruit production, we have found no evidence to suggest that plants overheat or lose their potential to function by being in (extremely) close proximity to PV panels. In fact, in many cases production is increased, and water use efficiency becomes much higher because the solar panels reduced direct sunlight on the soils that drive the evaporation of irrigated waters.

Additionally, we have found that PV panels in a traditional ground-mounted array were significantly warmer in the day and experienced greater within-day variation than panels over an agrivoltaic understory, illustrating the cooling effect of vegetation. We attribute these lower daytime temperatures in PV panels in the

agrivoltaic system to the greater balance of latent heat energy exchange from plant transpiration relative to sensible heat exchange from radiation off bare soil (the typical installation method). Across the core growing season, PV panels in an agrivoltaic system were ~ 8.9+0.2°C cooler in the day. These data suggest that even a vegetative barrier can significantly cool panels and the local atmosphere below those caused by the PVHI effect.

Figure 7. The co-location of agricultural under an elevated 'overstory' of PV panels has demonstrated increased production of some crop species (tomatoes, carrots, cabbages, chiltepin peppers, and kale) and increased water savings in the irrigation needed for additional spring and summer crops including red and yellow chards, purple, tepary, and cow beans, cilantro, and Japanese eggplant.

3.5 General Implications of the Above Studies and Literature for the Proposed Project

Comparative characteristics of the Arizona and Shepparton sites

Given recent work has shown that the Urban Heat Island effect is greater in locations with higher background temperatures (*Taha 2017*), it is important to consider comparative characteristics of the Arizona site, where much of my work has been conducted, and the Shepparton site under consideration here. Average climate data for Tucson (https://www.usclimatedata.com/climate/tucson/arizona/united-states/usaz0247) and Shepparton (http://www.bom.gov.au/climate/averages/tables/cw_081125.shtml) illustrate that Tucson is consistently warmer in terms of maximum and minimum temperatures in both the winter and summer seasons. Also noteworthy are vegetative differences in terms of understory vegetation. The installations in the Southwestern USA often are mechanically bladed to remove all vegetation, where as the proposed Project site will retain grasses in the understory. As noted above (Figure 6), this understory vegetation can provide significant cooling to mitigate the PVHI effect within a PV array. As such, we are working to adapt this type of practice more often here in the US installations.

Taken together with the results of *Taha 2017*, I would predict that the degree of PVHI within Shepparton might be lower than the values we measured in Tucson because of the differences in background temperatures and vegetation.

Table 1. A comparison of climatic differences between Tucson, Arizona, USA and Shepparton, Victoria, Australia, underscores the higher average temperatures of the Southwestern USA, which may lead to an elevated PVHI effect in the region.

	Summer		Winter	
	Maximum	Minimum	Maximum	Minimum
Tucson, Arizona, USA	38.1	24.7	18.9	5.5
Shepparton, Victoria, Australia	31.9	15.3	13.3	3.3

Potential for associated impact on bird and insect populations in the area

I have no experience in detecting ill effects on bird or insect populations in or around PV arrays, other than those that stem from a lack of vegetation. The fact that understory grass vegetation will be retained here should actually help to maintain local insect and bird abundances and biodiversity. Still, bolstering bird and insect populations could be achieved through either targeted revegetation efforts around the PV array or through co-location of PV and pollinator friendly vegetation, as has been carried out in multiple locations (Figure 8, for example). Multiple example stories are listed within the References section (5.2) of this report.

Beyond illustrating innovative applications in renewable energy systems, the co-location of pollinator habitat and grazing with PV arrays suggests that there are no ill effects of PV arrays on this vegetation or animals. Plants do not overheat or lose their potential to function by being in (extremely) close proximity to PV panels. Given that our research has shown that the increase in temperatures due to the PVHI effect do not extend past 30m, I do believe that off-site impacts on birds and insets are highly unlikely. Revegetating with native and locally adapted species will ensure that the solar farm does not contribute to any insect pest outbreaks that could negatively impact local agricultural areas.

Figure 8. The co-location of grasses and native or locally adapted pollinator species under an 'overstory' of PV panels has demonstrated increased abundance of bird populations and locally important pollinator species.
Photo of the Westmill Solar Park in Watchfield, England; Photo credit: Guy Parker

4 CONCLUSIONS

WILL THE PROJECT CHANGE ANY ONSITE OR OFFSITE TEMPERATURE?

In summary, both my own research and that of independent groups with which I am not affiliated have shown that solar farms can create PVHI effect, but the spatial extent of the effect is constrained. The PVHI effect is largely driven by the absence of vegetation and the vegetation's potential to cool the atmosphere through transpirational water loss. Bolstering the presence of vegetation through co-location (as described in Section 3.4) or having landscaping around the solar farm will mitigate the PVHI effect. My own research on adding grasses back into a solar farm showed the impacts of grasses on reducing the PVHI effect within a solar array. To-date, no study has published research on these patterns at such large scales, but I have no reason to believe that there will be a different outcome when extrapolated in scale. The increased practice of leaving or re-introducing vegetation within PV solar farms is acknowledging the multiple benefits that come from this practice.

Adding a vegetative buffer to the study site does not seem necessary to creating the dissipation of the PVHI effect as one moves outside of the PV array, as neither of the studies I have conducted or those described by *Fthenakis and Yu (2013)* monitored solar farms with a vegetative buffer.

I have made all of the enquiries that I believe are desirable and appropriate and that no matters of significance which I regard as relevant have to my knowledge, been withheld from the Panel.

Greg Barron-Gafford, PhD
University of Arizona
3 May 2018

5 REFERENCES

5.1 REFERENCES FOR PEER-REVIEWED MANUSCRIPTS CITED WITHIN THIS REPORT

Barron-Gafford, G. A. *et al.* The Solar Heat Island Effect: Larger solar power plants increase local temperatures. *Nature Scientific Reports* **6: 35070**, DOI: 10.1038/srep35070 (2016).

Fthenakis, V. & Yu, Y. Analysis of the potential for a heat island effect in large solar farms. *Analysis of the potential for a heat island effect in large solar farms; 2013 IEEE 39th Photovoltaic Specialists Conference*, 3362-3366 (2013).

Rajagopalan, P., Lim, K. C. & Jamei, E. Urban heat island and wind flow characteristics of a tropical city. Solar Energy 107, 159-170, doi:10.1016/j.solener.2014.05.042 (2014).

Santamouris, M. *et al.* Urban Heat Island and Overheating Characteristics in Sydney, Australia. An Analysis of Multiyear Measurements. *Sustainability* **9**, 21, doi:10.3390/su9050712 (2017).

Taha, H. Characterization of Urban Heat and Exacerbation: Development of a Heat Island Index for California. *Climate* **5**, doi:10.3390/cli5030059 (2017).

Yang, L. *et al.* Study on the local climatic effects of large photovoltaic solar farms in desert areas. *Solar Energy* **144**, 244-253, doi:10.1016/j.solener.2017.01.015 (2017).

5.2 REFERENCES FOR IMPACT ON BIRD AND INSECT POPULATIONS IN PV SOLAR FARMS

https://www.solarpowerworldonline.com/2017/05/pollinator-friendly-solar-vegetation/

http://eanvt.org/wp-content/uploads/2017/04/The-Effects-of-Solar-Farms-on-Local-Biodiversity-A-Comparative-Study-UK.pdf

https://www.greenbiz.com/article/pollinator-friendly-solar-sites

http://agriculture.vermont.gov/node/1507

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CHRONOLOGY OF EDUCATION

2005-2010 University of Arizona, Tucson, Arizona, USA
Ph.D. Ecology & Evolutionary Biology, 2010
Dissertation: *Temperature and precipitation controls over soil, leaf and ecosystem level CO_2 flux along a woody plant encroachment gradient*
Advisor: Travis Huxman

1998-2001 University of Georgia, Athens, Georgia, USA
M.S. Forest Ecology, 2001
Thesis: *The effects of increasing stand density on nutrient limitations to growth and nutrient budgets multi-species pine stands*
Advisors: Robert Teskey and Rodney Will

1994-1998 Texas Christian University, Ft. Worth, Texas, USA
B.S. Environmental Science, 1998
Thesis: *Analysis of forest structure and function at Huntsville State Park, Texas*
Advisors: Leo Newland and Glenn Kroh

CHRONOLOGY OF EMPLOYMENT

Aug 2017 – Present: **Tenure Track Associate Professor**, School of Geography & Development, University of Arizona, Tucson, AZ, 85721

Aug 2016 – Present: **Associate Director**, School of Geography & Development, University of Arizona, Tucson, AZ, 85721

Aug 2013 – Present: **Tenure Track Assistant Professor**, School of Geography & Development, University of Arizona, Tucson, AZ, 85721

Aug 2013 – Present: **Tenure Track Assistant Professor**, Biosphere 2, College of Science, University of Arizona, Tucson, AZ, 85721

Feb 2010 – Aug 2013: **Assistant Research Professor** and **Associate Research Scientist**, Biosphere 2, College of Science, University of Arizona, Tucson, AZ, 85721

Feb 2010 – Aug 2010: **Postdoctoral Research Associate**, Department of Botany, University of Wyoming, Laramie, WY, 82071

Dec 2003 – Feb 2010: **Research Specialist**, Department of Ecology & Evolutionary Biology, University of Arizona, Tucson, AZ, 85721

June 2001 – Dec 2003: **Senior Research Specialist**, Lamont-Doherty Earth Observatory ~ Biosphere 2, Columbia University, Palisades, NY, 10964

SERVICE / OUTREACH

Local / state outreach

2017	University of Arizona Museum of Art ~ *Art-Science Connections*
2017 – Present	Tucson Unified School District ~ *Rincon/University High Schools & Manzo Elementary School: Agrivoltaics installation and curriculum development*
2017	University of Arizona Biosphere 2 ~ *Earth Day: Agrivoltaics Hands-on Experiential learning station*
2017	University of Arizona Biosphere 2 ~ *Science Saturday: Agrivoltaics Presentations and Hands-on Experiential learning station*
2016	University of Arizona Museum of Art ~ *Fires of Change Panelist*
2013	Tumamoc Hill Public Lecture Series ~ *Lectures in the Libraries*
2013	The Santa Rita Experimental Range ~ *Discovery Saturday Public Series*
2008 – 2014	Science Saturdays (Hands-on Science activities) at Biosphere 2
2008 – Present	Informal presentations with Biosphere 2 visitors as we conduct experiments along the tour route

National / Professional

2017 – Present	Onsite Reviewer ~ U.S. National Science Foundation Environmental Biology
2017 – Present	Virtual Panel Reviewer ~ Swiss National Science Foundation, Swiss National Science Foundation Professorship
2017 – Present	Virtual Panel Reviewer ~ Israeli Science Foundation, China-Israel Research Program (CIRP) Review Panel
2017 – Present	International External Reviewer ~ University of Adelaide (Australia), External reviewer for doctoral dissertation
2017 – Present	International External Reviewer ~ Edith Cowan University (Australia), External reviewer for doctoral dissertation
2016 – Present	Onsite Reviewer ~ U.S. National Science Foundation Ecosystem Science Cluster program Doctoral Dissertation Improvement Grants (DDIG)
2013 – Present	Onsite Reviewer ~ U.S. Environmental Protection Agency (EPA) Science to Achieve Results (STAR) Graduate Fellowship

National / Professional (continued)

2013 – Present	Section Editor ~ *Annual Reviews in Plant Biology*
2013 – Present	Session Organizer for the Annual Meeting of the American Geophysical Union
2012 – Present	Section Editor ~ *Physiological Ecology of Photosynthesis* within *Oxford Bibliographies in Ecology*
2010 – Present	Oral presentation and poster judge for graduate student awards at the Annual Meeting of the American Geophysical Union
2010 – Present	Oral presentation and poster judge for Ecological Society of America's Plant Physiological Ecology section awards

2002 – Present	Journal Reviewer. (2012– 11; 2013- 12; 2014- 8; 2015- 9; 2016 – 8 so far): Representative Journals: *Journal of Biogeography, Agricultural and Forest Meteorology, Global Change Biology, Journal of Arid Environments, Nature, Nature Scientific Reports, Nature Energy, Journal of Geophysical Research-Atmospheres, Journal of Geophysical Research-Biogeosciences, New Phytologist, Methods in Ecology & Evolution, Oecologia*

University

2016 – 2017	Ecosystem Genomics Cluster Hire, Earth Sciences executive hiring committee
2015 – Present	UA Arid lands Steering Committee
2015 – Present	Art-Environment Network Governance Committee Member, Institute of the Environment
2014	University of Arizona Foundation Expo of Excellence, representing the School of Geography& Development and Biosphere 2's partnership in STEAM education programming with Manzo Elementary
2014	Water, Environmental, and Energy Solutions (WEES) Faculty Proposal Review Board
2013 – Present	National Ecological Observatory Network Regional Site Selection Committee
2013 – Present	UofA Sky School, Mt. Lemmon Sky Center – Project Organizer
2012 – Present	Institute of the Environment Faculty Exploratory Grant Referee
2011 – Present	University Representative for the Consortium of Universities Allied for Water Research (NSF sponsored program)
2011 – Present	Institute of the Environment Graduate Award Reviewer

Department

2016 – Present	SGD Associate Director
2014 – Present	SGD Undergraduate Committee
2014 – Present	SGD Curriculum and Assessment Committee

Department (continued)

2013 – 2015	SGD Graduate Committee
2013 – Present	Physical Geography Curriculum Sub-committee
2013 – Present	UC-San Diego Academic Connections, in partnership with Biosphere 2 – Project Organizer & student mentor
2013 – 2014	Association of Pacific Coast Geographers Conference Planning Committee
2013 – 2015	Biosphere 2 Earth Month Programming
2013 – 2015	Arizona Center for STEM Teachers – Presenter for weeklong program
2013 – 2014	Physical Geographer Position Hiring Committee
2010 – 2014	Advisor for Biosphere 2 Research Technicians
2011 – Present	Critical Zone Observatory – Ecohydrological Partitioning Sub-committee
2010 – Present	Specialty Tour Guide for Biosphere 2 VIP visitors

Societies

2014 – Present	Association of Pacific Coast Geographers (APCG)
2013 – Present	American Association of Geographers (AAG)
2007 – Present	American Geophysical Union (AGU)
2003 – Present	Ecological Society of America (ESA)

PUBLICATIONS / CREATIVE ACITIVITY

H-index (ISI).....22
Citations (ISI, October, 2017).....1635
Articles published in peer review journals.....63
Articles in review.....6
Other peer reviewed articles and book chapters.....3

Chapters in scholarly books

2. Moore GW, McGuire K, Troch PA, **Barron-Gafford GA**. (2015). Ecohydrology and the Critical Zone: Processes and Patterns across Scales. *In* Principles and Dynamics of the Critical Zone, Giardino and Houser (Eds.). Elsevier.

1. Sengupta A, Pangle LA, Volkmann THM, Dontsova K, Troch PA, Meira AA, Neilson JW, Hunt EA, Chorover J, van Haren J, **Barron-Gafford GA**, Bugaj A, Abramson N, Sibayan M. (2016, *In press*). Advancing understanding of hydrological and biogeochemical interactions in evolving landscapes through controlled experimentation and monitoring at the Landscape Evolution Observatory. In Terrestrial Ecosystem Research Infrastructures: Challenges, New Developments and Perspectives. Abbad Chabbi & Hank Loescher (Eds.). Taylor and Francis Group.

Electronic publication (peer reviewed)

1. **Barron-Gafford GA (2015).** *Physiological Ecology of Photosynthesis*. Oxford Bibliographies Online Resource Library. DOI: 10.1093/OBO/9780199830060-0093

Conference Proceedings

3. **Barron-Gafford GA**, Osmond CB, Grieve KA, Lipson D, and Murthy R. (2005) Elevated CO_2 differentially effects photosynthesis and carbon balance in poplar stands, a four year study. In: van der Est, A. and Bruce, D. (eds). *Photosynthesis: Fundamental Aspects to Global Perspectives: Proceedings 13th International Congress on Photosynthesis*. ACG Publishing (Photosynthesis and Global Change, 973-976).

2. Armstrong AF, Hartley IP, Ineson P, **Barron-Gafford GA**, Murthy R and Atkin OK. (2005). Can climate driven changes in photosynthesis be used to predict changes in the rate and temperature sensitivity of ecosystem respiration? In: van der Est, A. and Bruce, D. (eds). *Photosynthesis: Fundamental Aspects to Global Perspectives: Proceedings 13th International Congress on Photosynthesis*. ACG Publishing (Photosynthesis and Global Change, 958-959).

1. Will RE, **Barron GA**, Teskey RO, and Shiver B. (2005). Within and between canopy variability of foliar nitrogen concentrations for loblolly and slash pine stands planted at different densities. *Biennial Southern Silviculture Conference Proceedings*.

Refereed journal articles

63. **Barron-Gafford GA**, Sanchez-Cañete EP, Hendryx S, Minor RL, Colella T, Murphy P, Lee E, Scott RL, Kumar P. (2017). Impacts of hydraulic redistribution on grass-tree competition versus facilitation in a semiarid savanna. *New Phytologist*, **215**: 1451-1461.

62. Potts DL, Minor RL, Braun Z, **Barron-Gafford GA**. (2017). Photosynthetic phenological variation may promote coexistence among co-dominant tree species in a Madrean sky island mixed conifer forest. *Tree Physiology*, **37**: 1229-1238.

61. Minor J, Falk DA, **Barron-Gafford GA**. (2017). Fire severity and regeneration strategy influence shrub patch size and structure following disturbance. *Forests*, **8**: DOI: 10.3390/f8070221.

60. Sanchez-Canete EP, Scott RL, van Haren J, **Barron-Gafford GA**. (2017). Improving the accuracy of the gradient method for determining soil carbon dioxide efflux. *Journal of Geophysical Research-Biogeosciences*, **122**: 50-64.

59. van Haren J, Dontsova K, **Barron-Gafford GA**, Troch PA, Chorover J, Delong SB, Breshears DD, Huxman TE, Pelletier JD, Saleska SR, et al. (2017). CO_2 diffusion into pore spaces limits weathering rate of an experimental basalt landscape. *Geology*, **45**: 203-206.

58. Villegas JC, Law DJ, Stark SC, Minor DM, Breshears DD, Saleska SR, Swann ALS, Garcia ES, Bella EM, Morton JM, Cobb NS, **Barron-Gafford GA**, Litvak ME, Kolb TE. (2017). Prototype campaign assessment of disturbance-induced tree loss effects on surface properties for atmospheric modeling. *Ecosphere*, **8**:3.

57. **Barron-Gafford GA**, Minor RL, Allen NA, Cronin AD, Brooks AE, Pavao-Zuckerman MA. (2016). The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures. *Nature Scientific Reports* **6**.

56. Scott RL, Biederman JA, Hamerlynck EP, **Barron-Gafford GA**. (2015). The carbon balance pivot point of southwestern U.S. semiarid ecosystems: Insights from the 21st century drought. *Journal of Geophysical Research-Biogeosciences*, **120**: 2612-2624, doi: 10.1002/2015JG003181.

55. Villegas JC, Dominguez F, **Barron-Gafford GA**, Adams HD, Guardiola-Claramonte M, Sommer ED, Selvey AW, Espeleta JF, Zou CB, Breshears DD, Huxman TE. (2015). Sensitivity of regional evapotranspiration partitioning to variation in woody plant cover: insights from experimental dryland tree mosaics. *Global Ecology and Biogeography,* **24**: 1040-1048.

54. Stielstra CM, Lohse KA, Chorover J, McIntosh JC, **Barron-Gafford GA**, Perdrial JN, Litvak M, Barnard HR, Brooks PD. (2015). Climatic and landscape influences on soil moisture are primary determinants of soil carbon fluxes in seasonally snow-covered forest ecosystems. *Biogeochemistry*, **123**: 447-465.

53. Pangle LA, DeLong SB, Abramson N, Adams J, **Barron-Gafford GA**, Breshears DD, Brooks PD, Chorover J, Dietrich WE, Dontsova K, Durcik M, Espeleta J, Ferre TPA, Ferriere R, Henderson W, Hunt EA, Huxman TE, Millar D, Murphy B, Niu G-Y, Pavao-Zuckerman M, Pelletier JD, Rasmussen C, Ruiz J, Saleska S, Schaap M, Sibayan M, Troch PA, Tuller M, van Haren J, Zeng X. (2015). The Landscape Evolution Observatory: A large-scale controllable infrastructure to study coupled Earth-surface processes. *Geomorphology*, **244**: 190-203.

52. Field JP, Breshears DD, Law DJ, Villegas JC, Lopez-Hoffman L, Brooks PD, Chorover J, **Barron-Gafford GA**, Gallery RE, Litvak ME, Lybrand RA, McIntosh JC, Meixner T, Niu G-Y, Papuga SA, Pelletier JD, Rasmussen CR, Troch PA. (2015). Critical Zone Services: Expanding context, constraints, and currency beyond Ecosystem Services. *Vadose Zone Journal,* **14,** doi: 10.2136/vzj2014.10.0142.

51. Ogle K, Barber JJ, **Barron-Gafford GA**, Bentley LP, Young JM, Huxman TE, Loik ME, Tissue DT. (2015). Quantifying ecological memory in plant and ecosystem processes. *Ecology Letters*, **18**: 221-235.

50. Zhang X, Niu G-Y, Elshall AS, Ye M, **Barron-Gafford GA**, Pavao-Zuckerman M. (2014). Assessing five evolving microbial enzyme models against field measurements from a semiarid savannah - What are the mechanisms of soil respiration pulses? *Geophysical Research Letters*, **41**: 6428-6434.

49. **Barron-Gafford GA**, Cable JM, Bentley LP, Scott RL, Huxman TE, Jenerette GD, Ogle K. (2014). Quantifying the timescales over which exogenous and endogenous conditions affect soil respiration. *New Phytologist*, **202**: 442–454, doi: 10.1111/nph.12675.

48. Potts DL, **Barron-Gafford GA**, Jenerette GD (2014). Metabolic acceleration quantifies biological systems' ability to up-regulate metabolism in response to episodic resource availability. *Journal of Arid Environments*, **104**: 9-16.

47. Scott RL, Huxman TE, **Barron-Gafford GA**, Jenerette GD, Young JM, Hamerlynck EP. (2014). When vegetation change alters ecosystem water availability. *Global Change Biology,* **20**: 2198-2210, doi: 10.1111/gcb.12511.

46. Nelson K, Kurc SA, John G, Minor RL, **Barron-Gafford GA**. (2014). Influence of snow cover duration on soil evaporation and respiration efflux in mixed- conifer ecosystems. *Ecohydrology*, **7**: 869-880.

45. Kimball S, Gremer JR, **Barron-Gafford GA**, Angert AL, Huxman TE, Venable DL. (2014). High water-use efficiency and growth contribute to success of non-native *Erodium cicutarium* in a Sonoran Desert winter annual community. *Conservation Physiology*, **2**: cou006, doi:10.1093/conphys/cou006.

44. Hamerlynck EP, Scott RL, Sánchez-Cañete EP, **Barron-Gafford GA**. (2013). Nocturnal soil CO_2 uptake and its relationship to subsurface soil and ecosystem carbon fluxes in a Chihuahuan Desert shrubland. *Journal of Geophysical Research-Biogeosciences*, **118**, 1593–1603, doi: 10.1002/2013JG002495.

43. **Barron-Gafford GA**, Scott RL, Jenerette GD, Hamerlynck EP, Huxman TE. (2013). Landscape and environmental controls over leaf and ecosystem carbon dioxide fluxes under woody plant expansion. *Journal of Ecology*, **101**: 1471–1483, doi: 10.1111/1365-2745.12161.

42. Hamerlynck EP, Scott RL, Cavanaugh ML, **Barron-Gafford GA**. (2013). Water use efficiency of annual- and bunchgrass-dominated savanna intercanopy space. *Ecohydrology*, **7**: 1208-1215, doi: 10.1002/eco.1452

41. Cable JM, Ogle K, **Barron-Gafford GA**, Bentley LP, Cable WL, Scott RL, Williams DG, Huxman TE. (2013). Antecedent conditions influence soil respiration differences in shrub and grass patches. *Ecosystems*, **16**: 1230-1247, doi: 10.1007/s10021-013-9679-7.

40. **Barron-Gafford GA**, Angert AL, Venable DL, Tyler AP, Gerst KL, Huxman TE. (2013). Photosynthetic temperature responses of co-occurring desert winter annuals with contrasting resource-use efficiencies and different temporal patterns of resource utilization may allow for species coexistence. *Journal of Arid Environments,* **91:** 95-103.

39. Hamerlynck EP, Scott RL, **Barron-Gafford GA**. (2013). Consequences of cool-season drought-induced plant mortality to Chihuahuan Desert grassland ecosystem and soil respiration dynamics. *Ecosystems*, **16**: 1178-1191, doi: 10.1007/s10021-013-9675-y.

38. Huxman TE, Kimball S, Angert AL, Gremer JR, **Barron-Gafford GA**, Venable DL. (2013). Understanding past, contemporary, and future dynamics of plants, populations, and communities using Sonoran Desert winter annuals. *American Journal of Botany*, **100**: 1369-80.

37. Pelletier JD, **Barron-Gafford GA**, Breshears DD, Brooks PD, Chorover J, Durcik M, Harman CJ, Huxman TE, Lohse KA, Lybrand R, Meixner T, McIntosh JC, Papuga SA, Rasmussen C, Schaap M, Swetnam TL, Troch PA. (2013). Coevolution of nonlinear trends in vegetation, soils, and topography with elevation and slope aspect: A case study in the sky islands of southern Arizona. *Journal of Geophysical Research: Earth Surface*, **118**: 741-758.

36. Adams HD, Germino MJ, Breshears DD, **Barron-Gafford GA,** Guardiola-Claramonte M, Zou CB, Huxman TE (2013). Nonstructural leaf carbohydrates dynamics during drought-induced tree mortality support role for carbon metabolism in mortality mechanism of *Pinus edulis*. *New Phytologist,* **197**: 1142-1151.

35. **Barron-Gafford GA**, Rascher U, Bronstein JL, Davidowitz G, Chaszar B, Huxman TE. (2012). Herbivory of wild *Manduca sexta* causes fast down-regulation of photosynthetic efficiency in *Datura wrightii*: an early signaling cascade visualized by chlorophyll fluorescence. *Photosynthesis Research*, **113**: 249-260, doi: 10.1007/s11120-012-9741-x

34. Jardine K, **Barron-Gafford GA**, Norman JP, Abrell L, Monson RK, Meyers KT, Pavao-Zuckerman M, Dontsova K, Kleist E, Werner C, Huxman TE. (2012). Green leaf volatiles and oxygenated metabolite emission bursts from mesquite branches following light-dark transitions. *Photosynthesis Research*, **113**: 321-333.

33. Ogle K, Lucas RW, Bentley LP, Cable JM, **Barron-Gafford GA**, Griffith A, Ignace D, Jenerette GD, Tyler A, Huxman TE, Loik ME, Smith SD, Tissue DT. (2012). Differential daytime and night-time stomatal behavior in plants from North American deserts. *New Phytologist*, **213**: 1229-1239, doi: 10.1007/s11258-012-0081-x

32. Hamerlynck EP, Scott RL, **Barron-Gafford, GA**, Cavannaugh M, Moran S, Huxman TE. (2012). Cool-season whole-plant gas exchange of exotic and native semiarid bunchgrasses. *Plant Ecology*, **213:** 1229-1239, doi: 10.1007/s11258-012-0081-x

31. Resco V, Goulden ML, Ogle K, Richardson AD, Hollinger DY, Davidson EA, Alday JG, **Barron-Gafford GA**, Carrara A, Kowalski AS, Oechel WC, Reverter BR, Scott RL, Varner RK, Moreno JM. (2012). Endogenous circadian regulation of carbon dioxide exchange in terrestrial ecosystems. *Global Change Biology*, **18**: 1956-1970.

30. **Barron-Gafford GA**, Scott RL, Jenerette GD, Hamerlynck EP, Huxman TE. (2012). *Temperature and precipitation controls over leaf- and ecosystem-level CO_2 flux of grass and woody species along a woody plant encroachment gradient. *Global Change Biology*, **18**: 1389-1400, doi:10.1111/j.1365-2486.2011.02599.x

29. Jenerette GD, **Barron-Gafford GA**, Guswa A, McDonnel J, Camilo Villegas, J. (2012). Organization of complexity in water limited ecohydrology. *Ecohydrology*, **5**: 184-189.

28. Cable JM, **Barron-Gafford GA**, Ogle K, Huxman TE, Pavao-Zuckerman MA, Scot RL, Williams DG. (2012). Shrub encroachment alters sensitivity of soil respiration to variation in temperature and moisture. *Journal of Geophysical Research-Biogeosciences*, **117**: G01001, doi: 10.1029/2011JG001757

27. **Barron-Gafford GA**, Scott RL, Jenerette GD, Huxman TE. (2011). *The relative controls of temperature, soil moisture, and plant functional group on soil CO_2 efflux at diel, seasonal, and annual scales. *Journal of Geophysical Research-Biogeosciences*, **116**: G01023, doi: 10.1029/2010JG001442.

26. Bobich EG, **Barron-Gafford GA**, Rascher KG, Murthy R. (2010). Effects of drought and changes in vapour pressure deficit on water relations of Populus deltoides growing in ambient and elevated CO_2. *Tree Physiology*, **30**: 886-875.

25. Scott, RL, Hamerlynck EP, Jenerette GD, Moran MS, **Barron-Gafford GA**. (2010). Carbon dioxide exchange in a semidesert grassland through drought-induced vegetation change. *Journal of Geophysical Research-Biogeosciences*, **115**: G03026, doi:10.1029/2010JG001348.

24. Wang L, Caylor KK, Villegas JC, **Barron-Gafford GA**, Breshears DD, Huxman TE. (2010). Partitioning evapotranspiration across gradients of woody plant cover: Assessment of a stable isotope technique, *Geophysical Research Letters*, **37**: L09401.

23. Jenerette GD, Scott RL, **Barron-Gafford GA**, Huxman TE. (2009). Gross primary production variability associated with meteorology, physiology, leaf area, and water supply in contrasting woodland and grassland semiarid riparian ecosystems. *Journal of Geophysical Research-Biogeosciences*, **114**: G04010, doi:10.1029/2009JG001074

22. Adams HD, Guardiola-Claramontea M, **Barron-Gafford GA**, Camilo-Villegas J, Breshears DD, Zou CB, Troch PA, Huxman TE. (2009). Temperature sensitivity of drought-induced tree mortality portends increased regional die-off under global-change-type drought. *Proceedings of the National Academy of Sciences USA*, **106**: 7063–7066.

21. Adams HD, Guardiola-Claramonte M, **Barron-Gafford GA**, Camilo Villegas JC, Breshears DD, Zou CB, Troch PA, Huxman TE. (2009). Reply to Leuzinger et al.: Drought-induced tree mortality temperature sensitivity requires pressing forward with best available science. *Proceedings of the National Academy of Science*, **106**: E69-E69.

20. Adams HD, Guardiola-Claramonte M, **Barron-Gafford GA**, Camilo Villegas JC, Breshears DD, Zou CB, Troch PA, Huxman TE. (2009). Reply to Sala: Temperature sensitivity in drought-induced tree mortality hastens the need to further resolve a physiological model of death. *Proceedings of the National Academy of Science*, **106**: E107-107.

19. Huxman TE, **Barron-Gafford GA**, Gerst KL, Angert AL, Tyler AP, Venable DL. (2008). Photosynthetic resource-use efficiency and demographic variability in desert winter annual plants. *Ecology*, **89**: 1554-1563.

18. Venable DL, Flores-Martinez A, Muller-Landau HC, **Barron-Gafford GA**, Becerra JX. (2008). Seed dispersal of desert annuals. *Ecology*, **89**: 2218-2227.

17. Zou CB, **Barron-Gafford GA**, Breshears DD. (2007). Effects of topography and woody plant canopy cover on near-ground solar radiation: Relevant energy inputs for ecohydrology and hydropedology. *Geophysical Research Letters,* **34**: L24S21.

16. Pegoraro E, Potosnak MJ, Monson RK, Rey A, **Barron-Gafford GA,** Osmond CB. (2007). The effect of elevated CO_2, soil and atmospheric water deficit and seasonal phenology on leaf and ecosystem isoprene emission. *Functional Plant Biology,* **34**: 774-784.

15. **Barron-Gafford GA**, KA Grieve, Murthy R. (2007). Leaf- and stand-level responses of a forested mesocosm to independent manipulations of temperature and vapor pressure deficit. *New Phytologist*, **174**: 614-625.

14. Patrick L, Cable J, Potts D, Ignace D, **Barron-Gafford GA**, Griffith A, Alpert H, Van Gestel N, Robertson T, Huxman TE, Zak J, Loik ME, Tissue D. (2007). Effects of an increase in summer precipitation on leaf, soil, and ecosystem fluxes of CO_2 and H_2O in a sotol grassland in Big Bend National Park, Texas. *Oecologia*, **151**: 704-718.

13. Angert AL, Huxman TE, **Barron-Gafford GA**, Gerst KL, Venable DL. (2007). Linking growth strategies to long-term population dynamics in a guild of desert annuals. *Journal of Ecology,* **95**: 321–331.

12. Hartley IP, Armstrong AF, Murthy R, **Barron-Gafford GA**, Ineson P, Atkin AK. (2006). The dependence of respiration on photosynthetic substrate supply and temperature: integrating leaf, soil and ecosystem measurements. *Global Change Biology,* **12**: 1954–1968.

11. Lipson DA, Blair M, **Barron-Gafford GA**, Grieve K, Murthy R (2006). Relationships between microbial community structure and soil processes under elevated atmospheric carbon dioxide. *Microbial Ecology*, **51**: 302–314.

10. Druart N, Rodríguez-Buey M, **Barron-Gafford GA**, Sjödin A, Bhalerao R, Osmond CB, Hurry V (2006). Molecular targets of elevated [CO_2] in leaves and stems of *Populus deltoides*: implications for future tree growth and carbon sequestration. *Functional Plant Biology* **33**: 121–131.

9. **Barron-Gafford GA**, Martens D, McLain JET, Grieve KA, Murthy R. (2005). Growth of eastern cottonwoods (*Populus deltoides*) in elevated CO_2 stimulates stand-level respiration and rhizodeposition of carbohydrates, accelerates soil nutrient depletion, yet stimulates above and belowground biomass production. *Global Change Biology*, **11**: 1220-1233.

8. Pegoraro E, Abrell L, van Haren J, **Barron-Gafford GA**, Grieve K, Malhi Y, Murthy R, Lin G. (2005). The effect of elevated atmospheric CO_2 and drought on sources and sinks of isoprene in a temperate and tropical rainforest mesocosm. *Global Change Biology*, **11**: 1234-1246.

7. Murthy R, **Barron-Gafford GA**, Dougherty PM , Engel VC , Grieve K, Handley L, Klimas C, Potosnak MJ, Zarnoch SJ , Zhang J. (2005). Increased leaf area dominates carbon flux response to elevated CO_2 in stands of *Populus deltoides* (Bartr.) and underlies a switch from canopy light-limited CO_2 influx in well-watered treatments to individual leaf, stomatally-limited influx under water stress. *Global Change Biology*, **11**: 716-731.

6. Pegoraro E, Rey A, **Barron-Gafford GA**, Monson R, Malhi Y, Murthy R. (2005). The interacting effects of elevated atmospheric CO_2 concentration, drought and leaf-to-air vapour pressure deficit on ecosystem isoprene fluxes. *Oecologia*, **146**: 120-129.

5. Walter A, Christ MM, **Barron-Gafford GA**, Grieve K, Paige T, Murthy R, Rascher U. (2005). The effect of elevated CO_2 on diel leaf growth cycle, leaf carbohydrate content and canopy growth performance of *Populus deltoids. Global Change Biology*, **11**: 1207-1219.

4. Pegoraro E, Rey A, Murthy R, Bobich EG, **Barron-Gafford GA,** Grieve K, Malhi YC. (2004). Effect of elevated CO_2 concentration and vapor pressure deficit on isoprene emission from leaves of *Populus deltoides* during drought. *Functional Plant Biology*, **31**: 1137-1147.

3. **Barron-Gafford GA**, RE Will, EC Burkes, B Shiver, Teskey RO. (2003). *Nutrient concentrations and contents, and their relation to stem growth, of intensively managed *Pinus taeda* and *Pinus elliottii* stands of different planting densities. *Forest Science*, **49**: 291-300.

2. Burkes, EC, Will RE, **Barron-Gafford GA**, Teskey RO, Shiver BD. (2003). Biomass partitioning and growth efficiency of intensively managed *Pinus taeda* and *Pinus elliottii* stands of different planting densities. *Forest Science*, **49**: 224-234.

1. Will, RE, **Barron GA**, Burkes EC, Shiver BD, Teskey RO. (2001). *Relationship between intercepted radiation, net photosynthesis, respiration, and rate of stem volume growth of *Pinus taeda* and *Pinus elliottii* stands of different densities. *Forest Ecology and Management*, **154**: 155-163.

WORK IN PROGRESS

Articles in peer review, final preparation, or revision

6. Adams HA, **Barron-Gafford GA**, Minor RL, Gardea AA, Bentley LP, Breshears DD, Dowell NG, Huxman TE. (*In Re-review post-revision*). Ever increasing drought-induced mortality risk for tree species with ever rising temperatures. *Environmental Research Letters.*

5. Elshall AS, Ye M, Niu G-Y, **Barron-Gafford GA**. (*In Re-review post-revision*). Impacts of Residual Models on Bayesian Inference and Predictive Performance of Soil Respiration Models. *Journal of Geophysical Research – Biogeosciences.*

4. Elshall AS, Ye M, Niu G-Y, **Barron-Gafford GA**. (*In Re-review post-revision*). Relative Model Score: A Multi-Criteria Metric for Measuring Relative Predictive Performance of Multiple Models. *Water Resources Research.*

3. Lee E, Kumar P, **Barron-Gafford GA**, Hendryx S, Sanchez-Cañete EP, Minor RL, Colella T, Scott RL. (*In Review*). Impact of hydraulic redistribution on multispecies vegetation water use in a semi-arid savanna ecosystem: An experimental and modeling synthesis. *Water Resources Research*.

2. Froend RH, Breshears DD, Law DJ, **Barron-Gafford GA**. (*In Review*). Phreatophytes in the Anthropocene: State and Transition Models for Climate Change and Land Use Pressures. *Earth's Future*.

1. Minor J, Colella TR, Barnes M, Mann S, Murphy P, Pearl J, **Barron-Gafford GA**. (*In Review*). Critical Zone Science in the Anthropocene: Opportunities for Biogeographic Theory and Praxis to Drive Earth Science Integration. *Global Ecology and Biogeography*.

MEDIA OUTREACH

2017 — UA News. *UA Researchers Plant Seeds to Make Renewable Energy More Efficient.* Interviewee discussing Agrivoltaics as an experiment in combining agriculture with energy efficiency, involves growing plants beneath solar panels, community outreach with Manzo Elementary and University High School, and the linkage between School of Geography & Development and Biosphere 2. Full online version: https://uanews.arizona.edu/story/ua-researchers-plant-seeds-make-renewable-energy-more-efficient?utm_source=uanow&utm_medium=email&utm_campaign

2016 — ResearchGate. *Solar energy is hot right now, in more ways than one.* Interviewee discussing unintended impacts of large-scale renewable energy through photovoltaics. Full online version: https://www.researchgate.net/blog/post/solar-energy-is-hot-right-now-in-more-ways-than-one

2016 — Arizona Daily Star. *Critical Zone Observatory gets grant to extend research.* Interviewee discussing the inter- and cross-disciplinary research within the context of the Critical Zone Observatory, and the linkage between School of Geography & Development and Biosphere 2. Full online version: http://tucson.com/news/science/environment/critical-zone-observatory-gets-grant-to-extend-research/article_aa4df9dc-a7a1-11e6-9f60-b341da1029a7.html

2014 — Bill Buckmaster Show. *Superstars of Science.* Interviewee discussing the Manzo Elementary project, STEAM learning (including Art in STEM education), and the linkage between School of Geography & Development and Biosphere 2. Full online version: http://www.buckmastershow.com/2014/04/24/buckmaster-show-4242014-tusd-struggles-to-keep-students/

2013 — Tucson Weekly (cover story). *Learning through Landscapes*. Interviewee on the partnership between School of Geography & Development and Biosphere

2 with Manzo Elementary to introduce a new STEM learning program. Full online version: http://www.tucsonweekly.com/tucson/learning-through-landscapes/Content?oid=3918303

2013 Arizona Public Media. Interviewee on the biogeography of woody plant expansion and the linkage between School of Geography & Development and Biosphere 2. https://ondemand.azpm.org/videoshorts/watch/2013/9/16/26865-grassland-faces-threats-from-mesquite-trees-woody-plants/

CONFERENCES AND SCHOLARLY PRESENTATIONS *(limited to period in rank)*

Invited Symposia (limited to period in rank)

Barron-Gafford GA (*Invited speaker*). Biogeography in the Critical Zone: Insights from the Mountain Tops and Valley Floor. UCLA Department of Geography Tod Spieker Colloquium Series. Tucson, Arizona. November, 2015.

Barron-Gafford GA (*Invited speaker*). Ecohydrology in our Critical Zone: Insights from Semiarid Mountain Tops to the Valley Floor. School of Natural Resources & the Environment (SNRE) Colloquium. Tucson, Arizona. October, 2015.

Barron-Gafford GA (*Invited speaker*). Sensor Technologies and Unmanned Aerial Vehicles (drones) to Measure Ecosystem Processes in Semi-arid Environments. Research Insights in Semiarid Ecosystems (RISE) Symposium. Tucson, Arizona. October, 2015.

Barron-Gafford GA (*Invited speaker*). Examining ecosystem function in space and time within the critical zone through the lenses of ecology and biogeography. Department of Ecology & Evolutionary Biology Colloquium. Tucson, Arizona. September, 2015.

Barron-Gafford GA (*Invited speaker*). Woody plant encroachment: Influence of landscape change on aboveground-belowground linkages, pulse dynamics, and ecosystem function. Soil, Water, & Environmental Science (SWES) Colloquium. Tucson, Arizona. November, 2013.

Barron-Gafford GA (*Invited speaker*). Exploring the ecology of semiarid land-cover and land-use change in anticipation of a changing climate. Department of Ecology & Evolutionary Biology Colloquium. Tucson, Arizona. March, 2013.

Invited conferences (limited to period in rank)

Barron-Gafford GA. Lags and Legacies in Ecosystem Processes: Challenges and Opportunities for Biogeographers and Ecologists. Frontiers in Experimental Ecosystem Science. Paris, France. July, 2015.

Scott RL, Huxman TE, **Barron-Gafford GA**, Jenerette GD, Young JM. The ecohydrological consequences of woody plant encroachment: How accessibility to deep soil water Resources affects ecosystem carbon and water exchange (*Invited*). American Geophysical Union's Annual Fall Meeting, Dec. 9-13, 2013, San Francisco, CA.

Submitted presentations (limited to period in rank)

Barron-Gafford GA, Allen N, Minor RL, Pavao-Zuckerman M. The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Scott RL, **Barron-Gafford GA**, Biederman JA. Insights from a network of long-term measurements of biosphere-atmospheric exchanges of water vapor and carbon dioxide in southern Arizona. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Barron-Gafford GA, Minor RL, Hendryx, S, Lee E, Sutter L, Colella T, Murphy P, Sanchez-Cañete EP, Hamerlynck EP, Kumar P, Scott RL. Impacts of hydraulic redistribution on overstory-understory interactions in a semiarid savanna. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Sanchez-Cañete EP, Scott RL, Van Haren JLM, **Barron-Gafford GA**. The Necessity of Determining the Gas Transfer Coefficient In-situ to Obtain More Accurate Soil Carbon Dioxide Effluxes Through the Gradient Method. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Elshall AS, Ye M, Niu G-Y, **Barron-Gafford GA**. Numerical Demons in Monte Carlo Estimation of Bayesian Model Evidence with Application to Soil Respiration Models. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Murphy P, Minor RL, Sanchez-Cañete EP, Potts DL, **Barron-Gafford GA**. Seasonal and Topographic Variation in Net Primary Productivity and Water Use Efficiency in a Southwest Sky Island Forest. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Lee E, Kumar P, , **Barron-Gafford GA**, Scott RL. An Experimental and Modeling Synthesis to Determine Seasonality of Hydraulic Redistribution in Semi-arid Region with Multispecies Vegetation Interaction. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Sutter L, Sanchez-Cañete EP, **Barron-Gafford GA**. Aspect as a Driver of Soil Carbon and Water Fluxes in Desert Environments. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Hingley R, Juarez S, Dontsova K, Hunt E, Le Galliard J-F, Chollet S, Cros A, Llavata M, Massol F, Barré P, Gelabert A, Daval D, Troch PA, **Barron-Gafford GA**, Van Haren JLM, Ferrière R. Effects of Climate Change and Vegetation Type on Carbon and Nitrogen Accumulation during Incipient Soil Formation. American Geophysical Union's Annual Fall Meeting, Dec. 12-16, 2016, San Francisco, CA.

Sanchez-Cañete EP, **Barron-Gafford GA**, van Haren J, Scott RL. Accurate long-term soil respiration fluxes based on the gradient method in a semiarid ecosystem. University of Arizona Arid Lands Poster Session, April, 2016, Tucson, AZ.

Murphy P, Minor RL, Potts DL, **Barron-Gafford GA**. Studying Topographic Controls on Primary Productivity. University of Arizona Arid Lands Poster Session, April, 2016, Tucson, AZ.

Sutter L, Sanchez-Cañete EP, **Barron-Gafford GA**. An important aspect of soil carbon and water fluxes in desert environments. University of Arizona Arid Lands Poster Session, April, 2016, Tucson, AZ.

Hendryx S, Minor RL, Colella T, Murphy P, Lee E, Scott RL, Kumar P, **Barron-Gafford GA**. Impacts of hydraulic redistribution on plant and soil carbon and water fluxes in a dryland savanna. University of Arizona Arid Lands Poster Session, April, 2016, Tucson, AZ.

Colella T, Mann SN, Murphy P, Minor J, Pearl J, Barnes M, Gallery R, Swetnam T, **Barron-Gafford GA**. Critical Zone Science in the Anthropocene. Association of American Geographers Annual Meeting, April, 2016, San Francisco, CA.

Elshall AS Ye M, Niu G-Y, **Barron-Gafford GA**. Bayesian multimodel inference of soil microbial respiration models: Theory, application and future prospective. American Geophysical Union's Annual Fall Meeting, Dec. 14-18, 2014, San Francisco, CA.

Scott RL, Biederman J, **Barron-Gafford GA**, Hamerlynck EP. The Carbon Balance Pivot Point of Southwestern U.S. Semiarid Ecosystems: Insights From the 21st Century Drought. American Geophysical Union's Annual Fall Meeting, Dec. 14-18, 2014, San Francisco, CA.

Barron-Gafford GA, Minor RL, Heard MM, Sutter LF, Yang J, Potts DL. Complex terrain in the Critical Zone: How topography drives ecohydrological patterns of soil and plant carbon exchange in a semiarid mountainous system. American Geophysical Union's Annual Fall Meeting, Dec. 14-18, 2014, San Francisco, CA.

Lee E, Kumar P, **Barron-Gafford GA**, Scott RL, Hendryx S, Sanchez-Cañete EP. Determining the Role of Hydraulic Redistribution Regimes in the Critical Zone. American Geophysical Union's Annual Fall Meeting, Dec. 14-18, 2014, San Francisco, CA.

Sanchez-Cañete EP, **Barron-Gafford GA**, van Haren JLM, Scott RL. Improving soil CO2 efflux estimates from in-situ soil CO2 sensors with gas transport measurements. American Geophysical Union's Annual Fall Meeting, Dec. 14-18, 2014, San Francisco, CA.

Parra EA, McFarland E, Minor RL, Heard MM, **Barron-Gafford GA**. Effects of isoprene production on the photosynthetic performance of Poplars (*Populus* sp.) under thermal and moisture stress. American Geophysical Union's Annual Fall Meeting, Dec. 14-18, 2014, San Francisco, CA.

Barron-Gafford GA. Examining ecosystem function in space and time within the critical zone through the lenses of ecology and biogeography. Ecological Society of America's Annual Meeting, August, 2015, Baltimore, MD.

Barron-Gafford GA. Capturing heterogeneity in carbon fluxes in space and time across a semiarid montane forest. Association of American Geographers Annual Meeting, April, 2015, Chicago, IL.

Elshall AS, Ye M, **Barron-Gafford GA**. Quantification of Model Uncertainty in Modeling Mechanisms of Soil Microbial Respiration Pulses to Simulate Birch Effect. American Geophysical Union's Annual Fall Meeting, Dec. 15-19, 2014, San Francisco, CA.

Pfeiffer AW, Minor RL, Heard MM, **Barron-Gafford GA**. Photosynthetic response of Poplars (*Populus*) to climatic stressors: Investigating isoprene's role in increasing tolerance to temperature and atmospheric water stress in Arizona. American Geophysical Union's Annual Fall Meeting, Dec. 15-19, 2014, San Francisco, CA.

Ibsen P, Van Leeuwn WJD McCorkel J, **Barron-Gafford GA**, Moore DJ. Physiology and thermal imaging of Poplar hybrids with varying temperature tolerance. American Geophysical Union's Annual Fall Meeting, Dec. 15-19, 2014, San Francisco, CA.

Troch PA, **Barron-Gafford GA**, Dontsova K, Fang Y, Niu G-Y, Pangle LA, Tuller M, Van Haren JLM. Monitoring and modeling water, energy and carbon fluxes at the hillslope scale in the Landscape Evolution Observatory. American Geophysical Union's Annual Fall Meeting, Dec. 15-19, 2014, San Francisco, CA.

Scott RL, Biederman JA, **Barron-Gafford GA**. The coupling of ecosystem productivity and water availability in dryland regions. American Geophysical Union's Annual Fall Meeting, Dec. 15-19, 2014, San Francisco, CA.

Ruiz J, Van Haren JLM, Dontsova K, **Barron-Gafford GA**, Troch PA, Chorover J. Rapid CO_2 consumption during incipient weathering of a granular basaltic hillslope in the Landscape Evolution Observatory, Biosphere 2. American Geophysical Union's Annual Fall Meeting, Dec. 15-19, 2014, San Francisco, CA.

Pavao-Zuckerman M, Knerl A, **Barron-Gafford GA**. Ecohydrology frameworks for green infrastructure design and ecosystem service provision. American Geophysical Union's Annual Fall Meeting, Dec. 15-19, 2014, San Francisco, CA.

Pfeiffer AW, Minor RL, Heard MM, **Barron-Gafford GA**. Photosynthetic response of Poplars (*Populus*) to climatic stressors. American Geophysical Union's Annual Fall Meeting, Dec. 15-19, 2014, San Francisco, CA.

Barron-Gafford GA, Minor RL, Heard M, Barrows J, Allen N. Using Water Smart Design and an Ecosystem Services Approach to Fight Solar Heat Islanding and Enhance Renewable Energy Production. Association of Pacific Coast Geographers Annual Meeting, Sept. 24-27, 2014, Tucson, AZ.

Barron-Gafford GA, Minor RL, Heard M, Yang J, Wright C, Potts DL. Aspect as a source of heterogeneity in carbon & water fluxes in space and time. National Critical Zone Observatory All-Hands Meeting, Sept. 21-24, 2014, Yosemite, CA.

Chorover J, Pelletier J, Breshears DD, McIntosh J, Rasmussen C, Brooks P, **Barron-Gafford GA**, Gallery R, Ferré T, Litvak M, Meixner T, Niu G-Y, Papuga S, Rich V, Schaap M, Troch P. The Catalina-Jemez CZO: Transformative Behavior of Energy, Water and Carbon in the Critical Zone II. Interactions between Long and Short Term Processes that Control Delivery of Critical Zone Services. National Critical Zone Observatory All-Hands Meeting, Sept. 21-24, 2014, Yosemite, CA.

Barron-Gafford GA. Heat islanding around solar energy installations ~ Valid concern or unnecessary worry about renewable energy production. Association of American Geographers Annual Meeting, April 8-12, 2014, Tampa, FL.

Barron-Gafford GA, Minor RL, van Haren J, Dontsova K, Troch PA. Precipitation pulse dynamics of carbon sequestration and efflux in highly weatherable soils. American Geophysical Union's Annual Fall Meeting, Dec. 9-13, 2013, San Francisco, CA.

Niu G, Zhang X, **Barron-Gafford GA**, Pavao-Zuckerman M. Modeling the "Birch Effect" using a microbial enzyme based soil organic carbon decomposition and gas transport model. American Geophysical Union's Annual Fall Meeting, Dec. 9-13, 2013, San Francisco, CA.

Yang J, **Barron-Gafford GA**, Minor RL, Heard M. Examining the physical drivers of photosynthetic temperature sensitivity within a sub-alpine mixed conifer forest. American Geophysical Union's Annual Fall Meeting, Dec. 9-13, 2013, San Francisco, CA.

van Haren J, **Barron-Gafford GA**, Dontsova K. CO_2 sequestration through weathering of basalt tephra in the Landscape Evolution Observatory (LEO). American Geophysical Union's Annual Fall Meeting, Dec. 9-13, 2013, San Francisco, CA.

DeMets CM, Pavao-Zuckerman M, **Barron-Gafford GA**, Jenerette GD, Young JM. Strategies for cooler cities? Ecophysiological responses of semi-arid street trees to storm water harvesting. American Geophysical Union's Annual Fall Meeting, Dec. 9-13, 2013, San Francisco, CA.

Law DJ, Ravi S, **Barron-Gafford GA**, Breshears DD, and Huxman TE. Evapotranspiration Partitioning: Competition between abiotic and biotic components of the water budget. AGU Chapman Conference on Soil-mediated Drivers of Coupled Biogeochemical and Hydrological Processes Across Scales. Tucson, AZ. October, 2013.

Niu GY, Zhang X, and **Barron-Gafford GA**. A microbial enzyme based Soil Organic Carbon (SOC) decomposition model for use in climate models. AGU Chapman Conference on Soil-mediated Drivers of Coupled Biogeochemical and Hydrological Processes Across Scales. Tucson, AZ. October, 2013.

Yang J and **Barron-Gafford GA**. Examining the physical drivers of photosynthetic temperature sensitivity within a sub-alpine conifer forest. Undergraduate Research Opportunities Consortium, Tucson, AZ. August, 2013.

Community Presentations (limited to period in rank)

Barron-Gafford GA. "Mesquites in the Grasslands ~ Environmental and Human Drivers of Landscape Change". Living Gently on the Land Educational Series, Appleton-Whittell Research Ranch of the National Audubon Society, Elgin, AZ. November, 2014.

Barron-Gafford GA. "Experiential Ecological Learning as a Transformative Gateway in Elementary Learning". Arizona Center for STEM Teachers (ACST) Residential Teacher Training Workshop at Biosphere 2, Tucson, AZ. July, 2013.

SCIENTIFIC REPORTS

OPEN

The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures

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While photovoltaic (PV) renewable energy production has surged, concerns remain about whether or not PV power plants induce a "heat island" (PVHI) effect, much like the increase in ambient temperatures relative to wildlands generates an Urban Heat Island effect in cities. Transitions to PV plants alter the way that incoming energy is reflected back to the atmosphere or absorbed, stored, and reradiated because PV plants change the albedo, vegetation, and structure of the terrain. Prior work on the PVHI has been mostly theoretical or based upon simulated models. Furthermore, past empirical work has been limited in scope to a single biome. Because there are still large uncertainties surrounding the potential for a PHVI effect, we examined the PVHI empirically with experiments that spanned three biomes. We found temperatures over a PV plant were regularly 3–4 °C warmer than wildlands at night, which is in direct contrast to other studies based on models that suggested that PV systems should decrease ambient temperatures. Deducing the underlying cause and scale of the PVHI effect and identifying mitigation strategies are key in supporting decision-making regarding PV development, particularly in semiarid landscapes, which are among the most likely for large-scale PV installations.

Electricity production from large-scale photovoltaic (PV) installations has increased exponentially in recent decades[1–3]. This proliferation in renewable energy portfolios and PV powerplants demonstrate an increase in the acceptance and cost-effectiveness of this technology[4,5]. Corresponding with this upsurge in installation has been an increase in the assessment of the impacts of utility-scale PV[4,6–8], including those on the efficacy of PV to offset energy needs[9,10]. A growing concern that remains understudied is whether or not PV installations cause a "heat island" (PVHI) effect that warms surrounding areas, thereby potentially influencing wildlife habitat, ecosystem function in wildlands, and human health and even home values in residential areas[11]. As with the Urban Heat Island (UHI) effect, large PV power plants induce a landscape change that reduces albedo so that the modified landscape is darker and, therefore, less reflective. Lowering the terrestrial albedo from ~20% in natural deserts[12] to ~5% over PV panels[13] alters the energy balance of absorption, storage, and release of short- and longwave radiation[14,15]. However, several differences between the UHI and potential PVHI effects confound a simple comparison and produce competing hypotheses about whether or not large-scale PV installations will create a heat island effect. These include: (*i*) PV installations shade a portion of the ground and therefore could reduce heat absorption in surface soils[16], (*ii*) PV panels are thin and have little heat capacity per unit area but PV modules emit thermal radiation both up and down, and this is particularly significant during the day when PV modules are often 20 °C warmer than ambient temperatures, (*iii*) vegetation is usually removed from PV power plants, reducing the amount of cooling due to transpiration[14], (*iv*) electric power removes energy from PV power plants, and (*v*) PV panels reflect and absorb upwelling longwave radiation, and thus can prevent the soil from cooling as much as it might under a dark sky at night.

Public concerns over a PVHI effect have, in some cases, led to resistance to large-scale solar development. By some estimates, nearly half of recently proposed energy projects have been delayed or abandoned due to local opposition[11]. Yet, there is a remarkable lack of data as to whether or not the PVHI effect is real or simply an issue

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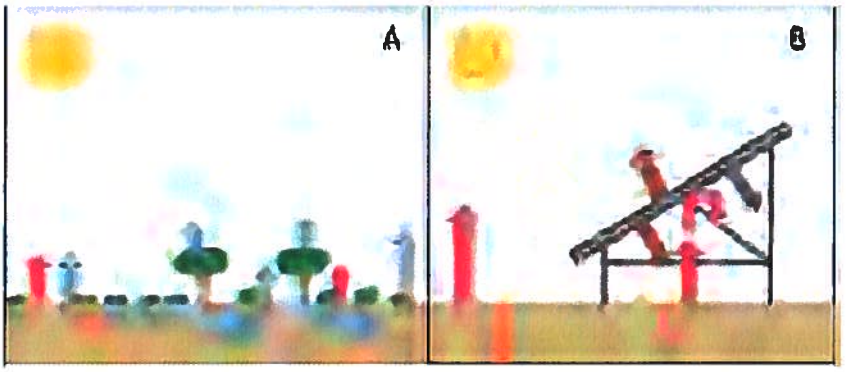

Figure 1. Illustration of midday energy exchange. Assuming equal rates of incoming energy from the sun, a transition from (**A**) a vegetated ecosystem to (**B**) a photovoltaic (PV) power plant installation will significantly alter the energy flux dynamics of the area. Within natural ecosystems, vegetation reduces heat capture and storage in soils (orange arrows), and infiltrated water and vegetation release heat-dissipating latent energy fluxes in the transition of water-to-water vapor to the atmosphere through evapotranspiration (blue arrows). These latent heat fluxes are dramatically reduced in typical PV installations, leading to greater sensible heat fluxes (red arrows). Energy re-radiation from PV panels (brown arrow) and energy transferred to electricity (purple arrow) are also shown.

associated with perceptions of environmental change caused by the installations that lead to "not in my back-yard" (NIMBY) thinking. Some models have suggested that PV systems can actually cause a cooling effect on the local environment, depending on the efficiency and placement of the PV panels[17,18]. But these studies are limited in their applicability when evaluating large-scale PV installations because they consider changes in albedo and energy exchange within an urban environment (rather than a natural ecosystem) or in European locations that are not representative of semiarid energy dynamics where large-scale PV installations are concentrated[10,19]. Most previous research, then, is based on untested theory and numerical modeling. Therefore, the potential for a PHVI effect must be examined with empirical data obtained through rigorous experimental terms.

The significance of a PVHI effect depends on energy balance. Incoming solar energy typically is either reflected back to the atmosphere or absorbed, stored, and later re-radiated in the form of latent or sensible heat (Fig. 1)[20,21]. Within natural ecosystems, vegetation reduces heat gain and storage in soils by creating surface shading, though the degree of shading varies among plant types[22]. Energy absorbed by vegetation and surface soils can be released as latent heat in the transition of liquid water to water vapor to the atmosphere through evapotranspiration – the combined water loss from soils (evaporation) and vegetation (transpiration). This heat-dissipating latent energy exchange is dramatically reduced in a typical PV installation (Fig. 1 transition from A-to-B), potentially leading to greater heat absorption by soils in PV installations. This increased absorption, in turn, could increase soil temperatures and lead to greater sensible heat efflux from the soil in the form of radiation and convection. Additionally, PV panel surfaces absorb more solar insolation due to a decreased albedo[13,23,24]. PV panels will re-radiate most of this energy as longwave sensible heat and convert a lesser amount (~20%) of this energy into usable electricity. PV panels also allow some light energy to pass, which, again, in unvegetated soils will lead to greater heat absorption. This increased absorption could lead to greater sensible heat efflux from the soil that may be trapped under the PV panels. A PVHI effect would be the result of a detectable increase in sensible heat flux (atmospheric warming) resulting from an alteration in the balance of incoming and outgoing energy fluxes due to landscape transformation. Developing a full thermal model is challenging[17,18,25], and there are large uncertainties surrounding multiple terms including variations in albedo, cloud cover, seasonality in advection, and panel efficiency, which itself is dynamic and impacted by the local environment. These uncertainties are compounded by the lack of empirical data.

We addressed the paucity of direct quantification of a PVHI effect by simultaneously monitoring three sites that represent a natural desert ecosystem, the traditional built environment (parking lot surrounded by commercial buildings), and a PV power plant. We define a PVHI effect as the difference in ambient air temperature between the PV power plant and the desert landscape. Similarly, UHI is defined as the difference in temperature between the built environment and the desert. We reduced confounding effects of variability in local incoming energy, temperature, and precipitation by utilizing sites contained within a 1 km area.

At each site, we monitored air temperature continuously for over one year using aspirated temperature probes 2.5 m above the soil surface. Average annual temperature was 22.7 + 0.5 °C in the PV installation, while the nearby desert ecosystem was only 20.3 + 0.5 °C, indicating a PVHI effect. Temperature differences between areas varied significantly depending on time of day and month of the year (Fig. 2), but the PV installation was always greater than or equal in temperature to other sites. As is the case with the UHI effect in dryland regions, the PVHI effect delayed the cooling of ambient temperatures in the evening, yielding the most significant difference in overnight temperatures across all seasons. Annual average midnight temperatures were 19.3 + 0.6 °C in the PV installation, while the nearby desert ecosystem was only 15.8 + 0.6 °C. This PVHI effect was more significant in terms of actual degrees of warming (+3.5 °C) in warm months (Spring and Summer; Fig. 3, right).

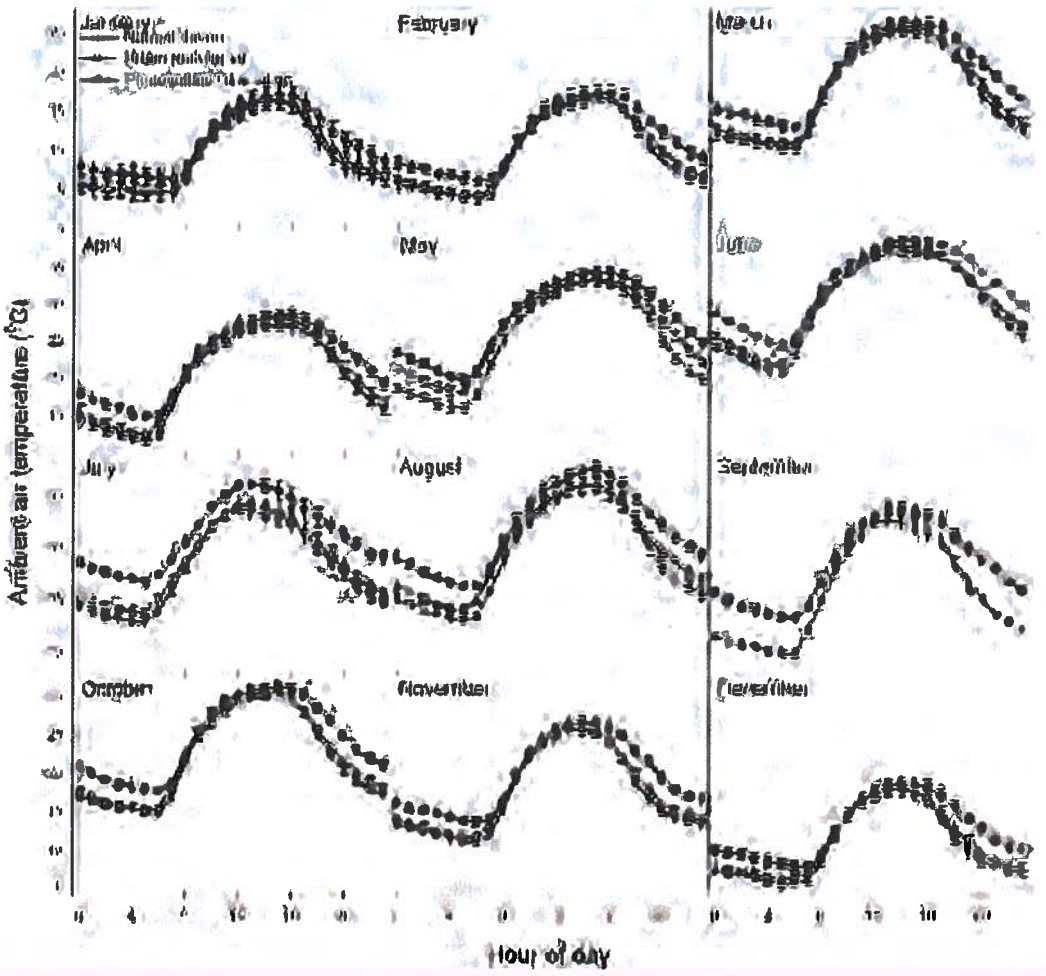

Figure 2. Average monthly ambient temperatures throughout a 24-hour period provide evidence of a photovoltaic heat island (PVHI) effect.

In both PVHI and UHI scenarios, the greater amount of exposed ground surfaces compared to natural systems absorbs a larger proportion of high-energy, shortwave solar radiation during the day. Combined with minimal rates of heat-dissipating transpiration from vegetation, a proportionally higher amount of stored energy is reradiated as longwave radiation during the night in the form of sensible heat (Fig. 1)[15]. Because PV installations introduce shading with a material that, itself, should not store much incoming radiation, one might hypothesize that the effect of a PVHI effect would be lesser than that of a UHI. Here, we found that the difference in evening ambient air temperature was consistently greater between the PV installation and the desert site than between the parking lot (UHI) and the desert site (Fig. 3). The PVHI effect caused ambient temperature to regularly approach or be in excess of 4 °C warmer than the natural desert in the evenings, essentially doubling the temperature increase due to UHI measured here. This more significant warming under the PVHI than the UHI may be due to heat trapping of re-radiated sensible heat flux under PV arrays at night. Daytime differences from the natural ecosystem were similar between the PV installation and urban parking lot areas, with the exception of the Spring and Summer months, when the PVHI effect was significantly greater than UHI in the day. During these warm seasons, average midnight temperatures were 25.5 + 0.5 °C in the PV installation and 23.2 + 0.5 °C in the parking lot, while the nearby desert ecosystem was only 21.4 + 0.5 °C.

The results presented here demonstrate that the PVHI effect is real and can significantly increase temperatures over PV power plant installations relative to nearby wildlands. More detailed measurements of the underlying causes of the PVHI effect, potential mitigation strategies, and the relative influence of PVHI in the context of the intrinsic carbon offsets from the use of this renewable energy are needed. Thus, we raise several new questions and highlight critical unknowns requiring future research.

What is the physical basis of land transformations that might cause a PVHI?

We hypothesize that the PVHI effect results from the effective transition in how energy moves in and out of a PV installation versus a natural ecosystem. However, measuring the individual components of an energy flux model remains a necessary task. These measurements are difficult and expensive but, nevertheless, are indispensable in identifying the relative influence of multiple potential drivers of the PVHI effect found here. Environmental

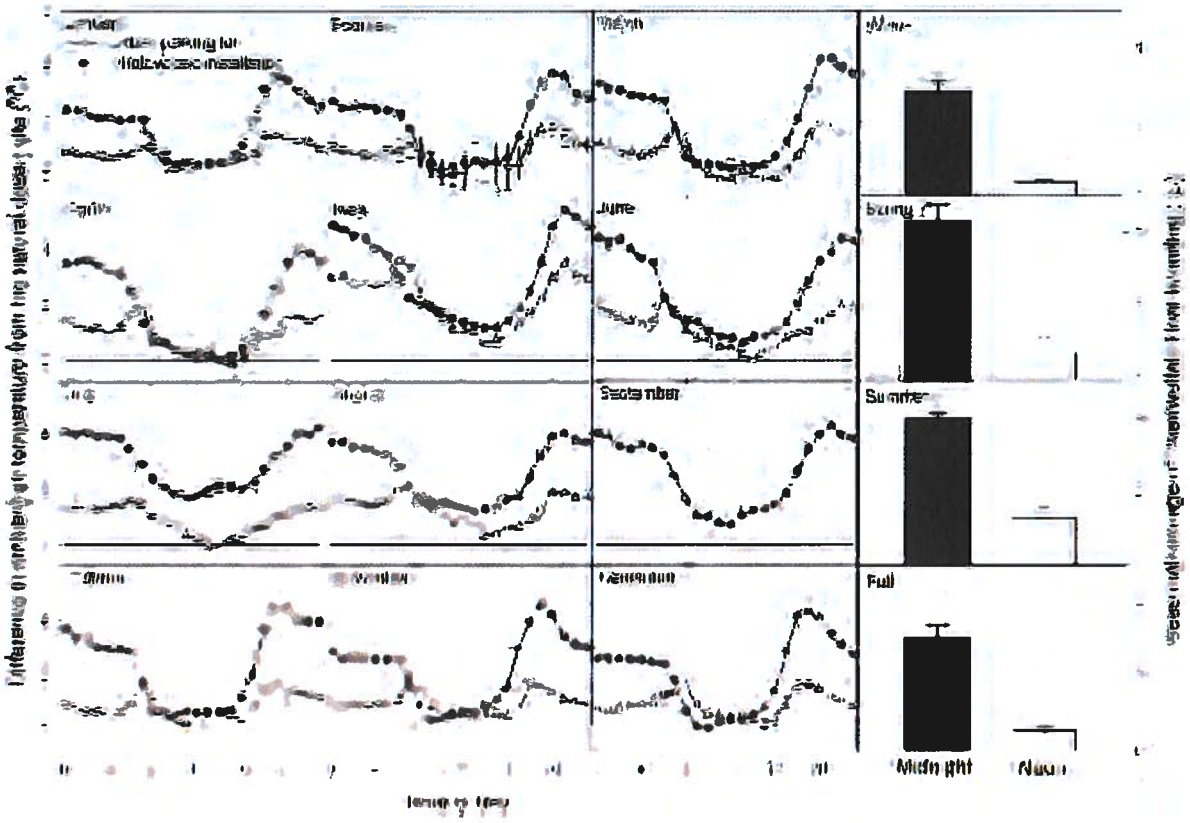

Figure 3. (Left) Average monthly levels of Photovoltaic Heat Islanding (ambient temperature difference between PV installation and desert) and Urban Heat Islanding (ambient temperature difference between the urban parking lot and the desert). (Right) Average night and day temperatures for four seasonal periods, illustrating a significant PVHI effect across all seasons, with the greatest influence on ambient temperatures at night.

conditions that determine patterns of ecosystem carbon, energy, and water dynamics are driven by the means through which incoming energy is reflected or absorbed. Because we lack fundamental knowledge of the changes in surface energy fluxes and microclimates of ecosystems undergoing this land use change, we have little ability to predict the implications in terms of carbon or water cycling[4,8].

What are the physical implications of a PVHI, and how do they vary by region?

The size of an UHI is determined by properties of the city, including total population[26–28], spatial extent, and the geographic location of that city[29–31]. We should, similarly, consider the spatial scale and geographic position of a PV installation when considering the presence and importance of the PVHI effect. Remote sensing could be coupled with ground-based measurements to determine the lateral and vertical extent of the PVHI effect. We could then determine if the size of the PVHI effect scales with some measure of the power plant (for example, panel density or spatial footprint) and whether or not a PVHI effect reaches surrounding areas like wildlands and neighborhoods. Given that different regions around the globe each have distinct background levels of vegetative ground cover and thermodynamic patterns of latent and sensible heat exchange, it is possible that a transition from a natural wildland to a typical PV power plant will have different outcomes than demonstrated here. The paucity in data on the physical effects of this important and growing land use and land cover change warrants more studies from representative ecosystems.

What are the human implications of a PVHI, and how might we mitigate these effects?

With the growing popularity of renewable energy production, the boundaries between residential areas and larger-scale PV installations are decreasing. In fact, closer proximity with residential areas is leading to increased calls for zoning and city planning codes for larger PV installations[32,33], and PVHI-based concerns over potential reductions in real estate value or health issues tied to Human Thermal Comfort (HTC)[34]. Mitigation of a PVHI effect through targeted revegetation could have synergistic effects in easing ecosystem degradation associated with development of a utility scale PV site and increasing the collective ecosystem services associated with an area[4]. But what are the best mitigation measures? What tradeoffs exist in terms of various means of revegetating degraded PV installations? Can other albedo modifications be used to moderate the severity of the PVHI?

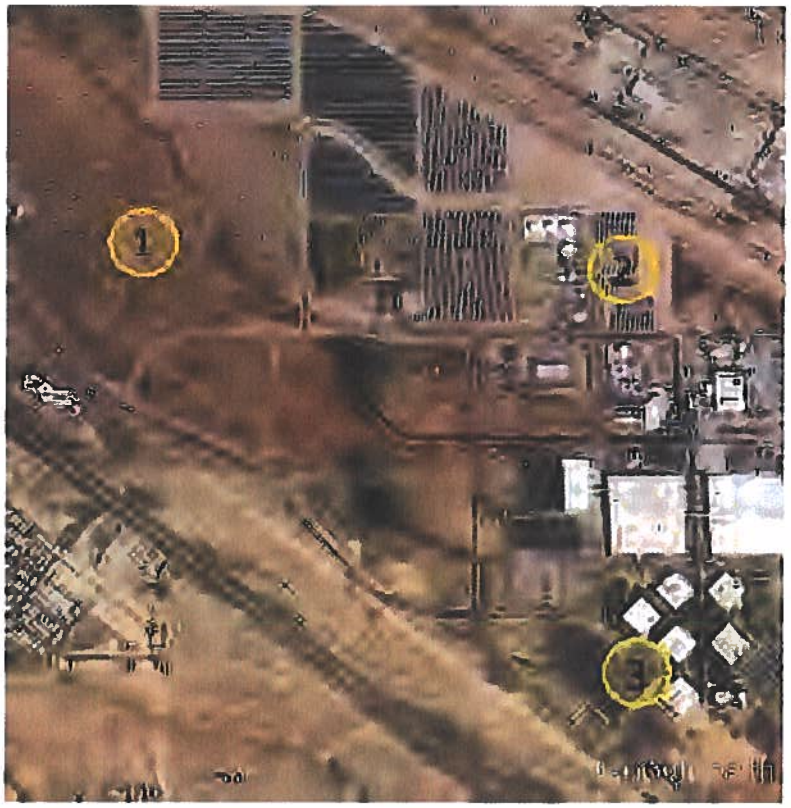

Figure 4. Experimental sites. Monitoring a (1) natural semiarid desert ecosystem, (2) solar (PV) photovoltaic installation, and (3) an "urban" parking lot – the typical source of urban heat islanding – within a 1 km² area enabled relative control for the incoming solar energy, allowing us to quantify variation in the localized temperature of these three environments over a year-long time period. The Google Earth image shows the University of Arizona's Science and Technology Park's Solar Zone.

To fully contextualize these findings in terms of global warming, one needs to consider the relative significance of the (globally averaged) decrease in albedo due to PV power plants and their associated warming from the PVHI against the carbon dioxide emission reductions associated with PV power plants. The data presented here represents the first experimental and empirical examination of the presence of a heat island effect associated with PV power plants. An integrated approach to the physical and social dimensions of the PVHI is key in supporting decision-making regarding PV development.

Methods

Site Description. We simultaneously monitored a suite of sites that represent the traditional built urban environment (a parking lot) and the transformation from a natural system (undeveloped desert) to a 1 MW PV power plant (Fig. 4; Map data: Google). To minimize confounding effects of variability in local incoming energy, temperature, and precipitation, we identified sites within a 1 km area. All sites were within the boundaries of the University of Arizona Science and Technology Park Solar Zone (32.092150°N, 110.808764°W; elevation: 888 m ASL). Within a 200 m diameter of the semiarid desert site's environmental monitoring station, the area is composed of a sparse mix of semiarid grasses (*Sporobolus wrightii, Eragrostis lehmanniana*, and *Muhlenbergia porteri*), cacti (*Opuntia* spp. and *Ferocactus* spp.), and occasional woody shrubs including creosote bush (*Larrea tridentata*), whitethorn acacia (*Acacia constricta*), and velvet mesquite (*Prosopis velutina*). The remaining area is bare soil. These species commonly co-occur on low elevation desert bajadas, creosote bush flats, and semiarid grasslands. The photovoltaic installation was put in place in early 2011, three full years prior when we initiated monitoring at the site. We maintained the measurement installations for one full year to capture seasonal variation due to sun angle and extremes associated with hot and cold periods. Panels rest on a single-axis tracker system that pivot east-to-west throughout the day. A parking lot with associated building served as our "urban" site and is of comparable spatial scale as our PV site.

Monitoring Equipment & Variables Monitored. Ambient air temperature (°C) was measured with a shaded, aspirated temperature probe 2.5 m above the soil surface (Vaisala HMP60, Vaisala, Helsinki, Finland in the desert and Microdaq U23, Onset, Bourne, MA in the parking lot). Temperature probes were cross-validated for precision (closeness of temperature readings across all probes) at the onset of the experiment. Measurements of temperature were recorded at 30-minute intervals throughout a 24-hour day. Data were recorded on a data-logger (CR1000, Campbell Scientific, Logan, Utah or Microstation, Onset, Bourne, MA). Data from this

instrument array is shown for a yearlong period from April 2014 through March 2015. Data from the parking lot was lost for September 2014 because of power supply issues with the datalogger.

Statistical analysis. Monthly averages of hourly (on-the-hour) data were used to compare across the natural semiarid desert, urban, and PV sites. A Photovoltaic Heat Island (PVHI) effect was calculated as differences in these hourly averages between the PV site and the natural desert site, and estimates of Urban Heat Island (UHI) effect was calculated as differences in hourly averages between the urban parking lot site and the natural desert site. We used midnight and noon values to examine maximum and minimum, respectively, differences in temperatures among the three measurement sites and to test for significance of heat islanding at these times. Comparisons among the sites were made using Tukey's honestly significant difference (HSD) test[35]. Standard errors to calculate HSD were made using pooled midnight and noon values across seasonal periods of winter (January-March), spring (April-June), summer (July-September), and fall (October-December). Seasonal analyses allowed us to identify variation throughout a yearlong period and relate patterns of PVHI or UHI effects with seasons of high or low average temperature to examine correlations between background environmental parameters and localized heat islanding.

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Acknowledgements

The authors thank Ken Marcus for access to the University of Arizona Solar Zone and the Science and Technology Park and to Tucson Electric Power for access to their PV installation. This research was supported by the University of Arizona Institute of the Environment and the Office of Research & Development through the TRIF-funded Water, Environmental and Energy Solutions initiative.

Author Contributions

G.A.B.-G., R.L.M. and N.A.A. established research sites and installed monitoring equipment. G.A.B.-G. directed research and R.L.M. conducted most site maintenance. G.A.B.-G., N.A.A., A.D.C. and M.A.P.-Z. led efforts to secure funding for the research. All authors discussed the results and contributed to the manuscript.

Additional Information

Competing financial interests: The authors declare no competing financial interests.

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EXHIBIT H

Dudek Carbon Sequestration Technical Memo

August 11, 2021

621 CHAPALA STREET
SANTA BARBARA, CALIFORNIA 93101
T 805.963.0651 F 805.963.2074

MEMORANDUM

To:	Geoff Fallon, BayWa
From:	Adam Poll, Dudek
Subject:	Carbon Sequestration Technical Memorandum for the JVR Energy Park Project
Date:	August 11, 2021
cc:	Candice Magnus, Dudek
Attachment(s):	A, Resume for Adam Poll

Dudek has prepared this memorandum to discuss the carbon sequestration impacts of the JVR Energy Park Project (project) in response to the comment from Billie Jo Jannen of the Campo Lake Morena Community Planning Group, dated July 8, 2021. Below is a synopsis of the comment relating to carbon sequestration:

> Project developers have very little upon which to base their calculations without area specific numbers on what is being sequestered in chaparral range and wildland, and SDC staff has done nothing to obtain analysis or suggest better sources for it. Using the boilerplate numbers provided by Natural Resources Defense Council and International Panel on Climate Change doesn't work because they have measured lands that are drastically different from our backcountry. In fact, any EIR that relies on pasture or forest numbers to compute permanent GHG releases on chaparral lands should be rejected out of hand. Computations should come from specific measurements on the types of land and vegetation we have here.
>
> In a March 14, 2019 comment letter on the Boulder Brush NOP, CLMPG wrote: "Wildland and agricultural scientists have been studying soil sequestration for over 30 years, and work has become intensive in recent years. Methods of physical measurement and quantification have been refined and there is not a single reason – other than simple disinclination – for county staff to neglect consulting with these experts. Some of these researchers are located right here in San Diego County. At what point is the science "old" enough to be used for practical purposes?
>
> According to research on carbon sequestration in arid biomes, soil sequestration – and not surface vegetation – is the greater part of local greenhouse gas-holding capacity. The Food and Agriculture Organization of the United Nations writes: "In dryland environments, soil organic carbon in the first 100 cm soil amounts to about 4 tons/hectare." http://www.fao.org/3/y5738e/y5738e07.htm#TopOfPage
>
> Subsoil biological agents – mostly bacteria – sequester this carbon and are permanently destroyed when the soil is disturbed. https://phys.org/news/2014-04-arid-areas-absorbunexpected-amounts.html.
>
> According to the 2014 study "Spatial Distribution of Soil Organic Carbon and Its Influencing Factors in Desert Grasslands of the Hexi Corridor, Northwest China," arid regions worldwide contain 40 times more carbon than what has been released due to human activity, adding, "soils in these

> regions are fragile and may experience degradation, desertification, wind erosion, and overgrazing. Small changes in soil conditions can modify the original balance of soil carbon cycle, increase the C loss from soil, and release more greenhouse gases into the atmosphere. Therefore, SOC storage in the desert-grassland ecosystem is a critical component of global C cycle and has a considerable effect on reducing the rate of enrichment of atmospheric CO_2." https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3986398/
>
> Unimpaired natural systems will not only hold the carbon they have, but will hold even more as atmospheric CO_2 increases, making them an irreplaceable GHG-buffering resource. www.currentscience.ac.in/Volumes/106/10/1357.pdf"

Carbon sequestration is the process by which CO_2 is removed from the atmosphere and deposited into a carbon reservoir (e.g., vegetation). Trees and vegetation take in CO_2 from the atmosphere during photosynthesis, break down the CO_2, store the carbon within plant parts, and release the oxygen back into the atmosphere[1]. A development that removes or disturbs existing vegetation results in potential release of sequestered carbon to the atmosphere as CO_2, which would not have been released had there been no land-type change. The planting of new trees and vegetation would store new carbon as their wood mass increases through normal growth. The following presents the methodology used to estimate the carbon loss from the project as presented in Appendix P (Greenhouse Gas Technical Report) of the Final EIR. The project did not include the planting of trees and as such no carbon sequestration was evaluated.

> The calculation methodology and default values provided in CalEEMod[2] were used to calculate potential CO_2 emissions associated with the one-time change in carbon sequestration capacity of a vegetation land use type. The calculation of the one-time loss of sequestered carbon is the product of the converted acreage value and the carbon content value for each land use type (vegetation community). The mass of sequestered carbon per unit area (expressed in units of MT of CO_2 per acre) is dependent on the specific land use type. Assuming that the sequestered carbon is released as CO_2 after removal of the vegetation, annual CO_2 is calculated by multiplying total biomass (MT of dry matter per acre) from IPCC data by the carbon fraction in plant material, and then converting MT of carbon to MT of CO_2 based on the molecular weights of carbon and CO_2.
>
> It is conservatively assumed that all sequestered carbon from the removed vegetation would be returned to the atmosphere; that is, the wood from the vegetation communities would not be re-used in a solid form or another form that would retain carbon. GHG emissions generated during construction activities, including clearing, vegetation removal, and grading, are estimated in the construction emissions analysis.
>
> CalEEMod calculates GHG emissions resulting from land conversion and uses six general IPCC land use classifications for assigning default carbon content values (in units of MT CO_2 per acre).

---

[1] CARB. 2015. *EMFAC2014 Volume III – Technical Documentation*. May 12, 2015. https://www.arb.ca.gov/msei/downloads/emfac2014/emfac2014-vol3- technical-documentation-052015.pdf.

[2] CAPCOA. 2017. California Emissions Estimator Model (CalEEMod) User's Guide Version 2016.3.2. Prepared by BREEZE Software, A Division of Trinity Consultants in collaboration with South Coast Air Quality Management District and the California Air Districts. Accessed May 2018. http://caleemod.com/.

CalEEMod default carbon content values were assumed to estimate the loss of sequestered carbon (release of CO_2) from the removal of the scrub (14.3 MT CO_2 per acre), forest (111 MT CO_2 per acre), and grassland (4.31 MT CO_2 per acre) vegetation categories, which are based on data and formulas provided in the IPCC reports. The Proposed Project would permanently disturb 629 acres with varying carbon content values; however, only 594.62 acres is vegetated land.

The CalEEMod relies on the International Panel on Climate Changes 2006 Guidelines for National Greenhouse Gas Inventories, Volume 4: Agriculture, Forestry and Other Land Use[3] as the methodology for estimating carbon loss and sequestration from projects. This report is the culmination of three years of work by the IPCC National Greenhouse Gas Inventories Programme, to update its own previous guidance on National Greenhouse Gas Emission Inventories. The development of these guidelines has depended on the expertise, knowledge and co-operation of the Coordinating Lead Authors, Lead Authors and Contributing Authors – the contribution over 250 experts worldwide. Two reviews of these guidelines were made in 2005. The first, an expert review, produced over 6,000 comments, while the second, a combined governmental and expert review, resulted in an additional 8,600 comments. The review editors have ensured the appropriate consideration of all the comments received.

The Biological Technical Report (Appendix D to the Final EIR) prepared for the project identified the types of impacted vegetation as well as the quantities (in acres) which is what the carbon loss was based on. Table 5-1 in Appendix D to the Final EIR listed the types of vegetation impacted to include: desert saltbush scrub, mesquite bosque, sonoran mixed wood and succulent scrub, and tamarisk scrub. Therefore, the use of the scrub sequestration factor from CalEEMod was appropriate as 98% of the impacted vegetation was scrub.

The comment cited one potential carbon content study which estimated carbon sequestration of 4 tons/hectare as a result of soil disturbance. A previous review of similar studies in the EIR/EIS for the East County Substation/Tule Wind/Energia Sierra Juarez U.S. Transmission Line projects regarding the carbon sequestration capacity of desert soils does not indicate a complete understanding of the mechanism by which carbon dioxide is taken up by desert soils and flora[4]. Specifically, the studies did not suggest that temporary disruption of desert soils during construction of a project would release carbon dioxide or eliminate or reduce the potential carbon sequestration capacity of desert soils, and if it did occur, the mechanism by which it would occur (i.e., inorganic or biological uptake).

With respect to carbon sequestration of chaparral, there is no universally accepted methodology for evaluating this issue in CEQA documents and more specifically for chaparral (as contrasted with forests, the loss of which is identified as a potentially significant impact in Appendix G of the CEQA Guidelines). No significance thresholds or other criteria have been established for evaluating loss of carbon sequestration resulting from removal of vegetation on a project site.

---

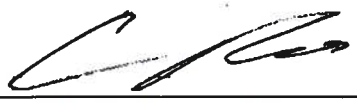
[3] IPCC. 2006. IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 Agriculture, Forestry and Other Land Use. https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html

[4] Dudek. 2011. *Final Environmental Impact Report/Environmental Impact Statement*. SCH No. 2009121079. DOI Control No. DES 10-62. Prepared for the California Public Utilities Commission and Bureau of Land Management. October.

Finally, any minimal amount of carbon released during the disturbance of soil during construction (e.g., 4 tons/hectare would amount to approximately 1,000 tons of carbon dioxide) would be insignificant compared to the proposed project's avoidance of 540,721 MT CO_2e over the lifetime of the project. As a one-time loss and not an annual loss, the minimal release of carbon would be amortized over the projects 35-year lifetime, resulting in an even smaller amount compared to the project's avoided GHG emissions.

In summary, the use of the CalEEMod emission factor is conservative and is based on an extensive peer-reviewed effort by the IPCC. Any carbon released from soil disturbance would be minimal and no change in the impact determination would occur.

Sincerely,



Adam Poll, QEP, LEED AP BD+C
Senior Air Quality Specialist

Att.: A, Resume for Adam Poll

Attachment A

Resume for Adam Poll

Adam Poll, LEED AP BD+C

Environmental Specialist

Adam Poll is an environmental specialist with 15 years' experience, trained in organizational greenhouse gas (GHG) accounting, which provided a thorough understanding of the Western Research Institute (WRI)/World Business Council for Sustainable Development (WBCSD) GHG Protocol Corporate Standard, while referring to the ISO 14064: Part 1 international standard for GHG inventories. Mr. Poll is experienced in GHG accounting principles, defining applications for GHG inventories, designing and development of GHG inventories, establishing GHG boundaries for an organization, identifying emission sources, tracking emissions over time, recalculations, establishing a base year, setting GHG reduction targets, inventory quality management, preparing a GHG inventory report, and preparing for verification.

Adam Poll

University of Denver

MS, Environmental Policy and Management, Energy and Sustainability, 2011

University of California, Santa Barbara

BS, Environmental Studies, 2006

Certifications

LEED AP BD+C, No. 10364581
International Organization for Standardization (ISO), No. 14001, Lead Auditor

Qualified Environmental Professional (QEP), No. 03120007

Professional Affiliations

Air & Waste Management Association

Relevant Previous Experience

GHG Inventory, Bexar County, Texas. Conducted county-wide GHG inventory. This provided the county with a baseline emissions inventory, emissions reductions strategies with projected reductions, and a GHG management plan outlining the steps necessary to implement the reductions. Acted as the technical lead for using Clean Action and Climate Protection (CACP) software, which was used to generate the emissions inventory and emissions reductions roadmap.

California Electronic GHG Reporting Tool (Cal e-GGRT) Submittal, SME, Santa Maria, California. Completed the online submittal of the calendar year 2013 emission inventory through the Cal e-GGRT reporting tool.

Air Emission Inventory (AEI) for Peterson AFB, Colorado. Conducted a stationary and mobile criteria air pollutant and GHG AEI for Peterson AFB. The inventory helped the base comply with Colorado Department of Public Health and Environment Title V recordkeeping and reporting requirements, in addition to the Air Force Instruction (AFI) 32-7040 requirements. The AEI was completed in the Air Force APIMS.

AEI for Minot AFB, North Dakota. Conducted a stationary and mobile criteria air pollutant and GHG AEI for Minot AFB. The inventory helped the base comply with North Dakota Department of Health Title V recordkeeping and reporting requirements, in addition to the AFI 32-7040 requirements. The AEI was completed in the Air Force APIMS.

AEI for Davis-Monthan AFB, Arizona. Conducted a stationary and mobile criteria air pollutant and GHG AEI for Davis-Monthan AFB. The inventory helped the base comply with Pima County Title V recordkeeping and reporting requirements, in addition to the AFI 32-7040 requirements. The AEI was completed in the Air Force APIMS.

AEI for Beale AFB, California. Conducted a stationary and mobile criteria air pollutant and GHG AEI for Beale AFB. The inventory helped the base comply with Feather River Air Quality Management District Title V recordkeeping and reporting requirements, in addition to the AFI 32-7040 requirements. The AEI was completed in the Air Force APIMS.

AEI for Laughlin AFB, Texas. The objective of the criteria air pollutant and GHG AEI was to meet the requirements in AFI 32-7040, Air Quality Compliance, which requires Air Force installations to conduct periodic source emission inventories. The AEI also supported the requirements of Executive Order (EO) 13514, which requires the reduction of GHGs. The AEI also fulfilled the base's regulatory obligation under the Texas Council on Environmental Quality (TCEQ) to provide both annual and ozone season emissions. The AEI was completed in the Air Force APIMS.

AEI for Join Base San Antonio (JBSA), Randolph, Texas. The objective of the criteria air pollutant and GHG AEI was to meet the requirements in AFI 32-7040, Air Quality Compliance, which requires Air Force installations to conduct periodic source emission inventories. The AEI also supported the requirements of EO 13514, which requires the reduction of GHGs. The AEI also fulfilled the base's regulatory obligation under the TCEQ to provide both annual and ozone season emissions. The AEI was completed in APIMS.

GHG and AEI for JBSA-Lackland, Texas. The objective of the criteria air pollutant and GHG AEI was to meet the requirements in AFI 32-7040, Air Quality Compliance, which requires Air Force installations to conduct periodic source emission inventories. The AEI also supported the requirements of EO 13514, which requires the reduction of GHGs. The AEI also fulfilled the base's regulatory obligation under the TCEQ to provide both annual and ozone season emissions. Lackland AFB is considered a major Title V source due to its Total Energy Plant. The GHG inventory was completed to upload to the Environmental Protection Agency (EPA) e-GRRT reporting tool for GHG emissions. The AEI was completed in APIMS.

Air Emission Inventory, Malmstrom AFB, Montana. The objective of the criteria air pollutant and GHG AEI was to meet the requirements in AFI 32-7040, Air Quality Compliance, which requires Air Force installations to conduct periodic source emission inventories. The Air Emission Inventory also supported the requirements of EO 13514, which requires the reduction of GHGs.

GHG Inventory Verification, Los Angeles AFB, California. Provided technical assistance in the verification of GHG emissions for the 2006 calendar year. The inventory was contrasted to the GHG Protocol and ISO 9001.

Landfill GHG Emissions Modeling, Edwards AFB, California. To ensure that the landfill located on Edwards AFB complied with AB 32, the GHG emissions were modeled using the EPA's Waste Reduction Model (WARM) in addition to other tools. This helped provide the necessary data to establish a landfill gas capture and destruction system.

EPA Climate Leaders Consultation, Union Bank, California. Provided GHG data management and verification services for Union Bank with regards to participating in the EPA Climate Leaders program. The work consisted of establishing an Inventory Management Program for Union Bank in addition to aligning the internal GHG management software with the Climate Leader program. Provided guidance for GHG baseline establishment and creating the Climate Leader goal.

Publications

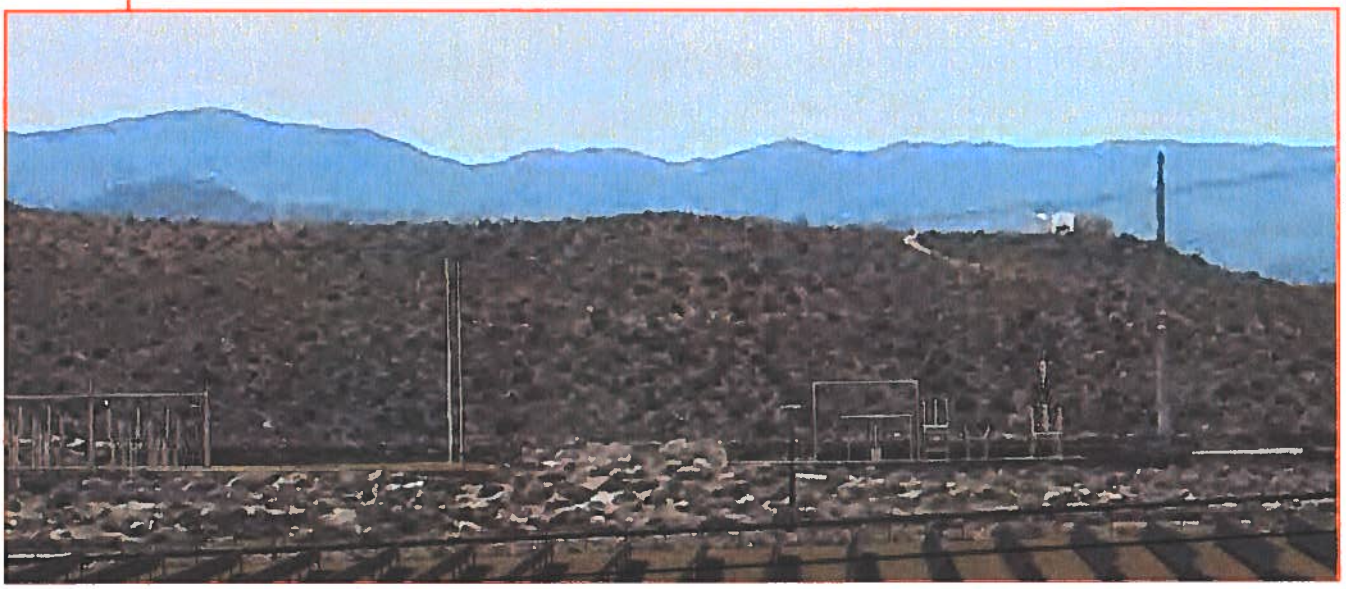
Poll, Adam. 2011. "The Identification of Best Management Practices in a Materials Recovery Facility to Increase Solid Waste Diversion in the Department of Defense (DoD) Installations along the Front Range of Colorado to Satisfy the DoD Solid Waste Diversion Goal of 40%." University of Denver, Capstone Project. February 2011.

Poll, A., Reed, J., and Grover, B. 2018. "Evaluation of Greenhouse Gas Emissions Offset Availability within San Diego County." December. https://www.ci.oceanside.ca.us/civicax/filebank/blobdload.aspx?BlobID=49641.

EXHIBIT I

Dudek Key View – East-bound I-8

Visual Simulation of the Project (Final EIR)



Zoomed in view of switchyard and substation facilities

FIGURE 1

Key View 1 – Eastbound I-8

DUDEK

EXHIBIT J

KOP-6 Undeveloped Brawley Avenue Property

Visual Simulation of the Community Buffer Alternative (w/ gap in landscape screen)

Zoomed in view of switchyard and substation facilities

FIGURE 2

KOP 6: Undeveloped Brawley Avenue Property

DUDEK

EXHIBIT K

BayWa Public Benefits Commitment Letter

August 16, 2021

BayWa r.e.

August 16, 2021

VIA EMAIL:
(PublicComment@sdcounty.ca.gov;
Andrew.Potter@sdcounty.ca.gov)

Chair Nathan Fletcher and
Honorable Members of the San Diego County Board of Supervisors
c/o Andrew Potter, Executive Officer/Clerk of the Board of Supervisors
1600 Pacific Highway, Fourth Floor, Room 402
San Diego, California 92101

Re: August 18, 2021 Hearing, Item No. 1, JVR Energy Park Major Use Permit (PDS2018-MUP-18-022)

Dear Chair Fletcher and Honorable Members of the Board of Supervisors:

The JVR Energy Park Project, a 90 megawatt ("MWac") solar project with a 90 MW (360 megawatt hour or MWh) battery energy storage system will come before the Board of Supervisors for your consideration on August 18, 2021. The Project has signed a power purchase agreement ("PPA") with San Diego Community Power, a community choice aggregation entity that will bring renewable energy to the greater San Diego area, to generate at least 260,000 MWh per year and power more than 52,000 homes. (San Diego Community Power, Staff Report to Board of Directors at 2 (May 27, 2021), available at https://sdcommunitypower.org/wp-content/uploads/2020/12/00.-Agenda-Packet-v4.pdf.) The Planning Commission has recommended that the Board approve the Community Buffer Alternative to the Project, which will still generate 90 MWac and allow the Project to meet its PPA commitment.

BayWa r.e. Solar Projects LLC ("BayWa") has been diligently working with community partners to create a public benefits package that addresses the needs of the Jacumba community. This public benefits package is one way that BayWa expresses its intent to create a long-lasting partnership with the community that corresponds with the Project's proposed 35-year lifespan.

This letter outlines the scope of BayWa's public benefits commitment to the community, which will provide at least **$1,600,000 in public benefits** to the Jacumba community specifically and the Mountain Empire region as a whole. As explained below, some elements of the Project's public benefits package are well-defined. Other parts of the program are still being memorialized in binding agreements.

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Existing and future public benefits agreements will be triggered by closing construction financing and issuing a notice to proceed with the full scope of construction to the engineering, procurement, and construction contractor.

JVR Energy Park Project Public Benefits Program:

1. Jacumba Community Services District ($250,000): BayWa and the Jacumba Community Services District ("JCSD") have executed an agreement for BayWa to contribute $250,000 to the JCSD to benefit the Jacumba Community Park.

2. Imperial Valley Desert Museum Society, Inc. ($75,000): BayWa and the Imperial Valley Desert Museum Society, Inc. ("Desert Museum") have executed an agreement for BayWa to contribute $75,000 to fund the installation of an exhibit that furthers understanding of climate change and renewable energy production, and that funds the Desert Museum's operations for a ten-year period.

3. San Ysidro Community Health ($125,000): Written commitment to contribute $125,000 to San Ysidro Community Health's efforts to provide nutrition to seniors in the Mountain Empire region, including the community of Jacumba. Proposal received and agreement under development.

4. Powering Jacumba with Solar ($1,000,000): Create a partnership with solar provider to provide $1,000,000 to install solar systems on residential and commercial properties in the Jacumba community for as many community members that are interested and apply. BayWa is in negotiations with two separate providers to coordinate this program.

5. Uncommitted community funds ($150,000): BayWa is committed to providing another $150,000 of unallocated community funds to be provided to fund other community benefits as determined through engagement with community members.

Thank you for your careful consideration of this Project. Please do not hesitate to contact me with any additional questions or concerns.

Sincerely,

Geoff Fallon

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