From: Slovick, Mark
To: Mike Appelman
Cc: Koutoufidis, Nicholas
Subject: RE: [External] Meeting
Date: Monday, August 16, 2021 11:53:32 AM

Thx so much Mike, our team will review the information. We'll let you know if we have any questions.

I have some time at 2pm if that works. Thx.

Thanks,

Mark Slovick, Deputy Director
County of San Diego | Planning & Development Services
T. 619.517.8067

From: Mike Appelman <mikeappelman@gmail.com>
Sent: Monday, August 16, 2021 11:43 AM
To: Slovick, Mark <Mark.Slovick@sdcounty.ca.gov>
Cc: Koutoufidis, Nicholas <Nicholas.Koutoufidis@sdcounty.ca.gov>
Subject: [External] Meeting

Mark,

I wanted to thank you again for your time Friday to discuss the JVR Energy project with myself and others. I've submitted the engineering documents to the county supervisors and wanted to make sure your team at PDS would also have a copy. I'd like to follow this up with a call to ask about a newer alternative proposal I see in the submission that doesn't have much in the way of details other than a plot showing a reduced footprint. Would there be a time today you can call?

Thank you,
Mike Appelman
858.518.186

JVR Energy Park

Preliminary Assessment of Installed Capacity as proposed by developer

Date: 8/12/2021

Executive Summary:

The JVR Energy Park, in Project Description of the EIR, states the project will include 300,00 PV modules (i.e., panels) and utilize 540-Watt panels to produce approximately 283,000 MWH per year. ZGlobal independent assessments found that this configuration appears to result in a DC/AC ratio of 1.8, which is extremely high compared to a typical ration of 1.25. However, there seems to be a discrepancy when reviewing Appendix V which suggests a ratio of 1.28 while still producing 283,000 MWH per year and still using 623 acres. ZGlobal assessment found that the project can meet its contract obligation of 90 MW AC and generally satisfy the annual production requirements using a reduced project footprint of roughly 475 acres, still using the same 540-Watt panels but with a reduced DC system size of 115.2 MW DC with a ratio of 1.28. This would reduce the project footprint by 148 Acres and allow for significant reduction in the impacts to the community of Jucumba Hot Springs.

Based on the stated panel rating of 540Watts in Appendix V and the stated total panels in the Summary of the FEIR S-3, of 300,000. This project would have a DC rating of 162MW. This corresponds to a DC/AC ratio of 1.8 (i.e., 162/90=1.8). This does not correlate with Appendix A in Appendix V which states the onsite DC Capacity at 115.18MW for the 623 Acre Proposed Project Size. According to our calculations, with the specified 540 Watt panel, this project could achieve the original stated MW Hr goals of 251,456 MWH/year with around 475 acres, or less. This footprint includes a 20% security factor

Detailed Summary:

Based on data and information extracted from publicly available data ZGlobal assessed the proposed solar PV portion of the proposed JVR Energy Park near Jucumba Hot Springs. The assessment specifically looked at the installed DC capacity of the proposed system in comparison to the approved AC capacity interconnection agreement of 90 MW. Of particular interest in this assessment is the AC to DC ratio. A typical AC to DC ratio will be around 1.25, meaning that for every AC MW there will be 1.25 MW DC.

Per “Summery Chapter S page 3” (JVR FEIR - Summary - Final Updated after PC Hearing.pdf (sandiegocounty.gov)) the initial proposed project utilized 385 Watt panels with a total of 300,000 individual solar panels. This equates to an installed DC capacity of 115.5 MW which corresponds to a

ratio of 1.28 MW AC for a 90 MW AC project. The annual production under the initial project proposal was found to be 251,456 MWH/year.

However, as described in the last paragraph of the "Project Description", section S.1.1, the project suggests the use of larger 540 Watt panels to take advantage of technological improvements. They go on to state that this change will increase the production to 283,000 MWh / year. Assuming the same number of panel (i.e. 300,000) the installed DC capacity is 162 MW resulting in a ratio of 1.8. If this is in fact the proposal, it is well above typical ratios of 1.25. Further, the required space would not be reduced and there would be no ability to lessen the impacts to the local community.

Using the 540 Watt panels and a more standard ration of 1.28 ZGlobal found that a total of 213,864 panels would be needed to roughly match the initial annual production volume. The results of the PVsyst simulation performed under this scenario found the production to be 251,905 MW, slightly higher than with the 385 Watt panels. ZGlobal also considered a ratio of 1.25, also with the 540 Watt panels, and found the production was again similar to the initial proposal at 247,325 MWH/year, or a 1.8% reduction from a ratio of 1.28. with a ratio of 1.25 the number of panels required was 208,600. This small percentage increase is not necessarily trivial in the eyes of the developer as it equates to roughly a 1.8% in annual revenue.

The final production simulation performed considered one of the larger size panels available on the market. This was a 645 Watt panel (Chint 635-644 W Monocrystalline PV Module CHSM66M(DG)/F-BH Series). Assuming a ratio of 1.25, the project would need 174,390 panels. However, as noted below, although these are larger wattage panels, they are also large and require more space.

Summary Table

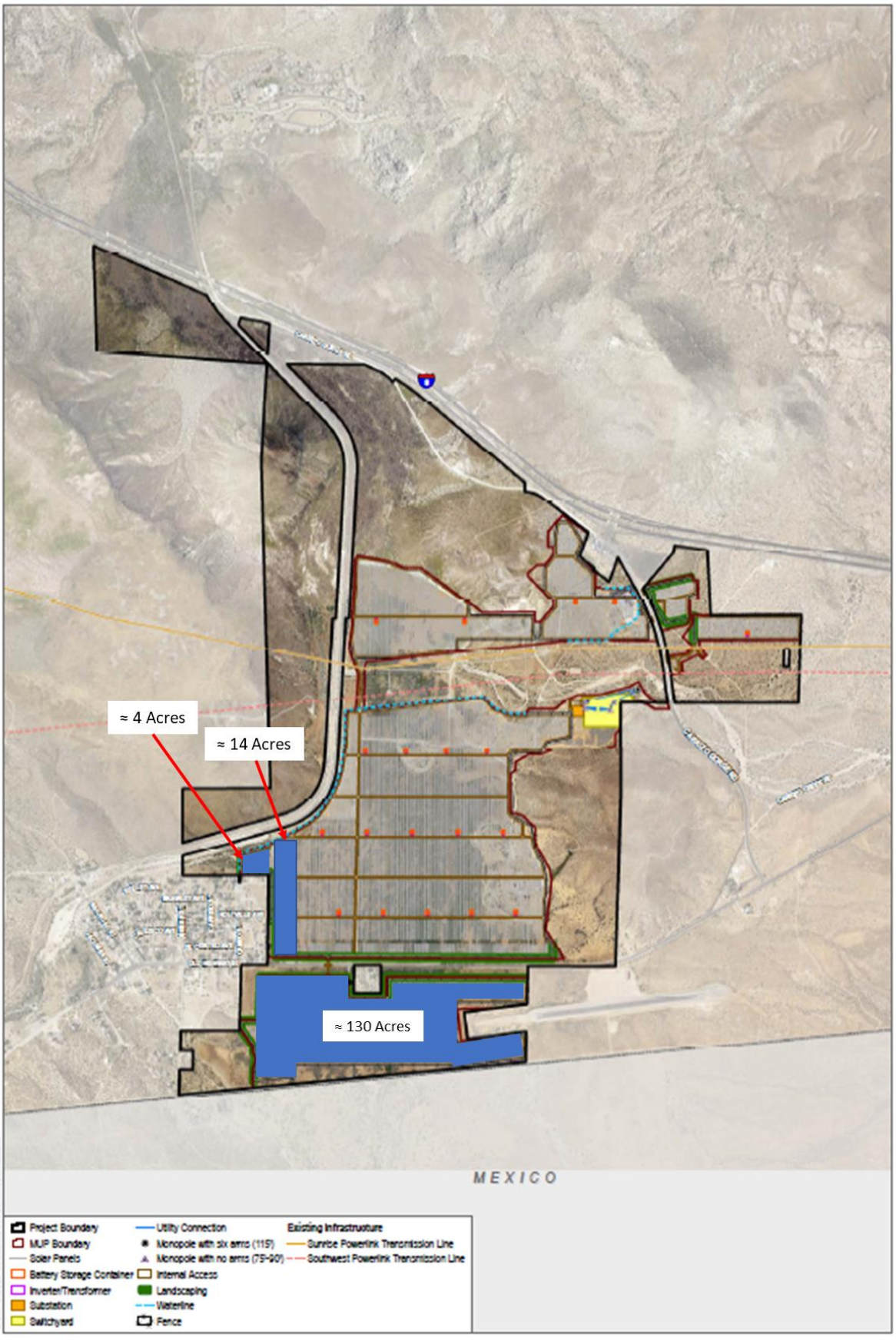
Panel Size (Watts)	Number of Panels	DC to AC Ratio	Annual Production (MWH/Year)	Comment
385	300,000	1.28	251,456	proposed project
540	300,000	1.8	283,000	Revised with larger panels
540	213,864	1.28	251,905	reduced ratio to same as proposed project
540	208,600	1.25	247,325	reduced ration to 1.25
645	174,390	1.25	249,740	revised with larger panels on market today

The space requirements for different size panels will vary due to minor to moderate differences in panel dimensions. The table below summarizes the estimated space requirements. The required acres are estimated based on panel size, typical row clearance, and a margin of error factor of 20%, as a detailed layout was not completed for each.

Scenario	Panel Capacity	Number of panels	Panel length with clearance for shading [meters]	Panel dimension	Area needed for 1 panel (panel lenght * width) [meters]	Total area used by the panel [Meters]	Acres	Acres adding a 20% security factor
1	385	300,000	6.1	Area for QPeak 385 W Panel: 2015*1000(mm) 79.3*39.4(inch)	6.1	1,830,000	452	543
2	540	213,864	6.8	Area for Longi 540W Panel: 2256*1133 (mm)	7.684	1,643,331	406	487
3	540	208,600	6.8	Area for Longi 540W Panel: 2256*1133 (mm)	7.684	1,602,882	396	475
4	685	174,390	7.1	Area for Astroenergy 645W Panel: 2384*1303 (mm)	9.23	1,609,620	398	477

The project developer, In Appendix V, of the EIR estimated the need at 623 Acres, which are assumed to include required easements, roads, fire lanes, retention basins, etc. By using the 540 Watt panels and holding the ratio to 1.25 for constancy with typical plant designs, the estimated need is 475 Acres. Comparing these values to typical “rule of thumb” of roughly 5 acres/MW we find that 623 acres equates to 124.6 MW and for 475 acres, 95 MW. Consequently, it appears that the project footprint could be reduced by 148 Acres (i.e., 623 – 475 = 148).

To put this into perspective, by eliminating 148 acres of panels and inverters, the entire section of the project south of Old Hwy 80 and north of the Mexico border can be eliminated. Additionally, the sections of the project along Laguna St can be pushed east by nearly 700 feet and the small section proposed behind the homes on Seeley Ave can be eliminated. The figure below shows the roughly 148 acres s of the project that could be eliminated while still meeting the fundamental project objectives of delivering 90 MW AC to the grid.

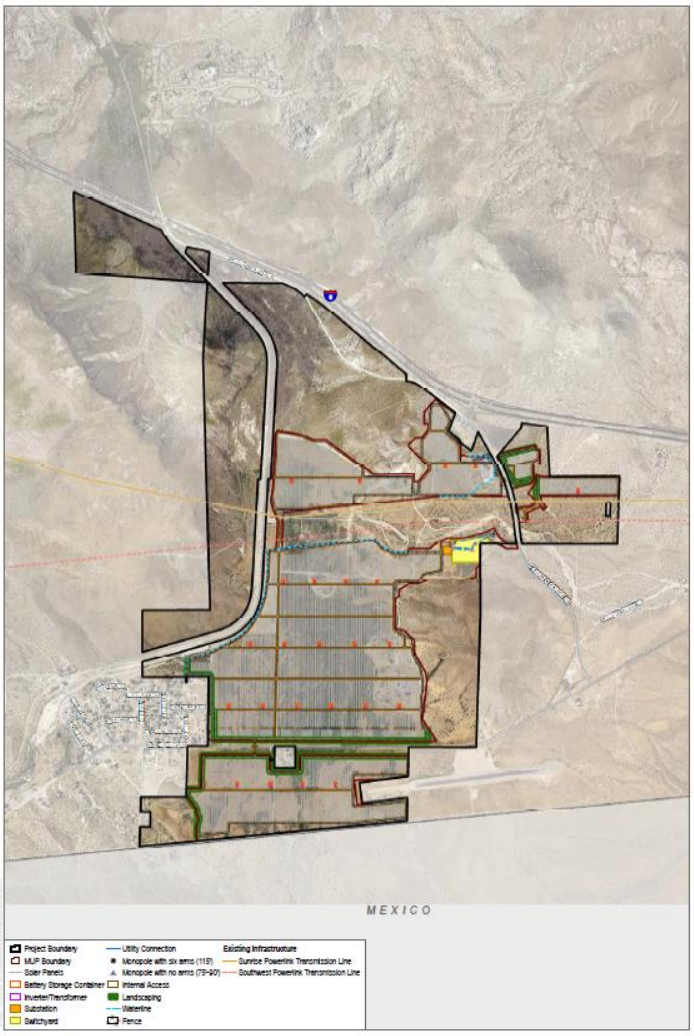

≈ 4 Acres
≈ 14 Acres
≈ 130 Acres
MEXICO
Project Boundary
MUP Boundary
Solar Panels
Battery Storage Container
Inverter/Transformer
Substation
Switchyard
Utility Connection
Monopole with six arms (115')
Monopole with no arms (75'-90')
Internal Access
Landscaping
Waterline
Fence
Existing Infrastructure
Sunrise Powerlink Transmission Line
Southwest Powerlink Transmission Line

ZGlobal Analysis notes and Assumptions

Background:

The JVR Project is a 90 MWAC located at Jacumba Hot Spring, CA. the proposed project area will use 604 acres from the 24 parcels listed in the EIR.

The following layout shows the 90 MWac project (source: Chapter 4 Project Alternative)



Task 1:

To run the Pvsyst and get the yearly production, the assumptions for the JVR ENERGY PARK project from "Summary Chapter S page 3" (JVR FEIR - Summary - Final Updated after PC Hearing.pdf (sandiegocounty.gov)) are: 300,000 PV module at 385 Watt per panel will produce 115.5 MWDC (300,000 * 385). Using this panel, the AC/DC ratio will be 1.28 to meet 90 MWAC.

Now by upgrading to the 540 Watt per panel, will produce 162 MW DC for the same number of panels (300,000 * 540). With these assumptions, the AC/DC ratio to reach 90 MW AC will be 1.8 which is much higher than industry standard range 1.2 to 1.4 AC/DC ratio. To reach the previous ratio of 1.28 with the newer panels, the quantity will decrease and only 213,900 panel will now be needed to meet a 115.5 MWDC with a ratio of 1.28 to deliver the 90 MWAC target.

Four (4) PVsyst scenarios are run all using the same parameters but only by modifying the panel size and number to adjust the 1.25 ratio and respecting the panel spacing using a ground Cover ratio of 33% (optimum again panel shading)

The first one will be the 300,000 panels at 385 Watt, followed by the one at 213,900 panels at 540 Watt. The production should be close since they have a similar ratio of 1.28 and close to the NREL report on the "Appendix V"

The third Pvsyst run will be to minimize the number of panels to have a ratio close to 1.25 and compare the impact on the yearly production.

The last Run will be to use higher panel, the Astroenergy 645W panel at a 1.25 ratio. The number of panels is even smaller, and the production should meet the third scenario.

The parameters for the Pvsyst simulation are the following:

Orientation	Tracker system with backtracking
inverters	25 Sungrow 3.6 MW (SG3600D
385 W panel	Hanwa QPEAK duo L G5.2 385
Row spacing (pitch) for 33 % Ground cover ratio (GCR) optimum	6.1 meter or 20 feet
540 W panel	Longi Solar LR 5-72 HIBD 540 M
Row spacing for 33 % Ground cover ratio (GCR) optimum	6.8 meter or 22 feet
645 W Panel	AstroEnergy
Row spacing for 33 % Ground cover ratio (GCR) optimum	7.1 or 23.2 feet

Scenario 1: Running the production using 300,000 panels at 385w each with an AC/DC ratio of 1.28

251,456 MWH/Year

Scenario 2: Running the production using 213,864 panels at 540w each with an AC/DC ratio of 1.28

251,905 MWH/Year

Scenario 3: Running the production using 208,600 panels at 540w each with an AC/DC ratio of 1.25

247,325 MWH/Year

Scenario 4: Running the production using 174,390 panels at 645w each with an AC/DC ratio of 1.25

249,740 MWH/Year

Task 2:

Comparing the area use using different size panel

Note: The change to higher panels reduces the number of panels needed but won't proportionally decrease the land occupation. With larger panel capacity, the physical shape is bigger and require more spacing to avoid shading.

Reproducing a layout will be challenging without a constrained map, so an acreage estimation is calculated to compare the coverage area

The assumption taken are:

For inverters:

The total area for the 25 Sungrow Inverter unit cover an estimated 0.2 acres adding some clearance distance to it. Since the inverters coverage is small, it will be neglected.

Sungrow Dimension 6.058*2.896 (meters) = 17m^2 → 25 unit * 17m^2 = 438 m^2= 0.1 acre (inverter only).

Total acreage with estimated clearance will reach about 0.2 acres

For panels:

The Area needed for 1 panel is the panel length plus its clearance (total length) time its width for example for the 385w panel the clearance plus the panel length is 20 feet (6.1meter) * 3.28 (1 meter) = 65.6sq ft

Since most datasheet gives the dimension of panels in meters, the acres will be found dividing the total sq meter by 4047.

A security factor of 20 % is added to the total acre

Scenario	Panel Capacity	Number of panels	Panel length with clearance for shading [meters]	Panel dimension	Area needed for 1 panel (panel lenght * width) [meters]	Total area used by the panel [Meters]	Acres	Acres adding a 20% security factor
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4	685	174,390	7.1	Area for Astroenergy 645W Panel: 2384*1303 (mm)	9.23	1,609,620	398	477

The area for the first scenario is estimated around 600 acres on the “appendix V” it may include some easement, road everything that is included into the project boundary.

By using bigger panel, from 385w to 540w, almost 50 acres can be saved without affecting the yearly production. But by increase again the panel size to 645w, the only advantage is the amount of panel unit that is decrease but not the surface used.