BIDDER QUERIES AND ANSWER
PAKIS-RFQ-24-027
PUMPING AND SOLRIZATION OF KOT CHANDNA, MIANWALI

Question # 1 (Tube Well Bazaar Area)
The tender called for the replacement of existing pumping machinery and its solarization shall this be assumed the pumping equipment which needs to be replaced is already pulled out from the tube well and the machinery is lying as abandoned and well or borehole is lying ready to receive new machinery for supply and installation, needs clarification as if the case otherwise then BOQ must be amended to include the pulling out of the existing pumping machinery from borehole and it's carriage & warehousing cost to be included in the amended BOQ.

Answer:
The pumping equipment is not pulled out from the tubewell. The machinery is in working condition and supplying water to the community. The item line for the dismantling/pulling out of machinery with pipes and accessories and handover to the respective administration will be included.

Question # 2 (Tube Well Bazaar Area)
Please confirm the availability of the desired flow capacity of the borehole sufficient to meet the design requirement of the pumping machinery specification included in the tender document. Also confirm the integrity of the borehole as free from any damage of its filter installed and the bore is able to provide clean and clear water without having accumulation of sand/ silt in the borehole.

Answer:
The design is based on the design flow capacity of the borehole which was assessed and advised/designed by the PHED department after their field visit on site. The borehole is working efficiently and supplying water as required. Similarly, interested vendors have visited the sites and has in-depth understanding of the existing system.

Question # 3 (Tube Well Bazaar Area)
Borehole Strata chart needed to be provided to ascertain the exact location of the filters installed in the borehole so as to ensure the installed depth of the pumping machinery to be ascertained to present the motor and pump not to be installed wrongly in front of filters located in the borehole.

Answer:
Borehole assessment is not conducted, and exact location of the filters installed in the borehole are not available. However, for information, the borehole depth is approx. 400ft. The design calculations are also available at the end of this document for further guidance.

Question # 4 (Tube Well Bazaar Area)
The current water table/ level in the borehole needed to be established and draw down at 0.5 cusec flow capacity needed to be quantified to establish the warranty clauses for compliances as per the tender specification.

Answer:
The design calculation shared by the PHED that clearly identified the drawdown and other details is provided at the end of this document.

Question # 5 (Tube Well Bazaar Area)
Does the setting depth or installed depth of the submersible pumping system shall be 200 feet inclusive of column pipe + pump + motor or 200 feet only column pipes, (i.e., 10ft x 20 nos) please clarify.

Answer:
The design calculation shared by the PHED that clearly identified the drawdown and other details is provided at the end of this document.

Question # 6 (Tube Well Bazaar Area)
Refer Note: B, please clarify if under the footnote B of the caption BOQ, shall it mean the vendor will be testing the pumping system after installation at the site and will be conducting the field acceptance test to prepare the final testing and commissioning report, please clarify.

Answer:
Yes, the Vendor will be testing the pumping system at site after installation and will be conducting the field acceptance test to prepare the final testing and commissioning report.

Question # 7 (Tube Well Bazaar Area)
Please clarify the item under note D in which the vendor has to ensure smooth and uninterrupted supply at tail end.

Answer:
Currently the installed system is meeting the demand of the community at the tail end and same is requested in the tender. Since the system is old, the machinery and pumping system is required to be replaced to avoid repair maintenance and to provide required water supply.

Question # 8 (IPS at Lal Tanki Area)
As specified in the tender specification and BOQ the vertical turbine pumping system quantity 2 sets are to be supplied and installed with a total setting depth of 30 feet, please clarify if the two pumping system shall be installed on the one shallow well or duck well or water tank and clarify if one pump shall be operational at the other standby unit.

Answer:
Vertical turbine system quantity 2 sets are required to serve two different areas (communities) and will be operated separately. No unit is standby.

Question # 9 (IPS at Lal Tanki Area)
Please clarify if the one solar power unit shall be needed with 29,250 watts? If the motor rating is 30HP then in the bazaar area tube well installation the solar power unit required is of 45,000 watts why this discrepancy? Please also clarify if only one power unit shall be required for the 02 pumping systems being ordered in the captioned tender at one dug well / shallow well.

Answer:
The solar system at Bazaar Area will be used to drive the new submersible pump system to be installed under the scope of this RFQ and accordingly 45 kW capacity solar system will be installed for this purpose. At IPS location, on-grid solar system with net-metering will be installed and will not be used to drive the water pumps at this location. Considering the available space at IPS location, total 29.25 kW (divided into two systems of 14.6 kW each) system has been proposed. For further details, please refer to the solar design reports for all three locations under the scope of this RFQ at the end of this document.

Question # 10 (Tola Mor Tube well site)
Please clarify if the solar power unit is to be supplied for the operations of pumping system is already installed? if pumping system is already installed then what could be the technical specification of the installed pumping system.

Answer:
Please note that at Tola Mor location, on-grid solar system with net-metering will be installed and will not be used to drive the water pump at this location.

Question # 11
Please confirm if there is any requirement for preferred material of construct for the pumping equipment.

Answer:
We are looking for reliable and efficient performance life of the system for the next 10 to 15 years. In this context, bidders are requested to quote and reliable pumping systems from reputed manufacturers.

Question # 12
TUBEWELL BAZAR AREA

PV Module Capacity: The BOQ specifies 45,000W for the solar PV system. Can you clarify the total number of modules required, considering the wattage per panel?

Answer:
Vendor may consider a single solar panel of 585 W or higher as the system is designed on 585-Watt solar panel (77 solar panels in total). For further details, please refer to the solar design reports for all three locations under the scope of this RFQ at the end of this document.

Solar Panel Mounting Details: Are the mounting structures to be designed for a specific roof pitch or should they be installed to accommodate variable angles based on the geographical location of the site of Installation?

Answer:
Recommended Azimuth is 180 degree and Tilt should be 30 degrees. South facing of the Tubewell Bazar Area is clear. For further details, please refer to the solar design reports for all three locations under the scope of this RFQ at the end of this document.

Fixed Mounting Structure: Can you confirm the expected wind load specifications, especially if the installation will be exposed to high winds?

Answer:
Solar Panels will be installed on ground inside a boundary wall. The PV modules will be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 150 km per hour. The minimum space between two PV Modules should be 2.54 cm (1 inch), to avoid air push over PV Modules. Front end of PV modules to ground clearance must not be less than 1.5 feet.

ATS Capacity and Functionality: The ATS is described as switching between solar and WAPDA. Should this ATS be able to prioritize solar or operate automatically when solar power production is insufficient to operate the required load at the assigned site of installation?

Answer:
ATS must be able to prioritize solar and switch to WAPDA when solar power is not sufficient to operate the required load.

Earthing Details: Can you provide the grounding electrode system's requirements and any site-specific conditions (e.g., soil resistivity) that may affect the earthing design?

Answer:
Water level below the ground surface is 30 feet. Required minimum resistance can easily be achieved. It is recommended that after excavation of 6 feet ground and install 6 feet 16mm copper rod below the excavated surface and connect with copper plate of 1 x 1 feet of minimum 4 mm thickness.

Inverter Specification: Can you provide the specifications for the solar pumping inverter (35 kVA)? What is the desired operating range of input DC voltage for the inverter? The solar inverter already has protections against over/under voltage, short circuit.

Answer:
Solar Pumping Inverter specifications are included in Annex-B. Please see revised Annex-B. There is no restriction on the operating range of input DC Voltage for the inverter.

Cable Protection: Is there any requirement for additional cable protection, such as underground cabling or conduit, particularly for outdoor wiring?

Answer:
HDPE pipe and HDPE accessories should be used for outdoor wiring.

Foundation and Load Calculation: Could you provide the expected load calculations for the RCC foundation, especially regarding the weight and wind loads for the mounting structure?

Answer:
The pit size for concrete works should be minimum 1.5x1.5x3 feet for each individual leg or 1.5x2.5x3 for double leg and the concrete should be extended at least 1 foot above the ground and 2 feet below the ground. The concrete ratio should be 1:2:4.
The PV modules will be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 150 km per hour.

MC4 Connectors: The BOQ specifies 7 pairs of MC4 connectors. Can you confirm the total number required based on the total number of panels and string configuration? And are these for 6mm² cable.
Answer:

Available Solar Pumping Inverter has the capacity of high input DC Voltage as well as high input DC Current. Based on the site and available area and string configuration 7 pairs of MC4 connectors are included in BOQ, however number of MC4 connectors may increase of decrease depending on the installers PV Mounting Structure design and selection of Solar Pumping Inverter.

Question # 13
IPS AT LAL TANKI AREA

PV Module Capacity: The BOQ specifies 29,250 W for the solar PV system. Can you clarify the total number of modules required, considering the wattage per panel?

Answer:
Vendor may consider a single solar panel of 585 W or higher as the system is designed on 585-Watt solar panel (50 solar panels in total). For further details, please refer to the solar design reports for all three locations under the scope of this RFQ at the end of this document.

Inverter Specification: For the grid-tied inverter, is it required to operate exclusively with the solar system, or should it have hybrid capabilities (i.e., also compatible with a backup generator or grid power)?

Answer:
Grid Tied inverter must be compatible with grid power. Grid Tied inverter specifications included in Annex-B. Please see revised Annex-B.

Inverter Specification: Are there any specific guidelines or limits on the inverter's DC input voltage?

Answer:
There is not restriction or limitation on inverter's DC input voltages. Grid Tied inverter specifications included in Annex-B. Please see revised Annex-B.

Ducting: What is the estimated distance between the solar panels, DC combiner box, and inverter, to better determine the ducting type, size, length and fitting requirements?

Answer:
Total length of the compound is approximately 118 feet, whereas, pumping chamber is in the mid of the compound. Recommended place for installation of inverter is pumping chamber.

Foundation and Load Calculation: Could you provide the expected load calculations for the RCC foundation, especially regarding the weight and wind loads for the mounting structure?

Answer:
The pit size for concrete works should be minimum 1.5x1.5x3 feet for each individual leg or 1.5x2.5x3 for double leg and the concrete should be extended at least 1 foot above the ground and 2 feet below the ground. The concrete ratio should be 1:2:4.
The PV modules will be mounted on metallic structures of adequate strength and appropriate design, which can withstand load of modules and high wind velocities up to 150 km per hour.

DESIGN OF RISING MAIN FOR EXISTING TUBEWELL BAZAR AREA

Tube well - Existing G.S Tank

Length					=	3300	Feet
Discharge					=	0.50	Cusec
Proposed dia of pipe		=	8 i/d	OR	=	0.67	ft
Area	3.142 X	0.67 X	0.67 X	0.25	=	0.349	Sft
Velocity	0.50 /	0.349			=	1.43	Ft/Sec
				Say	=	2.50	Ft/Sec

Head Losses

$$4 \times \frac{0.007 \times 3300}{2 \times 32.2} \times \frac{2.50}{0.67} \times 2.50 = 13.45 \text{ Ft}$$

Add 20% for specials	=	2.69	Rft
TOTAL	=	16.14	Rft
SAY	=	20.00	Rft

DESIGN OF PUMPING MACHINERY:-:-

Spring Level	=	110	Feet
Draw Down	=	25	Feet
Difference of G.L	=	65	Feet
Head Losses in rising main	=	20	Feet
Height of OHR	=	60	Feet
Safe Dilivery Head	=	20	Feet
Terminal Head	=	0	Feet
TOTAL	=	300	Feet
SAY	=	300	Feet

B.H.P

$$\frac{11250 \times 300 \times 10 \times 100}{33000 \times 60 \times 60} = 28.41 \text{ BHP}$$

SAY = 30 BHP

It is proposed to install Submersible Pumping Unit to give a discharge of 0.50 cusec against a total head of 300 Feet couple with 30 BHP Submersible electric motor and 200 Rft Riser Pipe.

DESIGN OF RISING MAIN FOR EXISTING IPS

IPSI - Hilly Side

Length			=	5500	Feet
Discharge			=	0.50	Cusec
Proposed dia of pipe	= 6 ' i/d	OR	=	0.50	ft
Area	3.142 X 0.50 X 0.50 X	0.25	=	0.196	Sft
Velocity	0.50 / 0.196		=	2.55	Ft/Sec
		Say	=	2.55	Ft/Sec

Head Losses

$$4 \times 0.007 \times \frac{5500}{2} \times \frac{2.55}{32.2} \times \frac{2.55}{0.50} = 31.10 \text{ Ft}$$

Add 20% for specials = 6.22 Rft

TOTAL = 37.32 Rft

(A) SAY = 40.00 Rft

Hilly Side -Haji Manan

Length			=	2800	Feet
Discharge			=	0.22	Cusec
Proposed dia of pipe	= 3 i/d	OR	=	0.25	ft
Area	3.142 X 0.25 X 0.25 X	0.25	=	0.049	Sft
Velocity	0.22 / 0.049		=	4.48	Ft/Sec
		Say	=	4.50	Ft/Sec

Head Losses

$$4 \times 0.007 \times \frac{2800}{2} \times \frac{4.50}{32.2} \times \frac{4.50}{0.25} = 98.61 \text{ Ft}$$

Add 20% for specials = 19.72 Rft

TOTAL = 118.33 Rft

(B) SAY = 120.00 Rft

(A+B) G.Total = 160.00 Rft

DESIGN OF PUMPING MACHINERY:-:-

Suction Lift	=	25	Feet
Draw Down	=	0	Feet

Difference of G.L		=	75	Feet
Head Losses in rising main		=	160	Feet
Height of G.S.Tank		=	15	Feet
Safe Dilivery Head		=	20	Feet
Terminal Head		=	0	Feet
	TOTAL	=	295	Feet
	SAY	=	300	Feet

B.H.P

$$\frac{11250 \times 300 \times 10 \times 100}{33000 \times 60 \times 60} = 28.41 \text{ BHP}$$

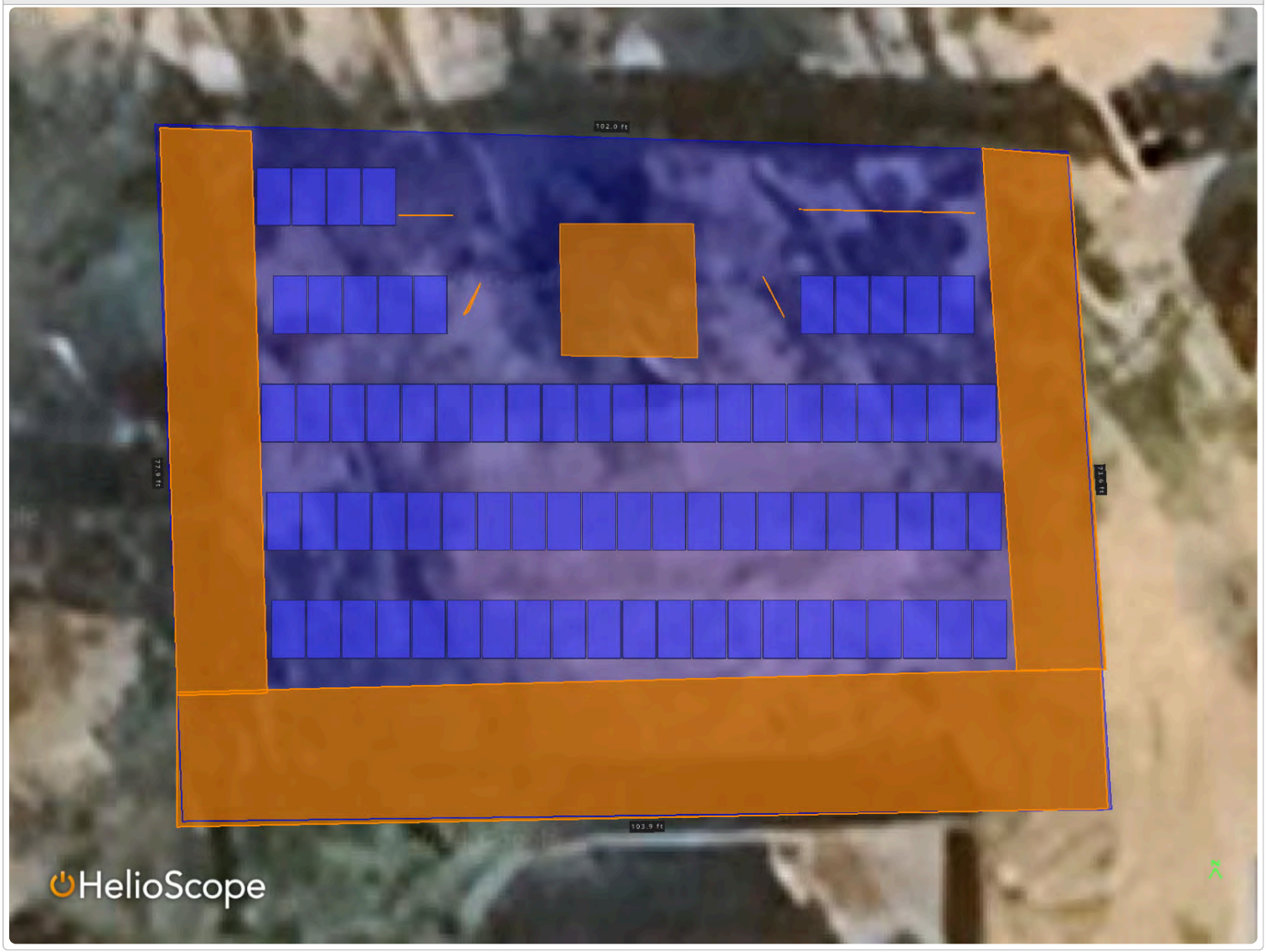
SAY = 30 BHP

It is proposed to install Verticak Terbine Pumping Unit to give a discharge of **0.50** cusec against a total head of 300 Feet couple with 30 BHP Vertical electric motor and 30 Rft Riser Pipe.

[redacted]

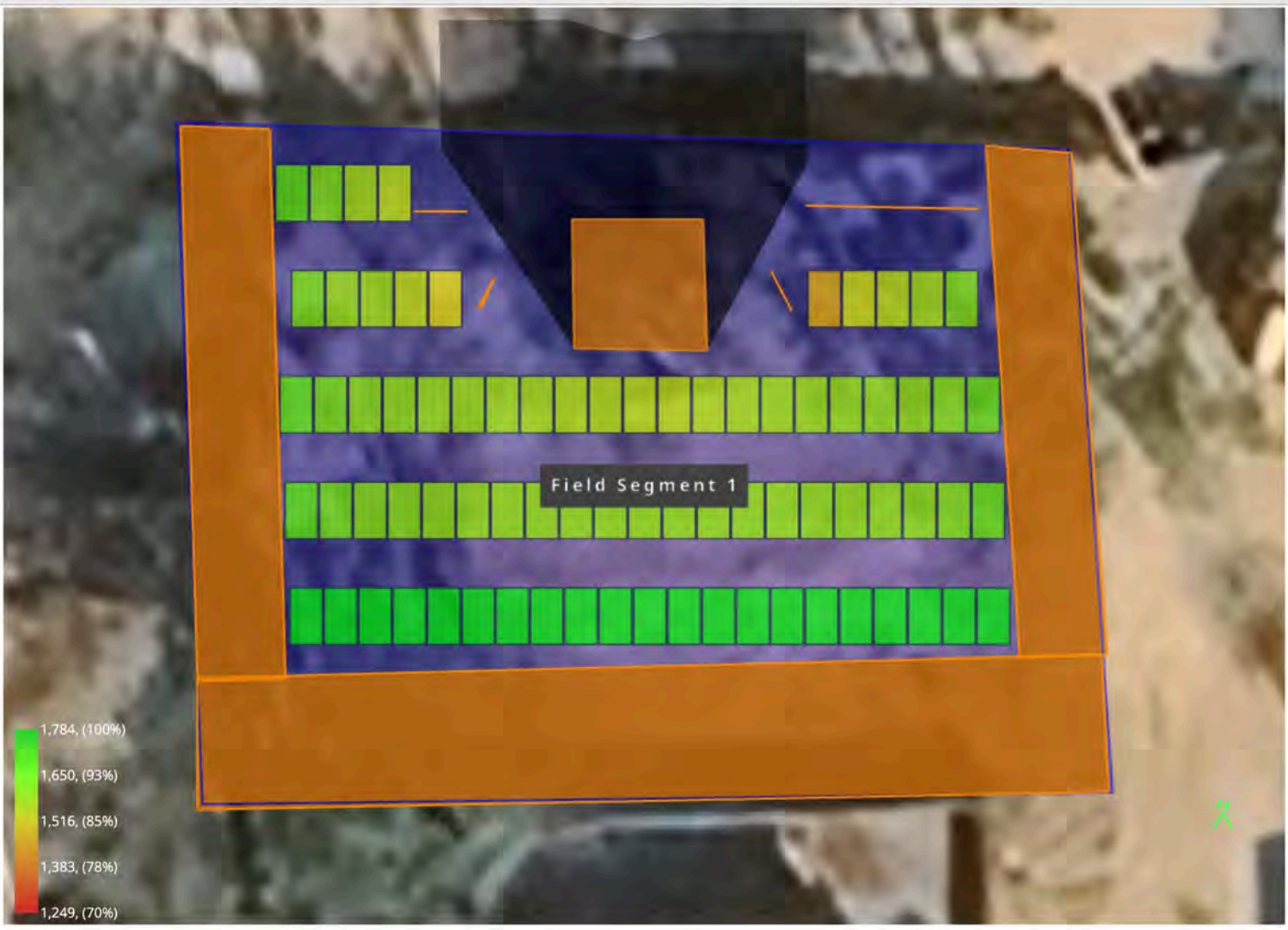
SOLAR DESIGN REPORT FOR BAZAAR AREA

Detailed Layout2



Design 30 BHP Pump Tube Well Bazar Area, 32.968883, 71.487028

Shading Heatmap



Shading by Field Segment

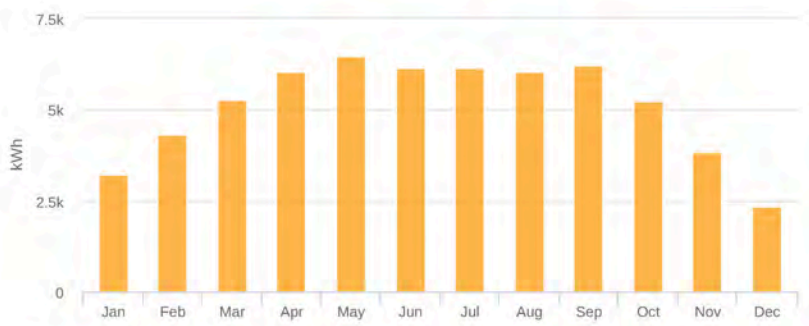
Description	Tilt	Azimuth	Modules	Nameplate	Shaded Irradiance	AC Energy	TOF[2]	Solar Access	Avg TSRF [2]
Field Segment 1	Module: 30.0°	Module: 180.0°	77	45.0 kWp	1,649.7kWh/m^2	61.3 MWh[1]	100.0%	92.4%	92.5%
Totals, weighted by kWp			**77**	**45.0 kWp**	**1,649.7kWh/m^2**	**61.3 MWh**	**100.0%**	**92.4%**	**92.5%**

[1] approximate, varies based on inverter performance
[2] based on location Optimal POA Irradiance of 1,783.9kWh/m^2 at 29.9° tilt and 183.2° azimuth

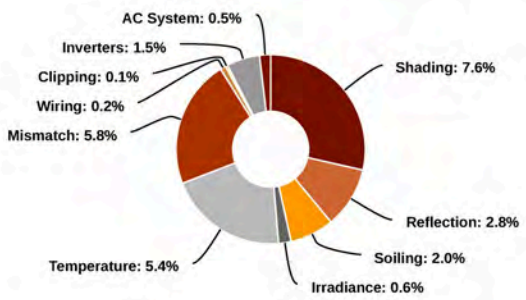
Solar Access by Month

Description	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
Field Segment 1	82%	95%	96%	96%	96%	96%	96%	96%	96%	96%	89%	63%
Solar Access, weighted by kWp	**81.6%**	**94.9%**	**96.2%**	**96.1%**	**96.1%**	**96.0%**	**95.9%**	**96.0%**	**96.4%**	**96.0%**	**88.6%**	**63.2%**
AC Power (kWh)	**3,236.9**	**4,302.4**	**5,257.3**	**6,047.7**	**6,462.2**	**6,151.6**	**6,139.5**	**6,046.7**	**6,204.5**	**5,224.3**	**3,849.3**	**2,328.5**

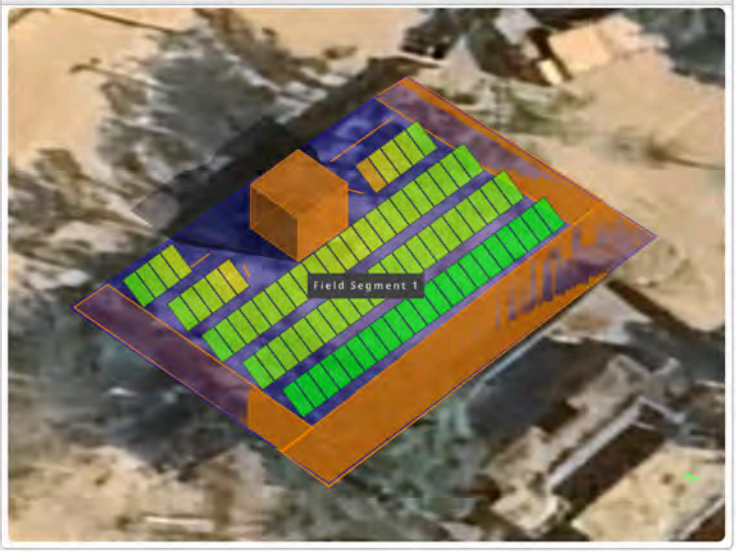
Monthly Production



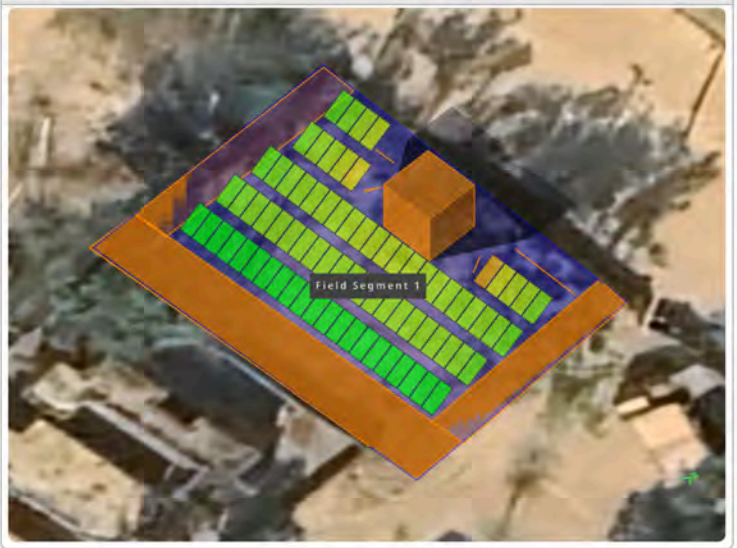
Sources of System Loss



Southwestern Angle

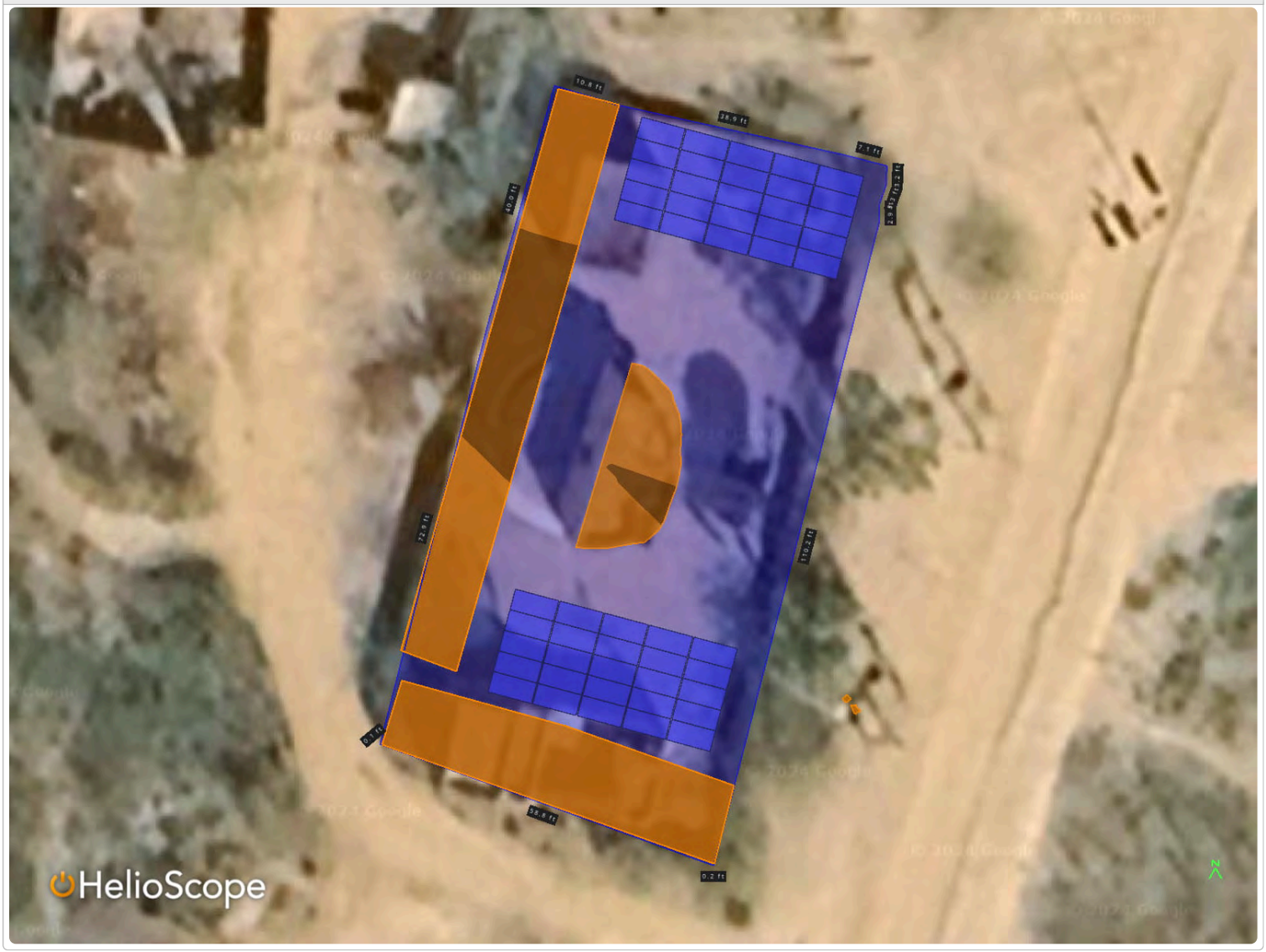


Southeastern Angle



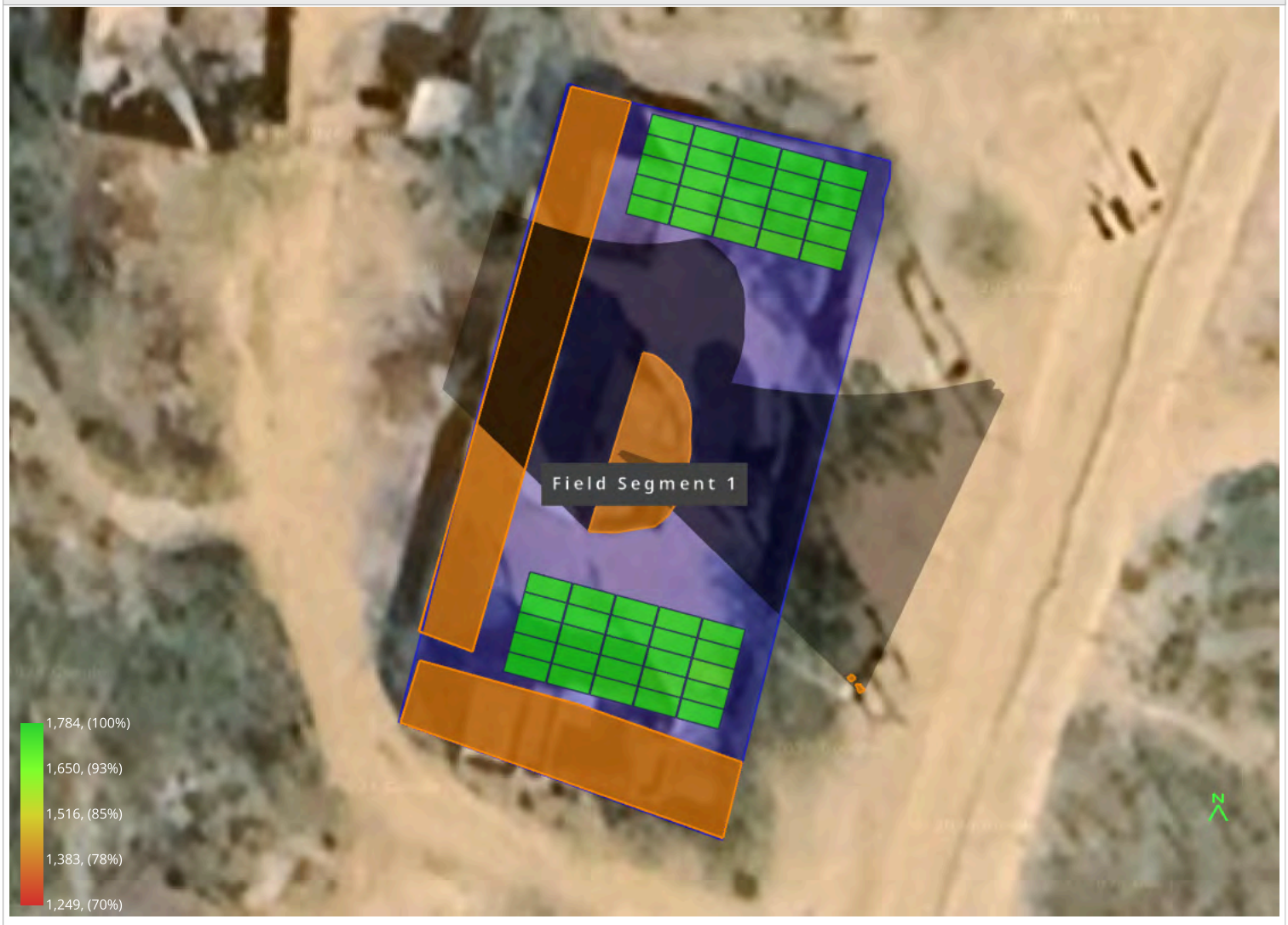
SOLAR DESIGN REPORT FOR IPS AREA

Detailed Layout2



Design OnGrid Design IPS 01 & 02, 32.98166515219784, 71.4898120647442

Shading Heatmap



Shading by Field Segment

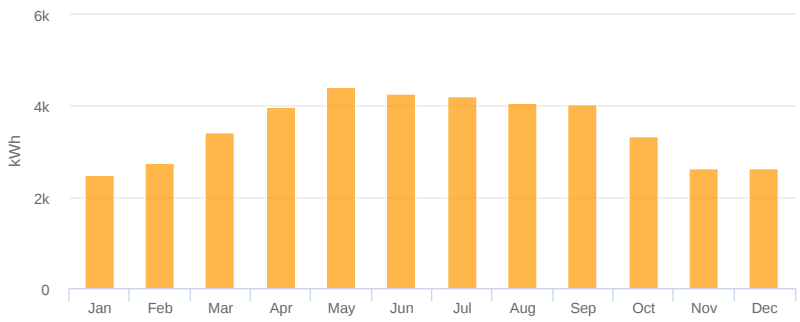
Description	Tilt	Azimuth	Modules	Nameplate	Shaded Irradiance	AC Energy	TOF[2]	Solar Access	Avg TSRF [2]
Field Segment 1	Module: 20.0°	Module: 195.0°	50	29.3 kWp	1,739.3kWh/m^2	42.2 MWh[1]	98.7%	98.8%	97.5%
Totals, weighted by kWp			**50**	**29.3 kWp**	**1,739.3kWh/m^2**	**42.2 MWh**	**98.7%**	**98.8%**	**97.5%**

[1] approximate, varies based on inverter performance
[2] based on location Optimal POA Irradiance of 1,784.1kWh/m^2 at 29.9° tilt and 183.2° azimuth

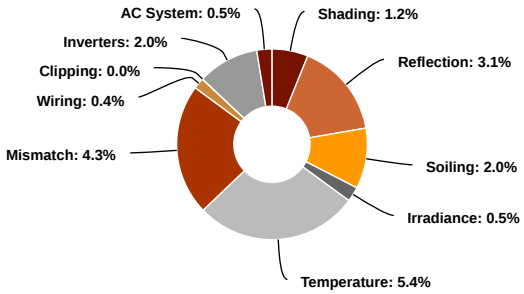
Solar Access by Month

Description	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
Field Segment 1	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	99%	98%
Solar Access, weighted by kWp	**98.9%**	**99.1%**	**98.9%**	**98.5%**	**98.7%**	**98.9%**	**98.8%**	**98.7%**	**98.8%**	**99.2%**	**98.9%**	**98.5%**
AC Power (kWh)	**2,478.9**	**2,747.2**	**3,426.0**	**3,987.7**	**4,409.4**	**4,270.6**	**4,200.0**	**4,067.2**	**4,046.3**	**3,340.2**	**2,629.2**	**2,627.6**

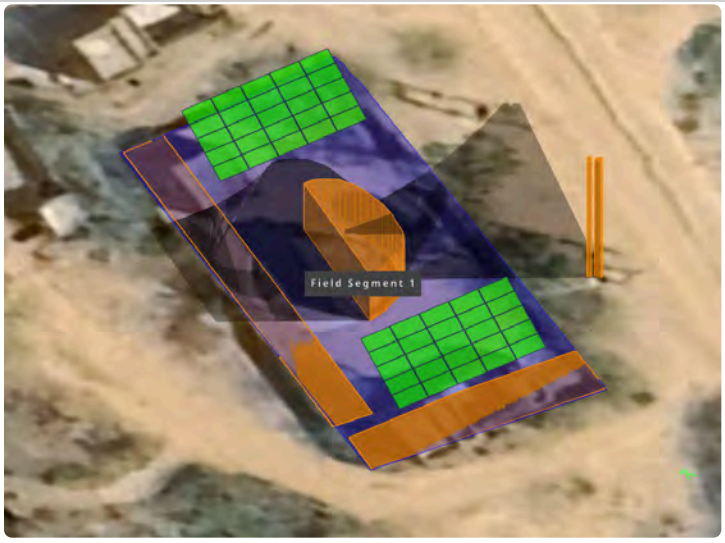
Monthly Production



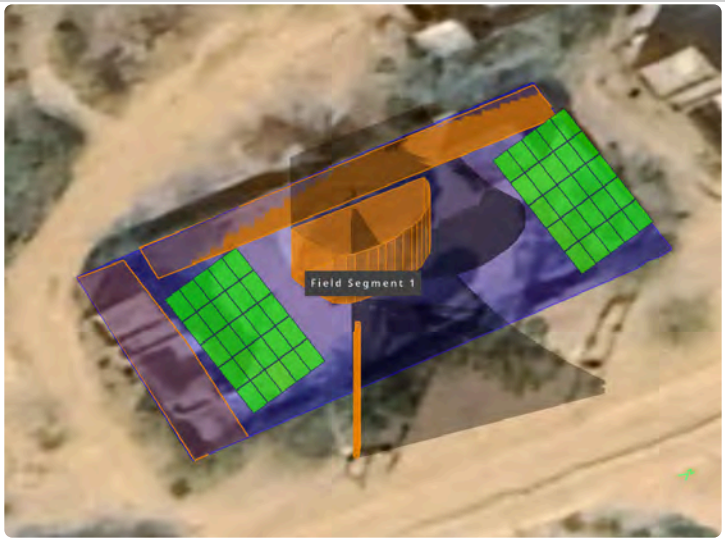
Sources of System Loss



Southwestern Angle

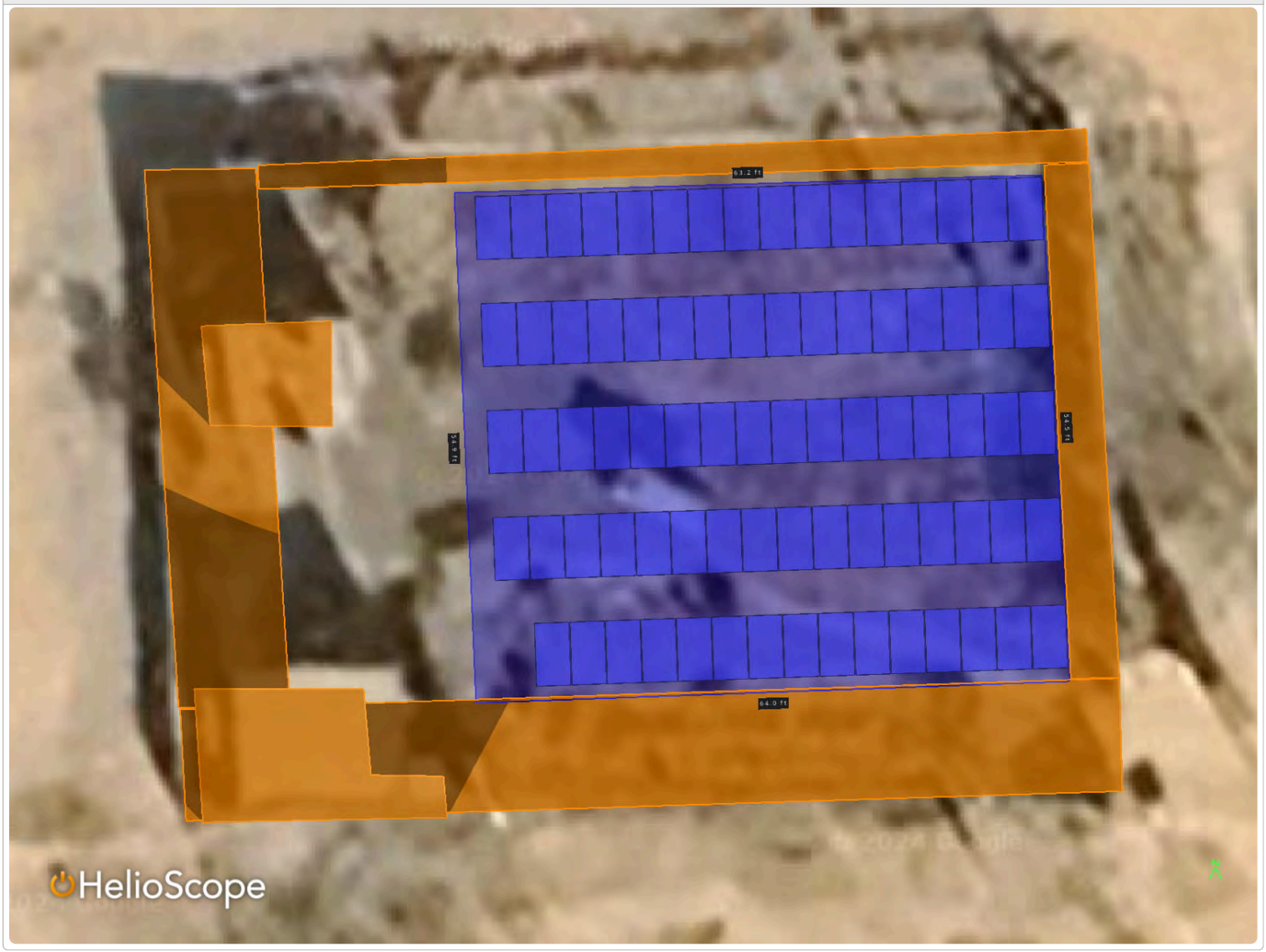


Southeastern Angle



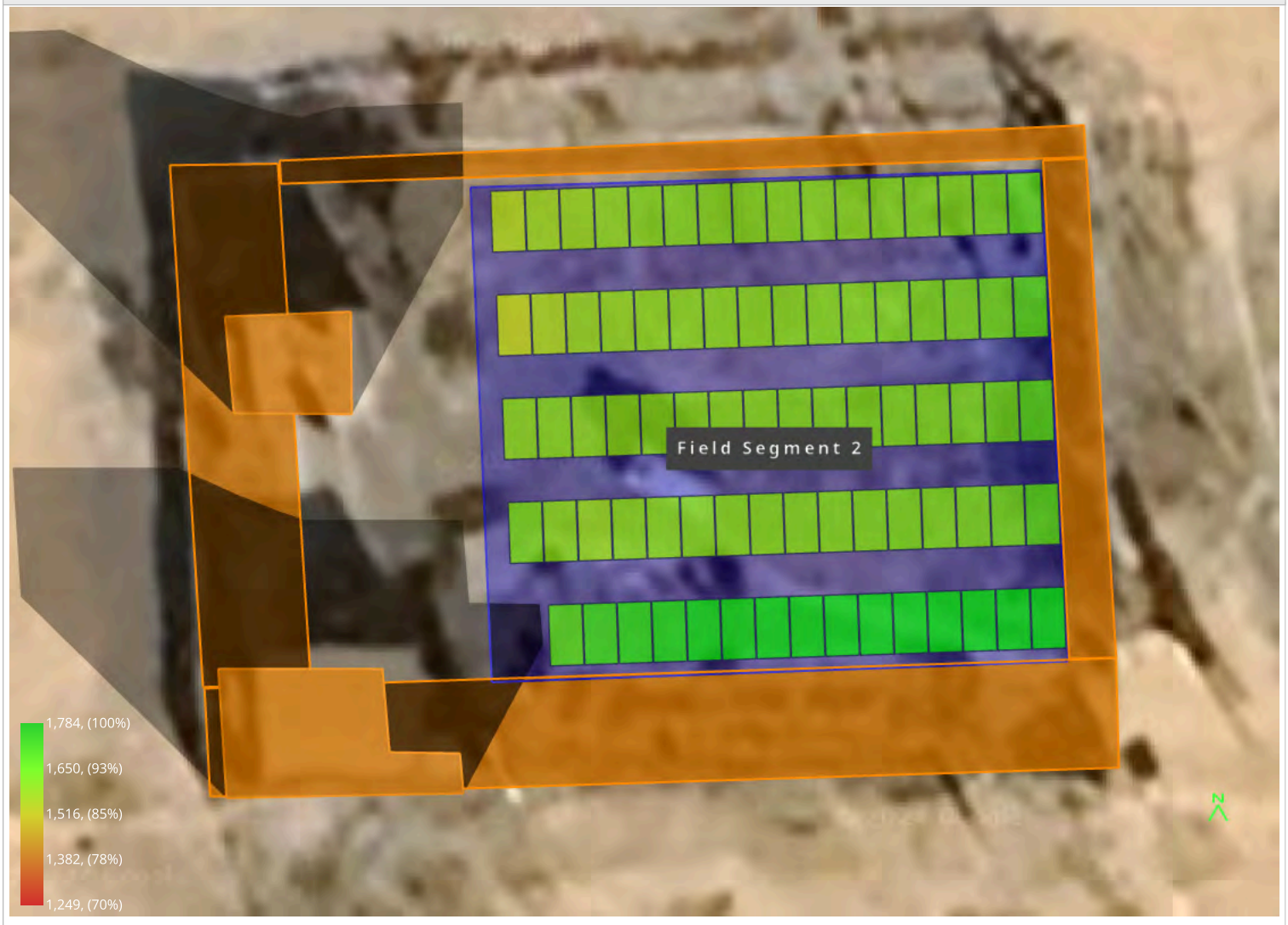
SOLAR DESIGN REPORT FOR TOLA MOR AREA

Detailed Layout2



Design 3 TURBINE TOLA MOR, 32.966042, 71.488014

Shading Heatmap



Shading by Field Segment

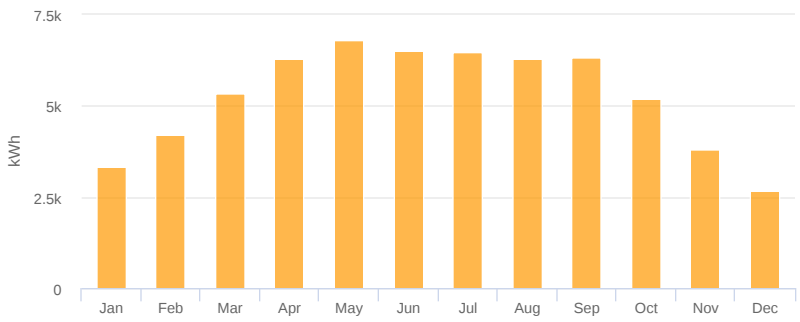
Description	Tilt	Azimuth	Modules	Nameplate	Shaded Irradiance	AC Energy	TOF[2]	Solar Access	Avg TSRF [2]
Field Segment 2	Module: 25.0°	Module: 178.0°	79	46.2 kWp	1,644.9kWh/m^2	63.2 MWh[1]	99.8%	92.4%	92.2%
Totals, weighted by kWp			**79**	**46.2 kWp**	**1,644.9kWh/m^2**	**63.2 MWh**	**99.8%**	**92.4%**	**92.2%**

[1] approximate, varies based on inverter performance
[2] based on location Optimal POA Irradiance of 1,783.8kWh/m^2 at 29.9° tilt and 183.2° azimuth

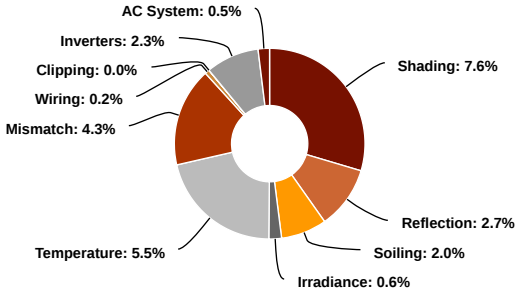
Solar Access by Month

Description	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
Field Segment 2	81%	94%	96%	97%	97%	97%	96%	96%	97%	96%	87%	61%
Solar Access, weighted by kWp	**80.6%**	**93.7%**	**96.1%**	**96.5%**	**96.6%**	**96.5%**	**96.4%**	**96.4%**	**96.5%**	**95.6%**	**86.6%**	**61.4%**
AC Power (kWh)	**3,344.3**	**4,214.1**	**5,324.4**	**6,282.1**	**6,801.8**	**6,504.8**	**6,465.5**	**6,293.1**	**6,326.8**	**5,204.0**	**3,800.3**	**2,670.3**

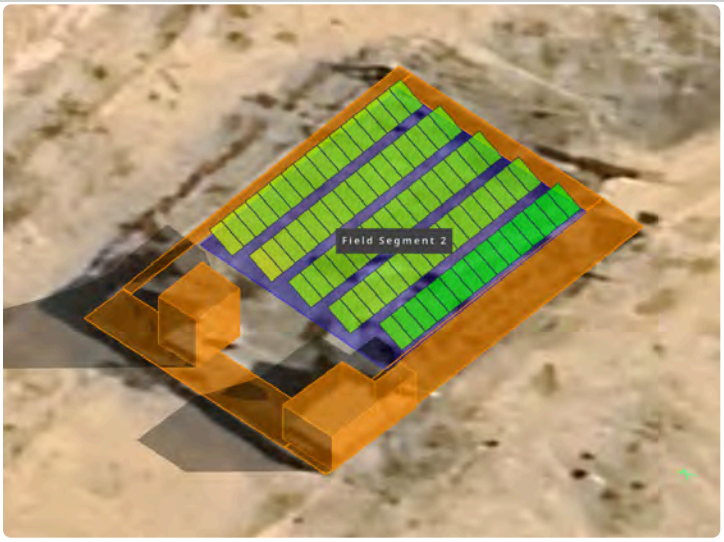
Monthly Production



Sources of System Loss



Southwestern Angle



Southeastern Angle