

January 9, 2019

**RE: Southwest Virginia Solar Value-Chain Springboard**

AML Pilot Plus Review Team,

This project will utilize land owned by the Wise County IDA and leased to the project through a 35-year lease. On January 7, 2019 Wise County IDA notified the Project Team that they would like to utilize the parcel originally proposed (ID 040984) for a different economic development opportunity. Wise County IDA is still very much a supporter of the project and in response has agreed to lease the Project Team the required acreage from one of two new parcels (ID 012058 or ID 010852) – see attached map. Both parcels can accommodate the original solar array size of 3.46MWdc with all the same financial characteristics.

For the purposes of this updated proposal, parcel ID 012058 will be the site location by default (PARCEL 1 on map below). This parcel contains one known open mine hole with an adjacent parcel containing two additional portals.

DMME will be conducting site visits to parcel 010852 (PARCEL 2 on map below) over the next two weeks to confirm the presence of features that can be remediated. If DMME locates AML features on parcel 010852, the Project Team will meet with DMME to discuss which features they believe are the most valuable for remediation. Regardless of the parcel ultimately chosen, the Project Team has allocated \$75,000 for AML feature remediations and will work side by side with DMME to best deploy the funds.

Attached is the letter of commitment from the Wise County IDA.





Sincerely,

**Southwest Virginia Solar Value-Chain Springboard Project Team**

Mineral Gap Data Center  
Proposed Solar Site  
Wise County, VA



Legend

-  AML Portal
-  Likely Eligible for AML Funding - Feature to be Identified
-  IDA Parcel Boundary - Proposed Solar
-  Parcel Boundaries

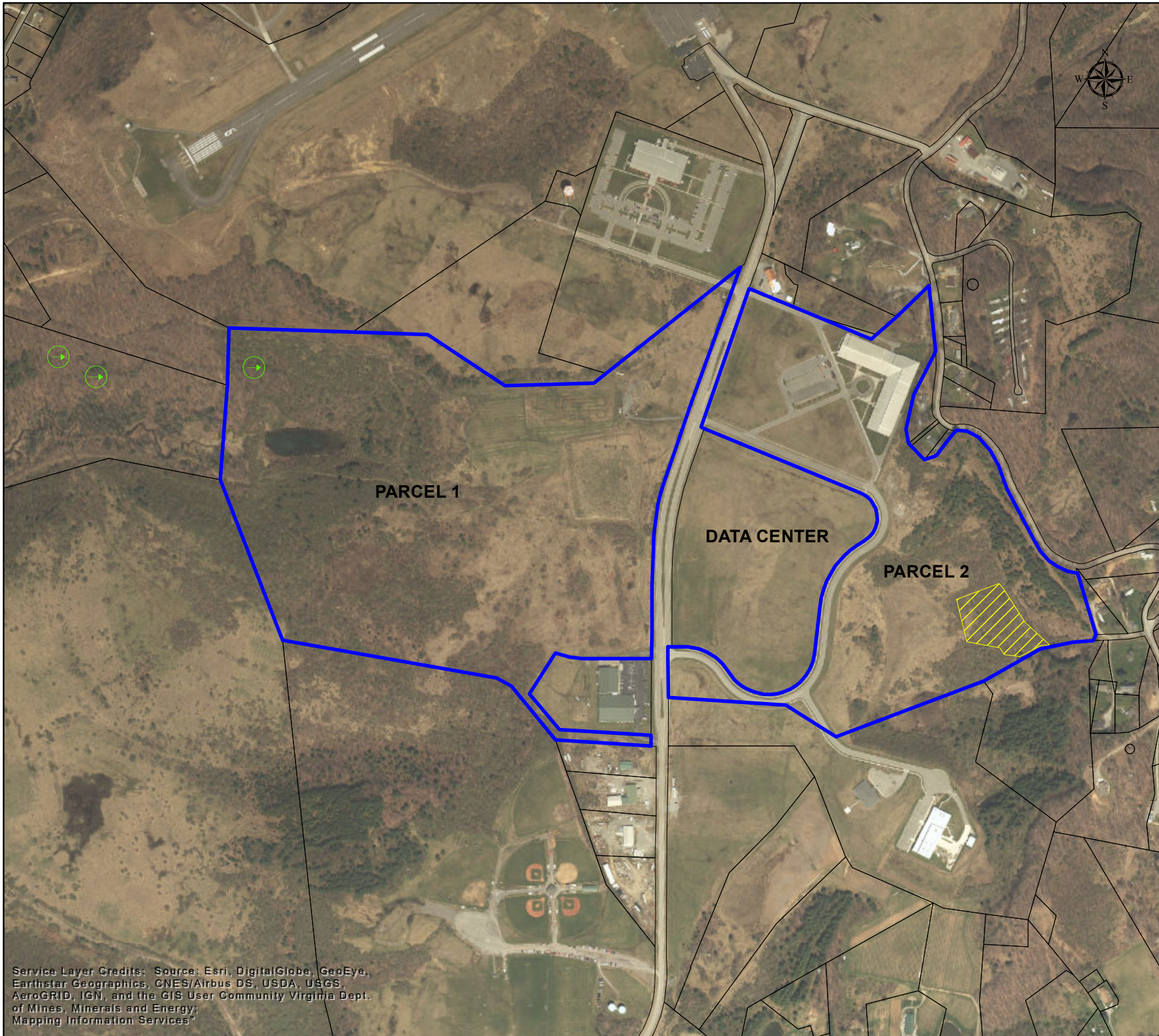


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Sun Tribe  
SOLAR

Prepared by: E. Arlen  
Date: 1/9/19



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Proposed 2018 AML Pilot Program Project Request Form**

**Completed forms should be emailed to [Tarah.Kesterson@dmme.virginia.gov](mailto:Tarah.Kesterson@dmme.virginia.gov)**

**The deadline for submittal is October 31, 2018.**

**UPDATED 1.9.19**

**Name:** Southwest Virginia Solar Value-Chain Springboard

**Municipality:** Wise

**County:** Wise

**Location: (Long/Lat)** -82.531826, 36.981737

**Primary Project Partner(s):** Mineral Gap Data Center Affiliate, Sun Tribe Solar

**Project Description:**

Global investment in renewable energy is at an all-time high. In the United States, despite low wholesale electricity rates, uncertainty about policy and incentives, and low natural gas prices, growth in the renewable energy sector continues to outpace projections. Solar photovoltaic (PV) energy, in particular, has had record-breaking growth year over year (James & Hansen, 2017). In just the first quarter of 2017, more than 2 gigawatts (GW) of solar capacity was installed in the U.S. market (SEIA, 2018).

In Southwest Virginia, a group of nonprofit and community action agencies, colleges, state agencies, planning district commissions, and other interested citizens and businesses seeking to develop a solar energy industry cluster in the seven coalfield counties of Southwest Virginia. The workgroup is co-convened by the University of Virginia-Wise Office of Economic Development & Engagement, People Inc., and Appalachian Voices. (Solar Workgroup of Southwest Virginia, 2017)

Electricity demand is expected to grow in Southwest Virginia (USEIA, 2016). Development of some or all aspects of the solar industry value-chain—from component manufacturing and sales to engineering and installation—will not only grow the local economy, but also provide new businesses with abundant, redundant, and renewable energy. The development of this value-chain, however, must start with proving that large-scale solar development works in Southwest Virginia and it can support solar and non-solar jobs alike.



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An innovative partnership between a Virginia-based solar developer and a national data center leader aims to leverage significant private investment to take a critical step towards developing this value-chain.

This solar project will consist of (8,991) 385W mono crystalline photovoltaic (PV) modules which will be ground mounted at a fixed tilt of 20 degrees at an azimuth of 176 degrees. The system will have a total installed capacity of up to 3.46MWdc. The DC electricity will be converted to grid compliant AC electricity via USA made 125kW string inverters. The power will be fed behind the load at the Wise County Data Center, both reducing the Center's operating budgets while helping to reduce peak demand loads on the region's distribution grid.

The land that will temporarily host the solar array will be leased under typical commercial terms, allowing for the termination and relocation of the system, if required. The racking system will be a standard "2up" configuration and will allow for streamlined decommissioning after the asset's useful life. Built into the project's budget is a line item for complete removal of the system and restoration to an as found or better condition at decommissioning.

The project team will coordinate with the Virginia DMME, Virginia DEQ and Virginia DCR, along with other federal, state and local agencies to ensure solar system development best practices. Pollinator friendly seed mixes will be utilized throughout the array site to promote habitat for native pollinator species. The project team will engage with a local firms for engineering and environmental studies.

Sources:

James & Hansen, 2017 –

[http://downstreamstrategies.com/documents/reports\\_publication/utility-scale-solar-report\\_2-21-17.pdf](http://downstreamstrategies.com/documents/reports_publication/utility-scale-solar-report_2-21-17.pdf)

SEIA, 2018 -

<https://www.seia.org/us-solar-market-insight>

Solar Workgroup of Southwest Virginia, 2017 -

<http://swvasolar.org/>



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USEIA, 2016 -

<https://www.eia.gov/todayinenergy/detail.php?id=26672>

**Total Estimated Project Cost:** \$4,617,200

**OSMRE AML Pilot Program Guidelines Category** (*Reference OSM Guidance Document*)? **(A, B, or Both A and B)** This is considered a Category A project.

**Proposed AML Pilot Funding Amount:** \$500,000

**Eligible for Title IV AML Funds** (*Reference OSM Guidance Document*)? **(Y or N)**

**If Yes: Why is this project being proposed as a Pilot Program project?**

*See Appendix for updated response*



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**Is there any ongoing operation and maintenance (O&M) funding requirement? (Y or N)**

**If Yes: What is the estimated annual O&M cost and source of that funding?**

There are no O&M costs associated with the AML features at the site. However, landscaping and maintenance of the solar facility will inject approximately \$17,100 each year into the local economy.

**Other Project Funding Source(s) (Amount and Status):**

\$2,308,600-Bank debt - first opportunities will be offered to local banks (banks will be approached upon award)

\$1,385,160-Sun Tribe's tax equity fund (committed)

\$423,440-Sponsor Equity: Sun Tribe Solar and Mineral Gap Data Center (committed)

**Anticipated Project Start and Completion Date:**

9/30/19 target start, 12/31/19 target completion

**Current Project Status:** Ready for implementation

**Are Project designs available: (Y or N)** Yes

**Summary of any Significant Project Issues:** None

**Describe AML features being reclaimed and/or nexus with AML lands and features associated with the project:**

[See Appendix for updated response](#)



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**How likely are the project partners to complete any work required beyond the reclamation project work?**

Highly likely; while the project is entirely within a former mine area, there are no known features in need of reclamation. Rather, this project focuses on smart-reuse of the underutilized post-mine area and remediation of features nearby.

**Provide description of anticipated outcomes relative to Economic Development and/or Community Development:**

As mentioned before, there are both environmental and economic returns we can expect from this project.

This project would lead to several economic and community development benefits. First being the increase in skilled labor experienced in the installation of large solar projects which will make the development of future projects more desirable if there is a workforce available to deliver. The second is the annual infusion of capital into the local community. The annual land lease as well as annual site O&M scopes will infuse approximately \$1,185,000 into the Wise County IDA and local O&M contractors over the project's 35-year life span. The project team will also work with Mountain Empire Community College to enable the classroom to perform site visits to get hands-on experience.

Data center customers value renewable energy - the fact that Mineral Gap would have a solar array co-located near the facility will give them a significant competitive advantage over most other data centers which do not have the space to have their own solar array nearby. Increased revenue to Mineral Gap will lead to more local jobs and will accelerate expansion of the facility.

A recent study from Downstream Strategies found that under an aggressive solar development scenario, utility-scale installations in Southwest Virginia could support approximately 212 jobs on average over the 10-year period—including project development and onsite jobs, supply chain jobs, and induced jobs. Again, while this project will not support that number of jobs, it is a vital first step towards achieving that type of economic return in Southwest Virginia. Essentially, these jobs are going to be created somewhere, why not here?

While expansion of local employment and income from solar energy investment occurring in Southwest Virginia are obvious economic gains to this region, there is also the possibility of other economic benefits that





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are not so obvious. Increased wage growth is one such possible benefit. In Germany, Antoni et al. (2015) examined wages across multiple sectors of the economy during 2009 and found what they called “a persistent renewable energy wage premium” in the construction/installation activities for solar and wind energy. Wages of renewable energy employees were more than 10% higher than wages for similar construction/installation activities in other industries. While there is no guarantee that employee wages will rise with solar industry development in Southwest Virginia, research has shown that the solar industry has increased wages for installation employees.

**How will these outcomes be measured?**

The project team will work with the Solar Workgroup of Southwest Virginia to quantify the impacts of this critical project. We plan to measure:

1. Solar jobs created and supported over a 10 year period following project construction.
2. Cost displacement at the Mineral Gap facility.
3. Environmental benefits (CO2 offset)

**Long-Term benefits to the local Economy and/or Community Development (Refer to the OSMRE AML Pilot Program Guidance Section III. ‘Economic and Community Development Nexus’ for example metrics for the benefits):**

Jobs Created: The engineering and construction phases will engage with at least four local contractors and will employ approximately 26 people over the four month delivery phase. The project will enter into a long term contract with local landscaping firm to maintain the site vegetation. The Mineral Gap Data Center’s commitment to sustainability will sway more potential customers to choose their site, resulting in more growth and will accelerate expansion.

Additionally, as outlined above, this project will be used as a valuable leverage point and critical step to developing the Central Appalachian Solar Value-Chain, located in Southwest Virginia. This could potentially lead to hundreds of jobs.

Infrastructure Created: The 3.46MW project will provide renewable power to the Mineral Gap Data Center helping to reduce peak loads on the grid during the summer months. As solar begins to increase in deployment throughout the region, the contractors utilized during the construction phase will be able to leverage their experience for future projects.



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Communities Served: Southwest Virginia has been the energy capital of the region for decades, the community's expansion into new technology such as solar will continue to bolster the local economy. Wise County is known as "The Safest Place on Earth" and utilizing the sun as a renewable feedstock will enable the Southwest Virginia to maintain its leadership role in the energy space.

Students Served: Sun Tribe will work with Mountain Empire Community College to enable students in the solar training program to get hands on experience when the annual inspections are performed. Additionally, Wise County Public Schools will have a local opportunity to schedule site visits for STEM enhancement to learn about a different energy resources in their area.

**Attachments:**

Project Production Report (2 pages)  
Appendix 1 and related maps

**For DMME Use Only:**

**Primary VA AML Project Contact:**

**AML Pilot Project Name:**

**Problem Area Number and Name:**

**Project Number(s):**

**Title IV AML grant funding (Amount and Status)**

# Mineral Gap 1.9.19 2 Mineral Gap, Mineral Gap, VA

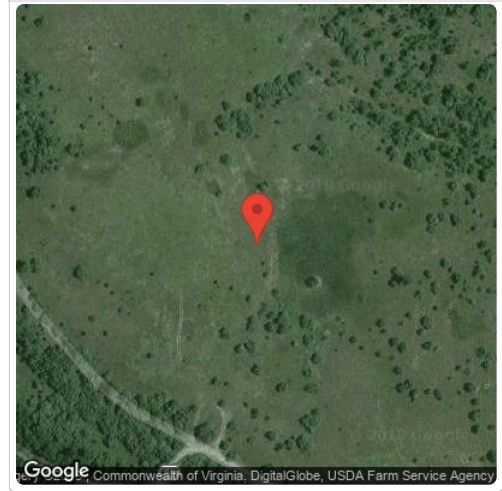
## Report

Project Name	Mineral Gap
Project Address	Mineral Gap, VA
Prepared By	Trevor Francis, PE taylor@suntribesolar.com

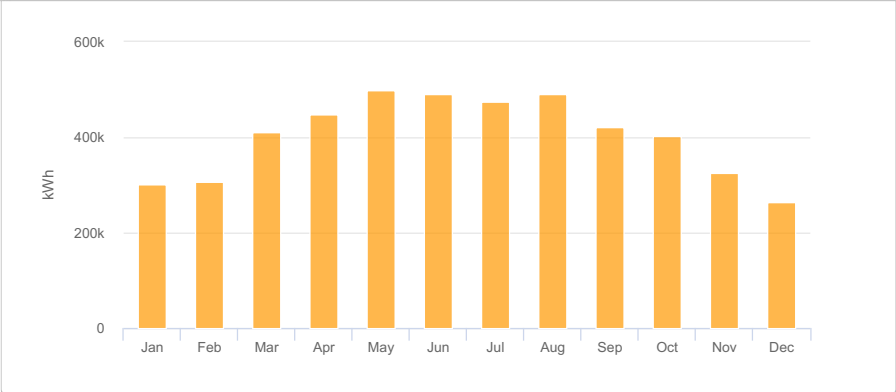
## System Metrics

Design	Mineral Gap 1.9.19 2
Module DC Nameplate	3.46 MW
Inverter AC Nameplate	2.88 MW Load Ratio: 1.20
Annual Production	4,837 GWh
Performance Ratio	82.9%
kWh/kWp	1,397.5
Weather Dataset	TMY, (36.9742 -82.5393), Solar Anywhere- Mineral Gap (custom)
Simulator Version	a36d904014-4b77413718-cab88881b0-f5d77519c2

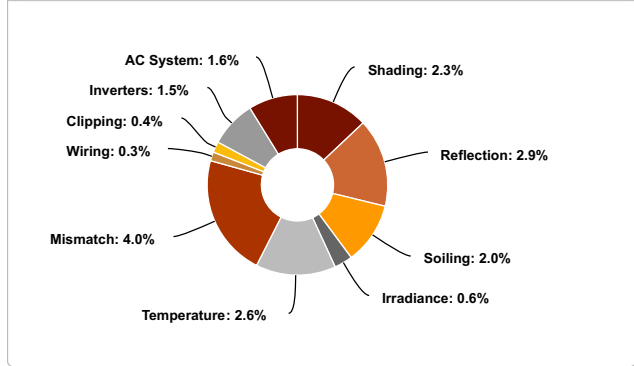
## Project Location



## Monthly Production



## Sources of System Loss



## Annual Production

	Description	Output	% Delta
Irradiance (kWh/m <sup>2</sup> )	Annual Global Horizontal Irradiance	1,494.4	
	POA Irradiance	1,686.7	12.9%
	Shaded Irradiance	1,647.1	-2.3%
	Irradiance after Reflection	1,599.9	-2.9%
	Irradiance after Soiling	1,567.9	-2.0%
	<b>Total Collector Irradiance</b>	<b>1,567.9</b>	<b>0.0%</b>
Energy (kWh)	Nameplate	5,400,870.9	
	Output at Irradiance Levels	5,368,955.1	-0.6%
	Output at Cell Temperature Derate	5,229,632.1	-2.6%
	Output After Mismatch	5,022,929.2	-4.0%
	Optimal DC Output	5,008,496.6	-0.3%
	Constrained DC Output	4,990,940.5	-0.4%
	Inverter Output	4,915,810.0	-1.5%
	<b>Energy to Grid</b>	<b>4,837,480.0</b>	<b>-1.6%</b>
Temperature Metrics			
	Avg. Operating Ambient Temp		14.6 °C
	Avg. Operating Cell Temp		23.3 °C
Simulation Metrics			
	Operating Hours	4584	
	Solved Hours	4584	

## Condition Set

Description	Solar Anywhere											
Weather Dataset	TMY, (36.9742 -82.5393), Solar Anywhere- Mineral Gap (custom)											
Solar Angle Location	Meteo Lat/Lng											
Transposition Model	Perez Model											
Temperature Model	Sandia Model											
Temperature Model Parameters	Rack Type	a	b	Temperature Delta								
	Fixed Tilt	-3.56	-0.075	3°C								
	Flush Mount	-2.81	-0.0455	0°C								
	East-West	-3.56	-0.075	3°C								
	Carport	-3.56	-0.075	3°C								
Soiling (%)	J	F	M	A	M	J	J	A	S	O	N	D
	2	2	2	2	2	2	2	2	2	2	2	2
Irradiation Variance	5%											
Cell Temperature Spread	4° C											
Module Binning Range	-2.5% to 2.5%											
AC System Derate	0.50%											
Module Characterizations	Module	Characterization										
	JKM385M-72H (Jinko Solar)	Spec Sheet Characterization, PAN										
Component Characterizations	Device	Characterization										
	XGI 1500-125 (Solectria)	Spec Sheet										

🏠 Components

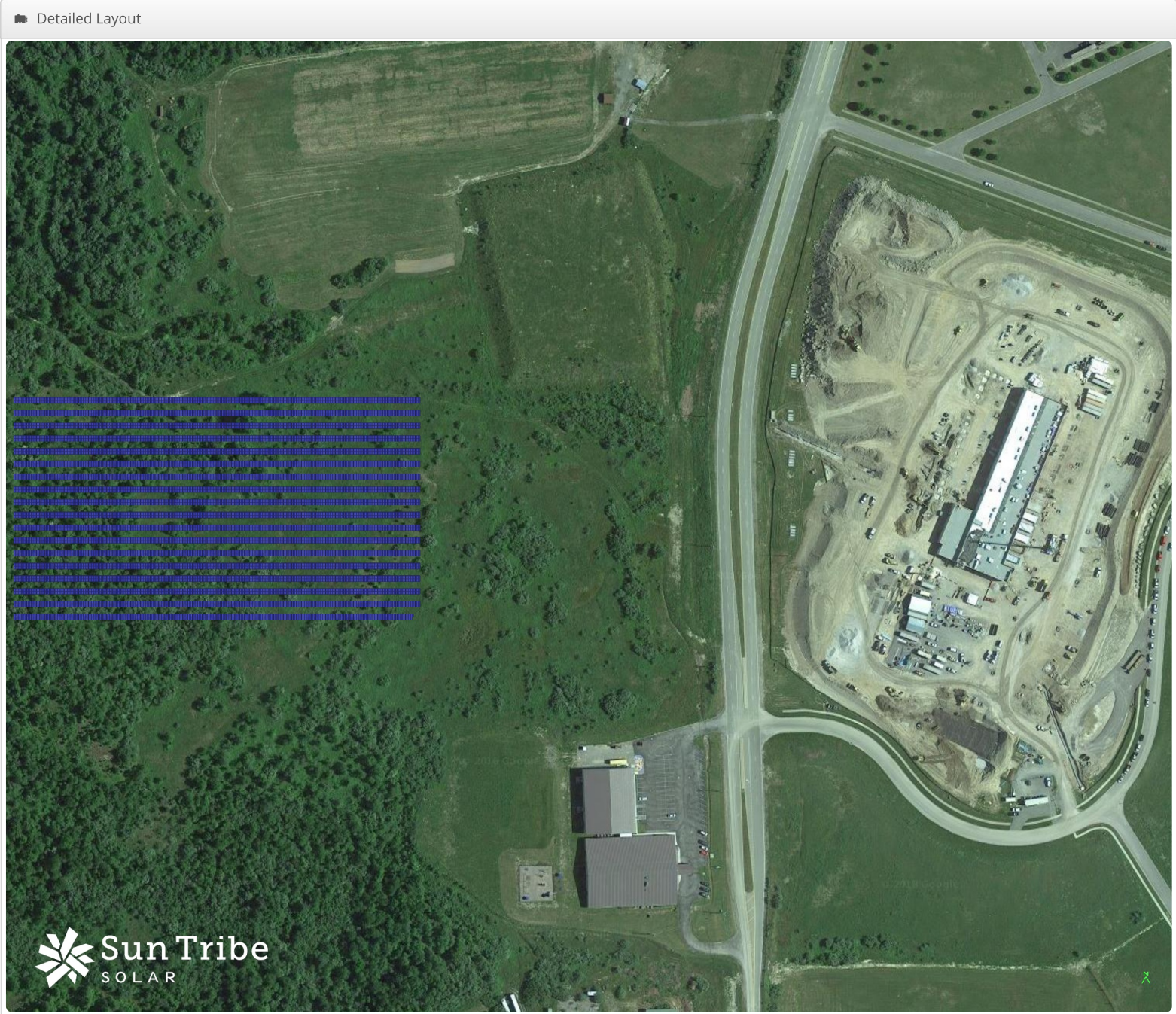
Component	Name	Count
Inverters	XGI 1500-125 (Solectria)	23 (2.88 MW)
AC Home Runs	750 MCM (Copper)	23 (171,361.6 ft)
Strings	10 AWG (Copper)	333 (141,998.8 ft)
Module	Jinko Solar, JKM385M-72H (385W)	8,991 (3.46 MW)

📍 Wiring Zones

Description	Combiner Poles	String Size	Stringing Strategy
Wiring Zone	12	27-27	Along Racking

Field Segments

Description	Racking	Orientation	Tilt	Azimuth	Intrarow Spacing	Frame Size	Frames	Modules	Power
Field Segment 1	Fixed Tilt	Portrait (Vertical)	25°	180°	14.0 ft	2x1	4,500	9,000	3.47 MW



## **Appendix 1**

**January 9, 2019**

**Eligible for Title IV AML Funds (Reference OSM Guidance Document)? (Y or N)**

**If Yes: Why is the project being proposed as a Pilot Program project?**

The project is situated within the qualifying area for AML Pilot Funds and within a mining area that was abandoned in 1957. There is one portal on the parcel and two on the adjacent parcel that need remediation and the presence and location of these portals was confirmed by Daniel Kestner of DMME in January 2019.

**Describe AML features being reclaimed and/or nexus with AML lands and features associated with the project:**

There is one portal on the parcel near where the solar system will be situated with two other portals adjacent. These portals have been confirmed as partially opened mine holes and will be properly managed / barricaded. This project will dedicate \$75,000 to reclamation activities with these portals being the priority. The team will work with DMME to identify the best solution for each portal. Any excess funds after these portals have been remediated will be utilized to remediate other nearby features per DMME's recommendations.