

LAND SUITABILITY AND THE SOLAR
RADIATION POTENTIAL FOR A
LIMITED PLOT IN THE PHOENIX
METROPOLITAN REGION

CENE 599 - GIS/RS

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MISSION SOLAR 360 SILVER MONO PERC SOLAR PANEL

278.23" x 39.33" x 1.57"

47.6 pounds

\$245

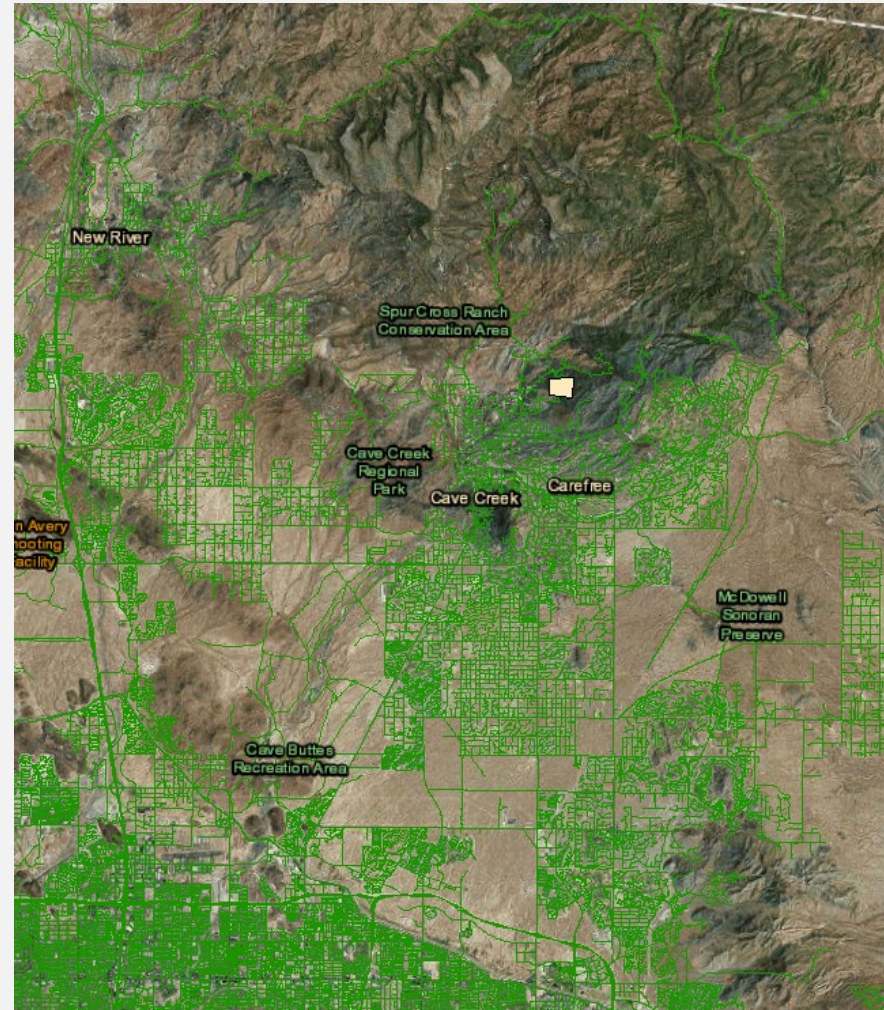
MISSION SOLAR
ENERGY



ASSUMPTIONS

- All potential ground will be used purely for solar production
- 15% space margin per panel applied
- All other equipment will be placed onto non-solar producing surface
- All energy will be produced with 100% system efficiency and with no regard to battery storage limits

PROJECT LOCATION



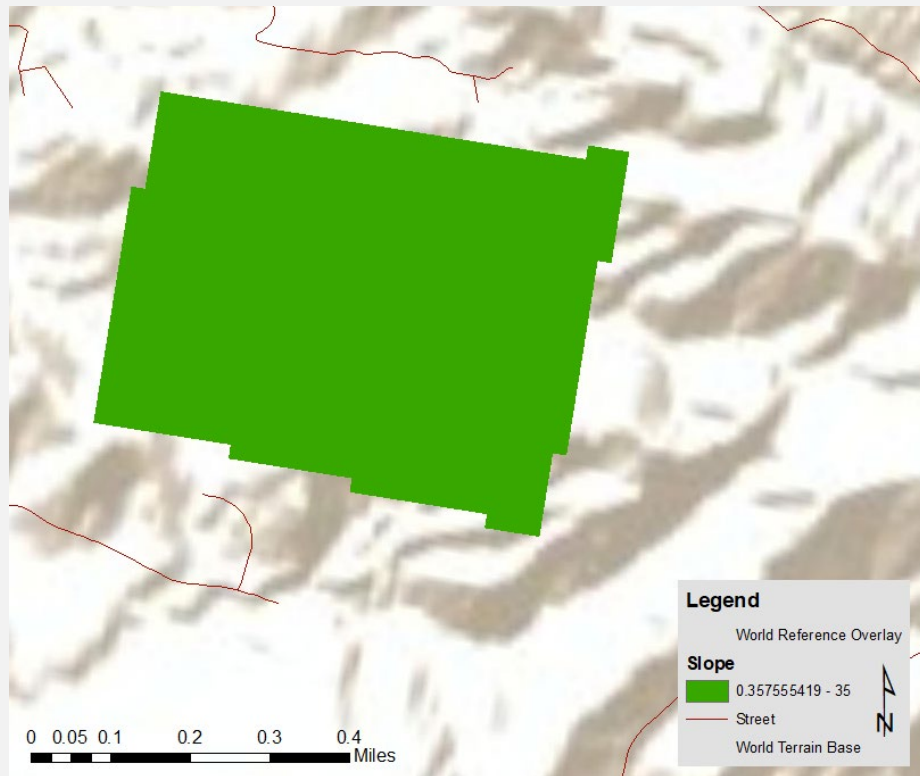
METHODS & ANALYSIS

- NRCS Get Data
 - ASTER Global DEM
 - October 2011
 - TIGER Primary and Secondary Roads
 - August 2016
 - TIGER Street Map
 - August 2016
- Set project boundaries
- Surface analysis
 - Slope analysis
 - Aspect analysis
 - Panel space availability
 - Panel production
- Solar analysis
 - Solar radiation analysis
- Evaluation of Results

ANALYSIS

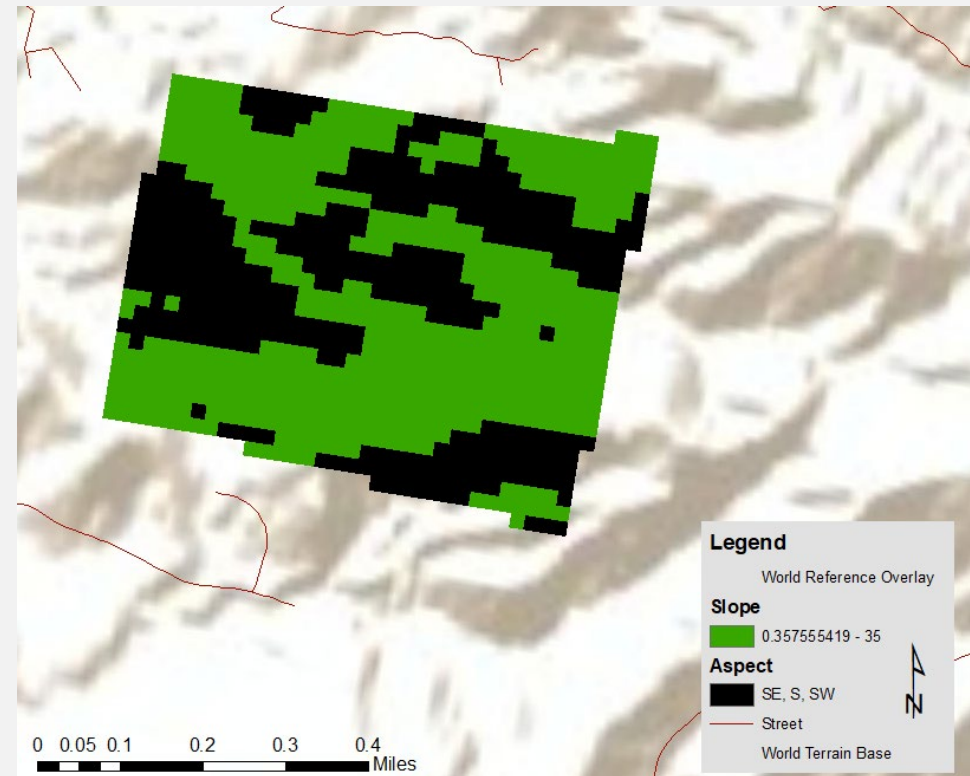
Slope

35 degrees or less



Aspect

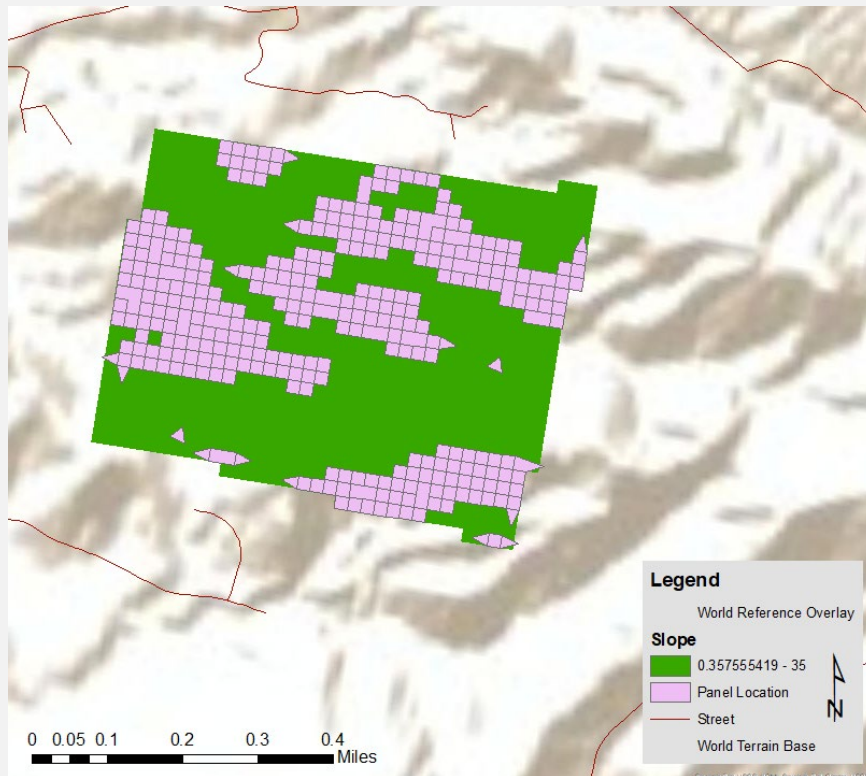
Southeast, south, and southwest facing



ANALYSIS

Panel Space Availability

35 degree slope AND proper direction



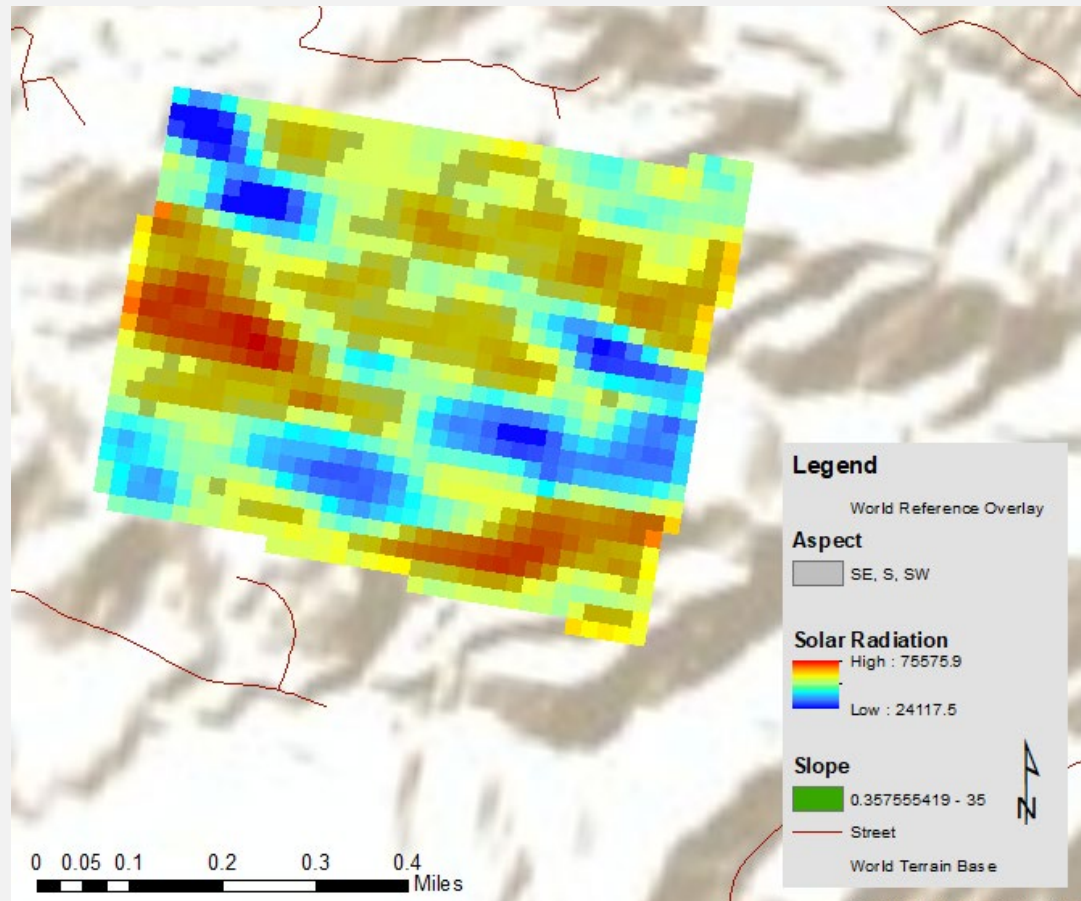
Panel production

- Useable area
 - 279347 sq m
 - 69.2 acres
- Panels on property
 - 106410
- Production per panel
 - 332.3 W
 - Reduced for product inefficiencies

RESULTS

Annual Solar Radiation

W-h/m²



Financial gain and loss

2021 initial production year

Assumption: 211 days with minimum 8 hrs sun

Land investment: **\$400,000**

Panel investment: **\$26,070,408**

Connection to utility system: **UNDETERMINED**

Total buyback per year (0.094c): **\$2,318,413**

Solar tax credit (30%): **\$7,821,123**

Net Finances:

\$16,330,872

DISCUSSION

- The solar production was favorable, as expected
- Usable surface for the plot was lower than expected with the set conditions
- Panels cover more surface area for cost than initially considered

Potential Errors

- Miscalculation in initial project boundary
- Panels and system will not have 100% efficiency or production
- Unknown settings while performing area solar radiation analysis

CONCLUSION & FUTURE RESEARCH

- Production is very favorable
- Cost of initial investment is steep
- Payoff will neutralize 8 years post installation

- Consider profitability of dual use land and extending acceptable panel directions
- Complete solar graphics calculations
- Determine production accounting for loss during transportation

REFERENCES

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