

Yearly Solar Potential Calculations on the Morongo Indian Reservation

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Location



Process Steps

- Gather and verify solar radiation data
- Run and adjust solar model in ArcMap
- Identify physical constraints
- Establish values in select areas
- Isolate greatest potential locations
- Compare to existing solar farms

Gather and verify solar radiation data

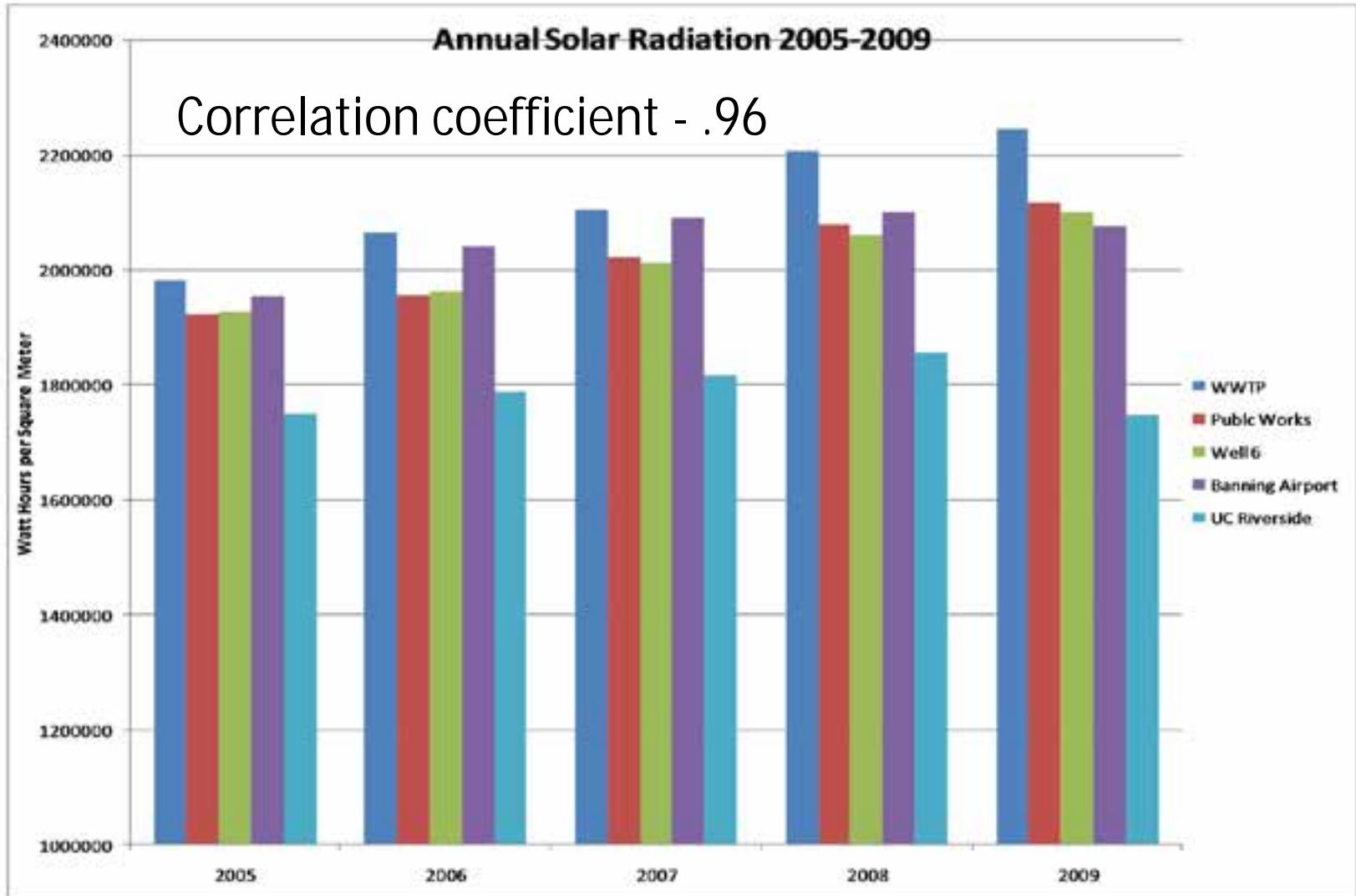
- Data gathered from 2005-2009
- Hourly totals in watt hours per square meter (Wh/m²).
- Data compared from 3 weather stations on Morongo and 2 off reservation*



*Data obtained from California Air Resources Board

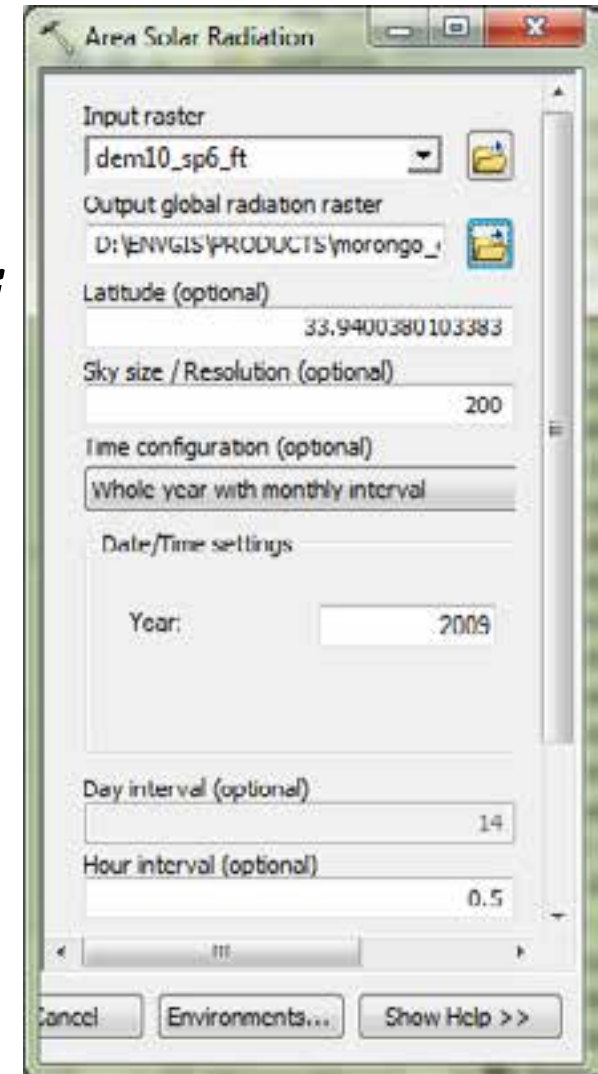
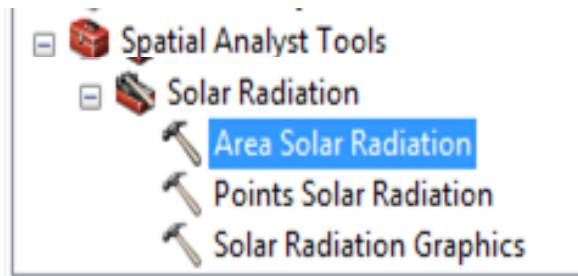


Gather and verify solar radiation data



Run and adjust solar model in ArcMap

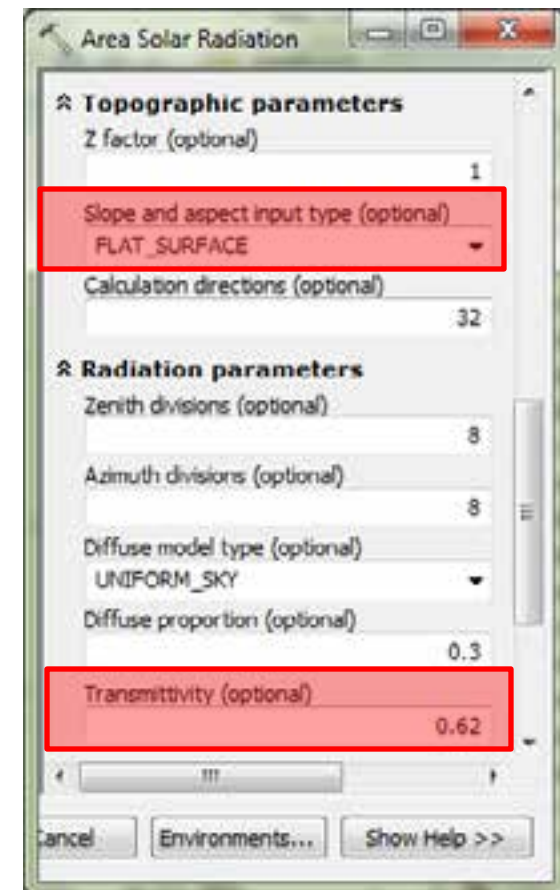
- Area solar radiation analysis is used to calculate the insolation across an entire landscape.-*Esri*
- Processed in Arc 9.3 using 2009 data (whole year time config)
- Retained *most* default settings

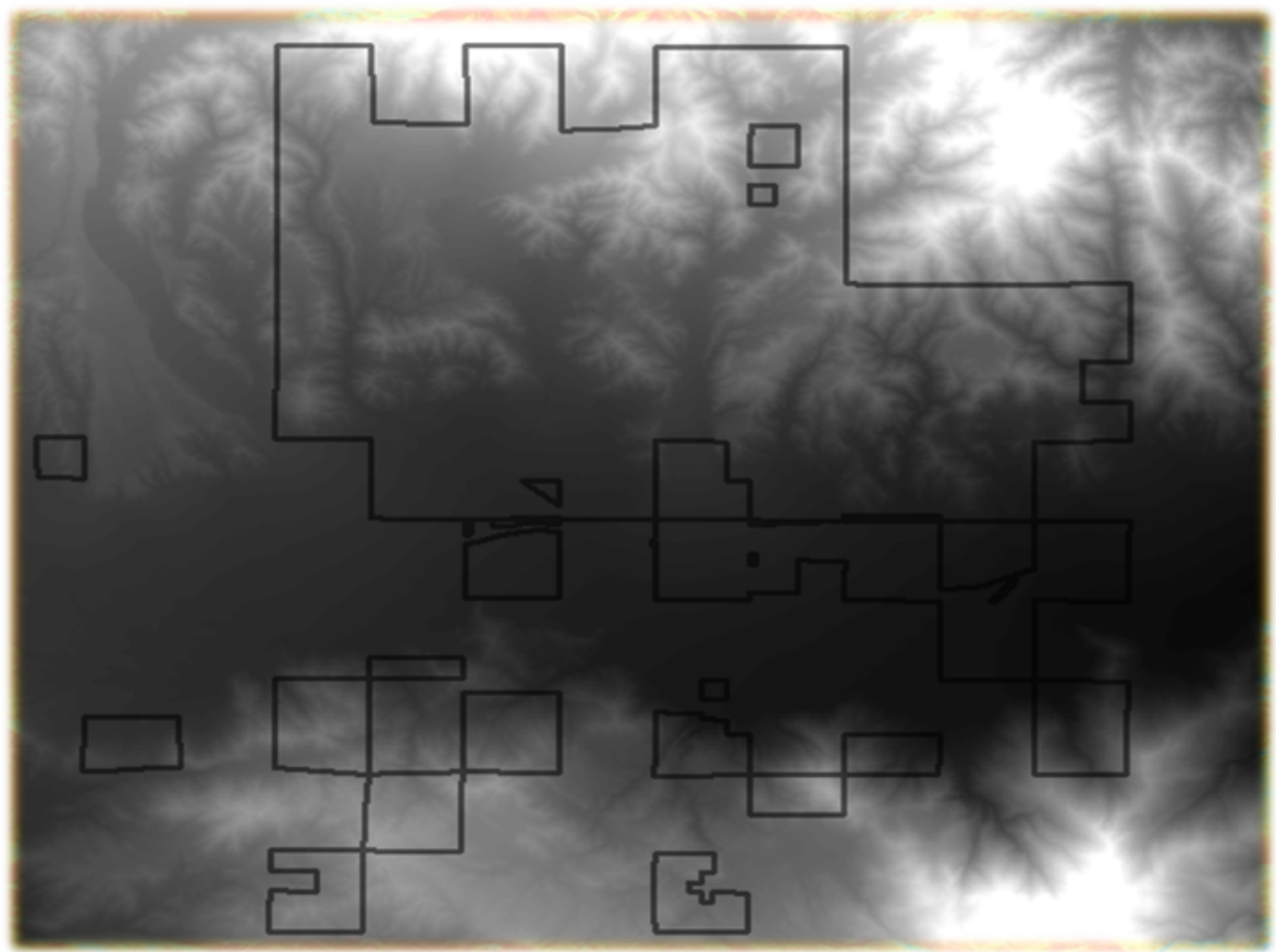


Run and adjust solar model in ArcMap

- Ran analysis several times until model best matched real world data
- Selected *Flat_Surface* to mimic reception by pyranometer
- Modified *Transmissivity* repeatedly

Wx Site	Real Value (Wh/m ²)	Modeled Value (Wh/m ²)	% Δ
WWTP	224,6111	218,6949	2.7
W6	210,0556	223,1926	6.3
PW	211,6944	217,3645	2.7

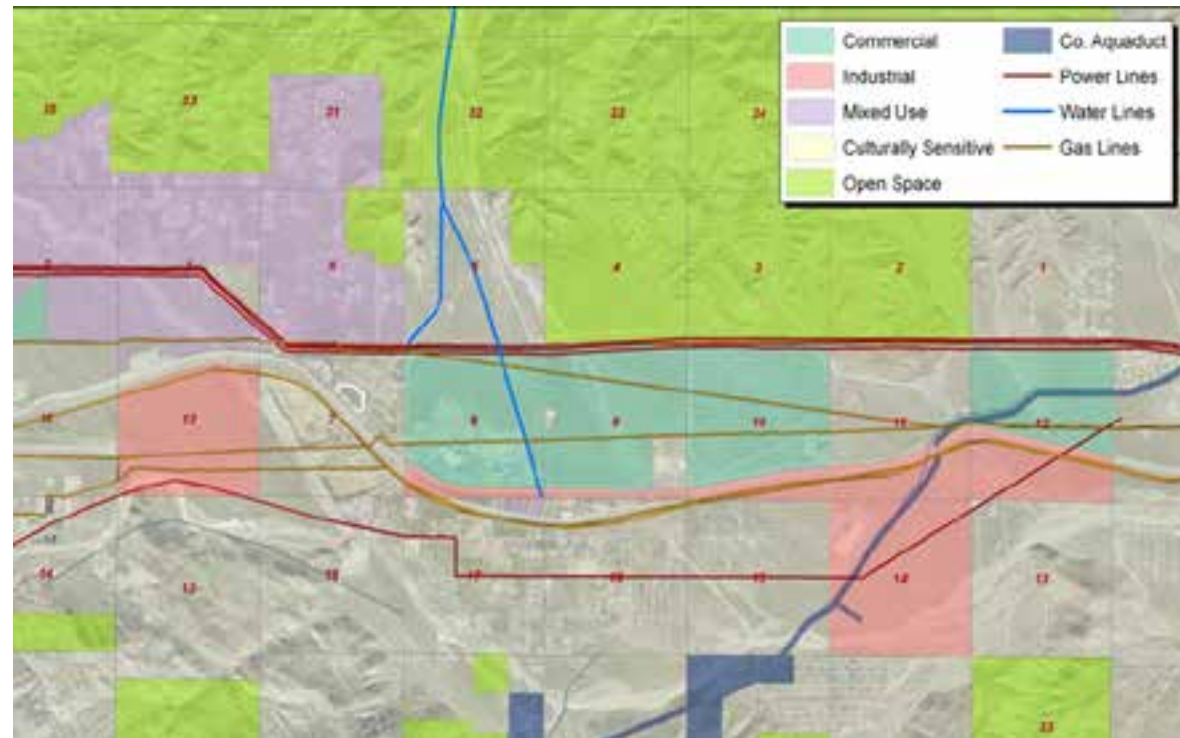




Identify physical constraints

- Consistency with Morongo General Plan, ROW's
- Cost considerations

Constraint	Distance	Reason
Power lines	≥ 250'	ROW's
Power lines	≤ 2640'	Cost
Gas lines	≥ 40'	ROW'S
Water lines	≥ 40'	ROW's
General Plan	Varies	Zoning
Aqueduct	Varies	ROW's

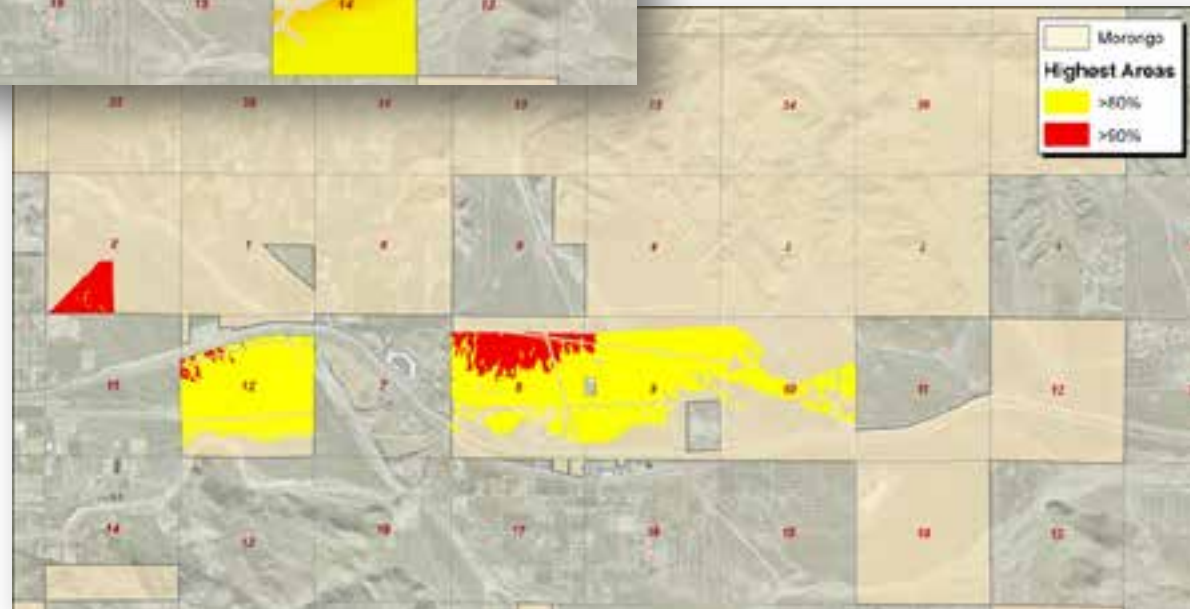
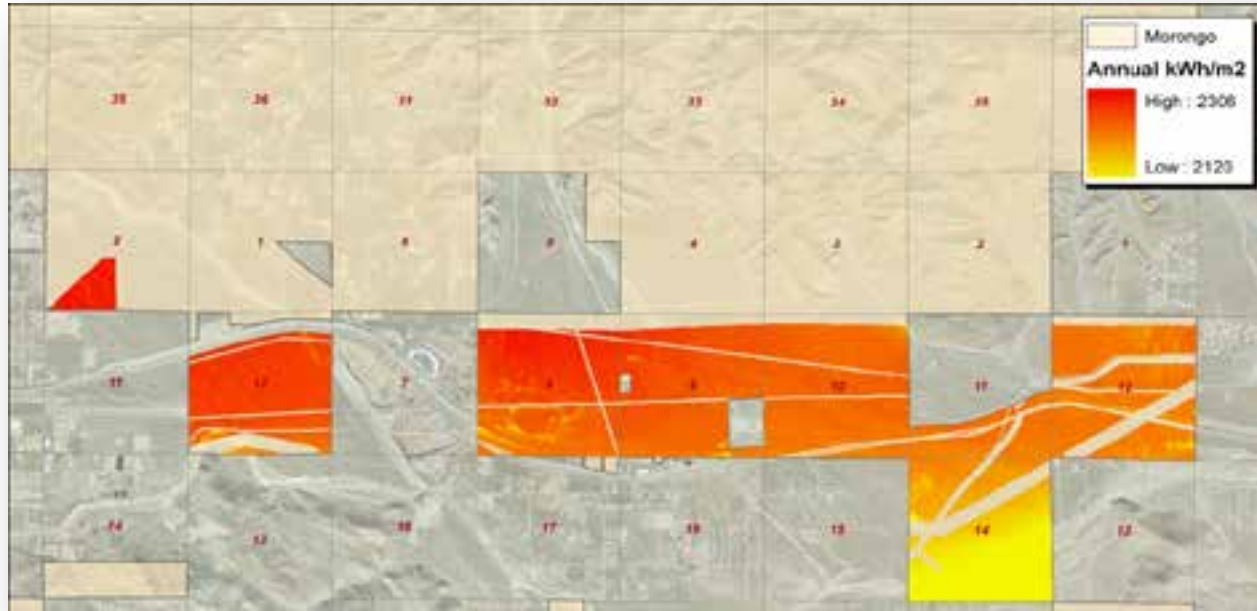


Identify physical constraints

- $[GasLine] \geq 40 \ \& \ ([landuse] == 3 \ | \ [landuse] == 4) \ \& \ [WaterLine] \geq 40 \ \& \ [Aqueduct] \neq 1 \ \& \ ([Powerline] \geq 250 \ \& \ [Powerline] \leq 2640)$



Establish values in select areas



Isolate the
greatest potential
locations

Compare to existing solar farms

- Solar radiation in the modeled potential areas range from 2,120 to 2,306 kWh/m²
- The areas with the most potential (> 80%) indicate annual modeled values of 2,269 to 2,306 kWh/m²

Name	Location	kWh/m ² (*)(f)
DeSoto Next Generation Solar Energy Center	Arcadia, Florida	2,037
Nellis Solar Power Plant	Nellis AFB, Clark County, NV	2,285
Alamosa Photovoltaic Power Plant	San Luis Valley, Colorado	2,175
Morongo Indian Reservation	Banning, California	2,186

(*)Data extrapolated from NREL data set. Data provided as average daily reception, which was multiplied by 365 to show similarity across sites for annual average.

(f) Data will indicate lower values than model and real data since it was calculated using averages rather than maximum values.

Comments/Questions?

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