

# PARK IT LIKE IT'S HOT:

## Solar Potential Assessment of Commercial Buildings' Parking Lots in Las Vegas

### Top 5 Solar Sites



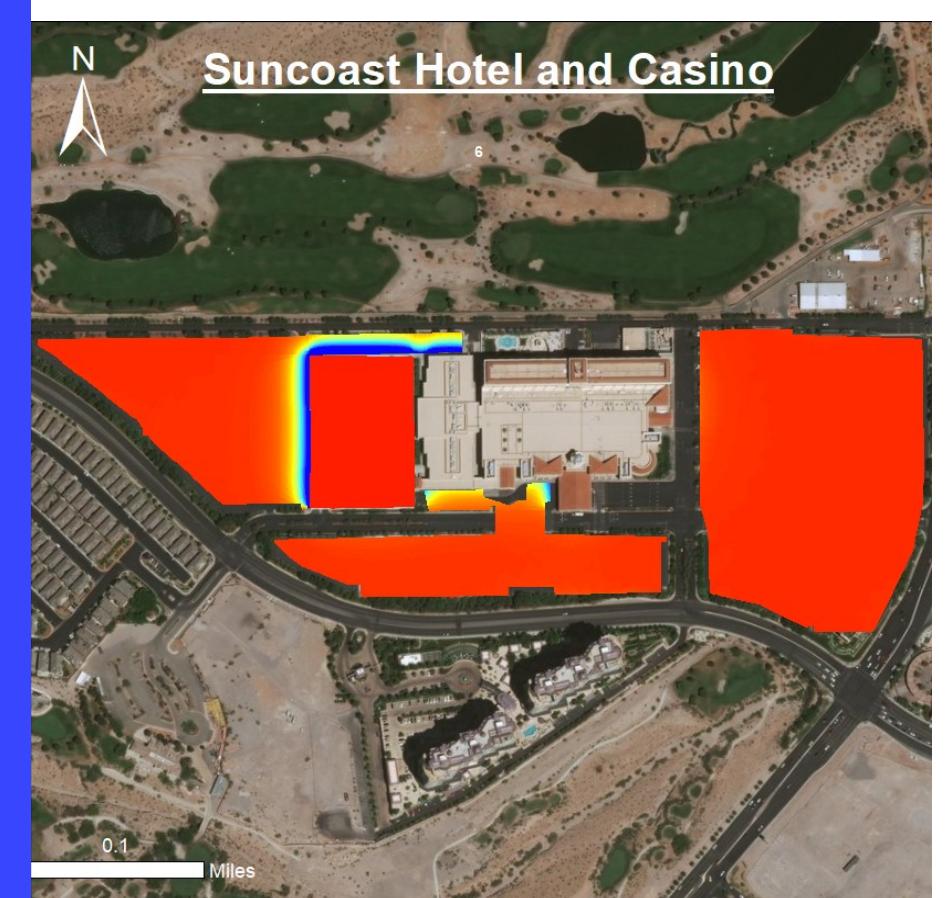
**Solar\_Potential**  
Value  
Highest Potential : 1.36901e+06 WH/m<sup>2</sup>  
Lowest Potential : 133,043 WH/m<sup>2</sup>

Parking Lot Area: 138,079.192 meters<sup>2</sup>

Solar Potential:

**178,938,772,741.531 WH/m<sup>2</sup>**

**Comments:** This was the only commercial site that already had solar panels on it, however, there's still a lot of potential to be had by the Meadows Mall! Their parking lot does not have any trees or tall surrounding buildings, making it the perfect spot for a large solar array.

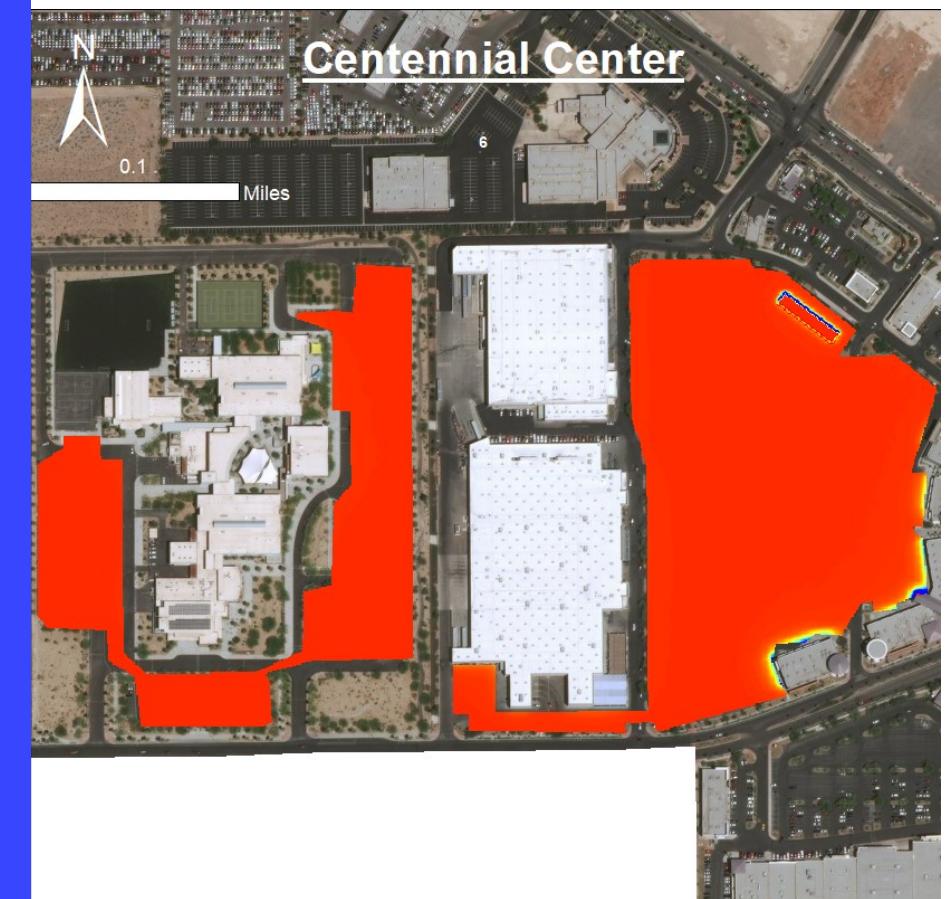


Parking Lot Area: 115,416.526 meters<sup>2</sup>

Solar Potential:

**147,208,194,149.484 WH/m<sup>2</sup>**

**Comments:** The Suncoast has three entire parking lots with quite a bit of solar potential. The leftmost parking lot has slightly less because of the tall parking garage right next to it and connected to the casino.



Parking Lot Area: 98,257.783 meters<sup>2</sup>

Solar Potential:

**127,183,893,927.766 WH/m<sup>2</sup>**

**Comments:** Though technically two separate properties, they are on the same parcel of land and combined, their solar potential is quite large



Parking Lot Area: 83,485.739 meters<sup>2</sup>

Solar Potential:

**108,261,996,658.5 WH/m<sup>2</sup>**

**Comments:** Stadiums always have enormous amounts of parking to accommodate the enormous numbers of people they draw. The Cashman Stadium is no exception with three enormous parking lots with very high solar potentials

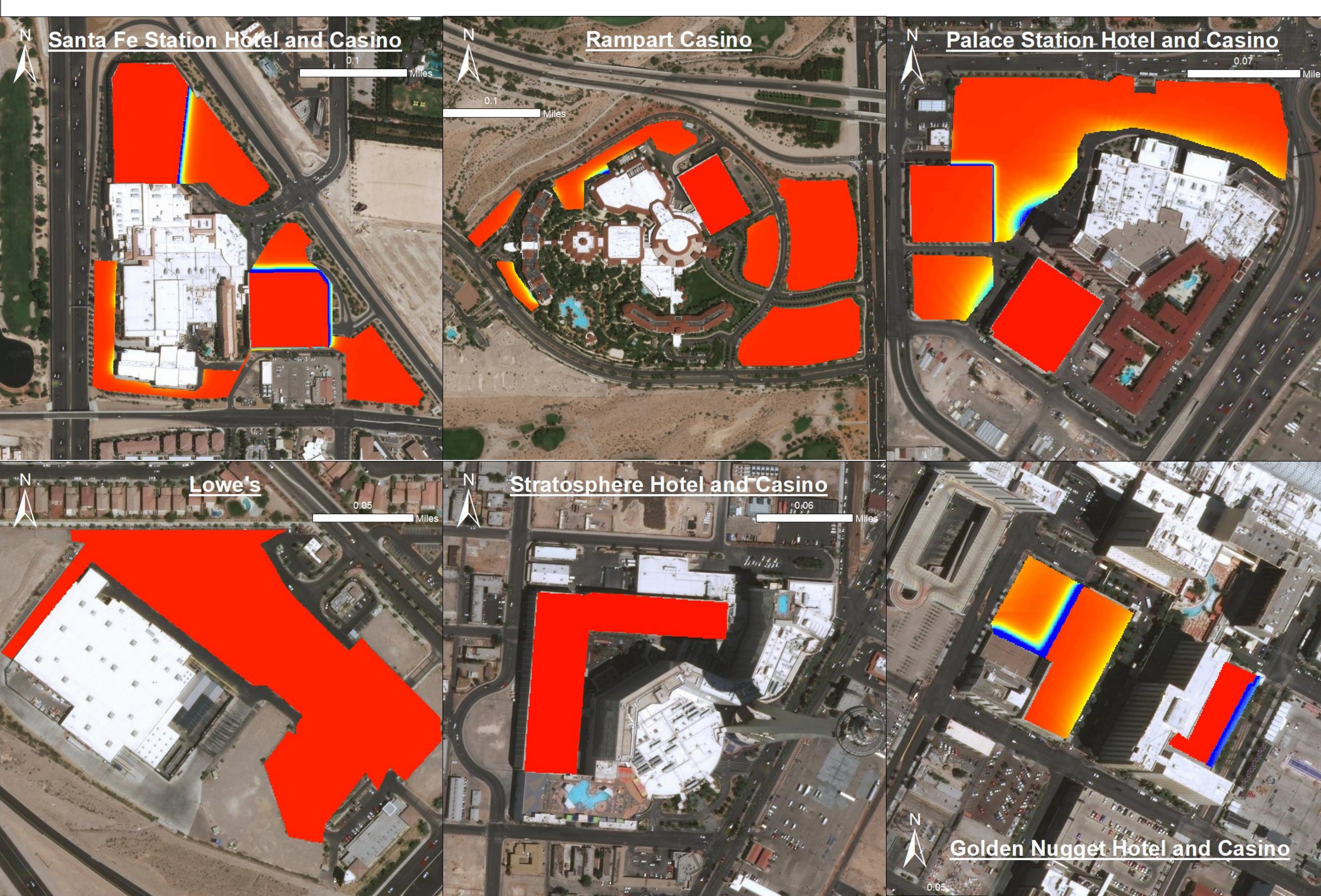
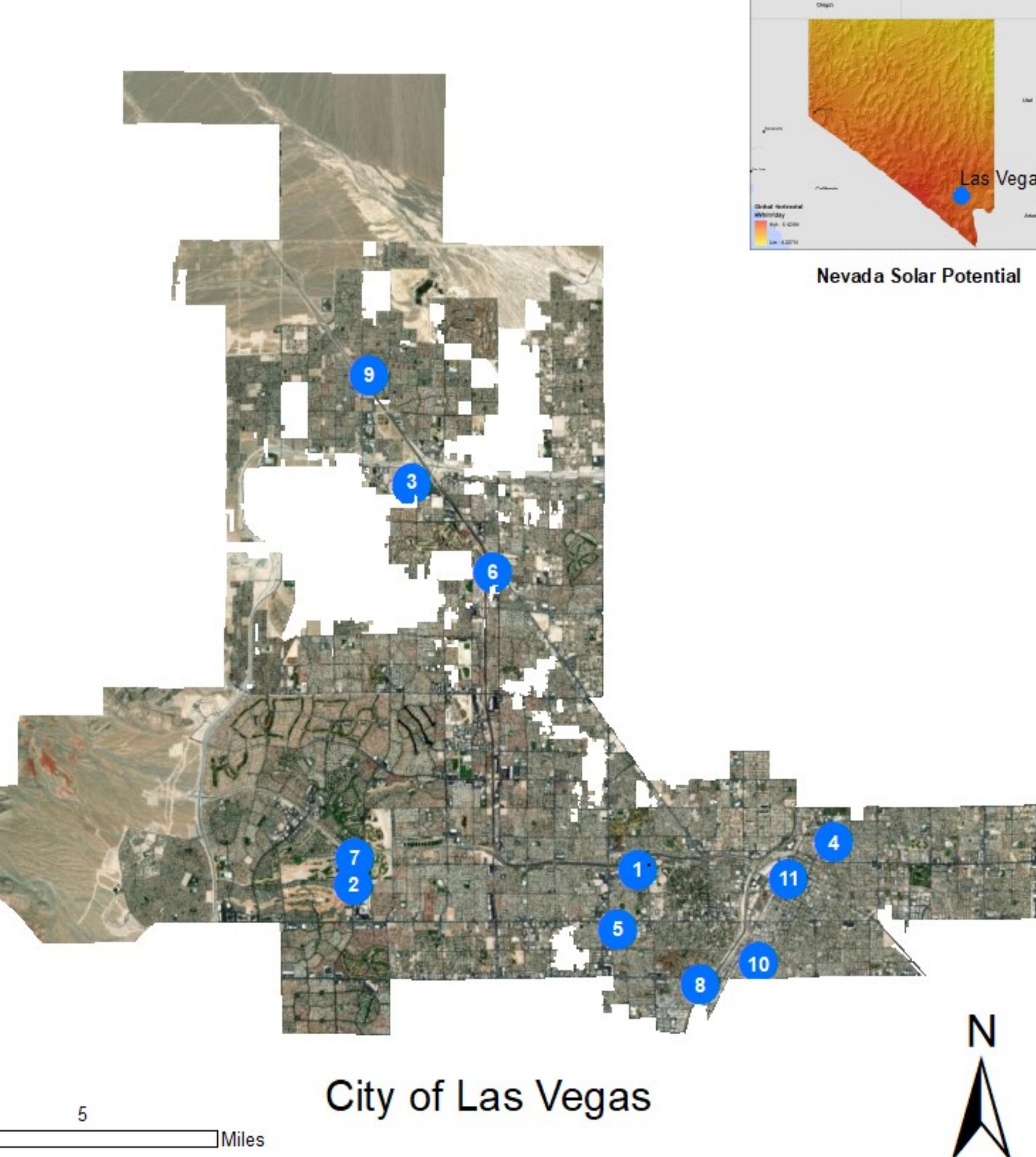


Parking Lot Area: 74,830.426 meters<sup>2</sup>

Total Solar Potential:

**96,613,765,773.922 WH/m<sup>2</sup>**

**Comments:** The second mall in my top five, the Westland Fair Mall might be an interesting solar project, as it also has multiple businesses/buildings attached to the same large parking lot. Community solar project, anyone?



The rest of the properties are quite interesting. The Santa Fe Casino has two parking garages, which is why we see slightly lower solar potential. The Rampart Casino, while an enormous property, does have quite a few trees, offsetting its input on the urban heat island effect slightly and lowering its solar potential. The Palace Station has one large skyscraper, decreasing its solar potential along with its parking garage. The oddest of the bunch, there's a Lowe's! It has no limitations to its solar potential though, and Lowe's has plenty of money to install solar panels! The Stratosphere is smaller because it's closer to the city center, and so is its parking lot. Last but not least, there's the Golden Nugget. It doesn't have as much solar potential nor area because it's in the city center with taller buildings and smaller properties.

### Abstract

When I walk around cities, I'm always amazed at how much space is wasted as parking lots. So many businesses, parks, or apartments could easily fit in the enormous plots instead. After taking so many environmental classes, I don't just see how much of a seemingly useless an ugly piece of space parking lots are, but I've learned how they contribute to the urban heat island effect, accumulate gasoline from cars that runs off into environments and waterways, and create even hotter and more dangerous environments for animals and children. That's why I see parking lots as the perfect places for solar panels.

Yes, of course, buildings could use solar panels for the heat insulation, but there are already plenty of businesses, organizations, and initiatives that do rooftop solar projects. For all of the reasons I've listed previously, though, we should be putting more emphasis on parking lots. In these series of maps, I depict eleven ideal commercial sites in Las Vegas, Nevada for parking lot solar installations. Why commercial sites? It's a fair question, since one might think that I would just go by the parcels with the largest buildings or parking lots, but I wanted to focus on commercial sites because I wanted to find sites where I knew that the owners of those buildings could afford to put in solar panels, unlike the many extremely large schools I found in Las Vegas which are not usually very well funded. I chose my parcels based on building sizes because no such data exists on the sizes of parking lots in Las Vegas, unfortunately. Why Las Vegas, though? Because that city is an environmental abomination that is severely lacking solar panels considering how sunny it is, and that is notorious for its exorbitant and completely useless energy usage through its casinos (see copious fountains, fake Eiffel Towers, lights shows, etc.).

### Methodology

First, I found the data/shapefiles of the parcels, building footprints, and building heights in all of Las Vegas and narrowed my scope to the largest eleven commercial buildings. Next, I created a shapefile for the parking lots of these buildings based on satellite imagery. I then turned the shapefiles for the parking lots and the building footprints into raster files using the Polygon to Raster tool. After that I combined the two rasters into one new raster using the Mosaic to New Raster tool based on the building heights, accounting for and including the parking garages as well as the ground-level parking lots. I then used the tool Area Solar Radiation to calculate the solar potential of the combined raster file. I used the Clip tool to only display the solar potential of the parking lots of the commercial sites. Finally, I used the Zonal Statistics as a Table tool to find the solar potential in WH/m<sup>2</sup> for each parking lot polygon.

### Results

Though I knew that casinos were quite large in Las Vegas, I was not expecting them to make up over half of my potential sites. I especially was not expecting this after I initially began my project and discovered that the legal city of Las Vegas is actually much smaller than it appears from satellite imagery. The Las Vegas metropolitan area is made up of over five different towns, and none of them are in the areas you'd expect them to be. The legal city of Las Vegas is off to the side of what visually appears to be the center of Las Vegas, with a bunch of odd cutouts and shapes sticking out of it. This brought my spirits down especially as I began searching for data online only to find that most data only covered the legal city of Las Vegas, not the entire metropolitan area. Still, after completing my analysis, I was happy to find so many casinos among my sites, because these energy-consuming behemoths were what originally inspired my project in the first place. I was not entirely surprised that two of my top five parcels with the largest amount of solar potential turned out to be malls, though, as mall parking lots are often enormous. It wasn't entirely shocking, though it was still odd to process just how much parking lot area these buildings have. They were often close to double the area of the buildings themselves—just think of all of those potential savings! It's mind-boggling to me that these buildings haven't already built solar panels, especially when one first looks at the maps. There are extremely few spots on these parking lots that do not have the absolute highest possible solar potential. Most shocking out of all of my processing, I would say, were the actual solar potential numbers. Each of my top five have several hundred BILLION Watt Hours of solar potential. That's absolutely insane! I would hope that my analysis makes its way to Las Vegas and some of these building owners so some solar panels can get involved.

### Sources/Acknowledgements

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Data Sources: ESRI (Basemap), Tufts M Drive, US Census, Las Vegas Nevada.gov, Clark County GIS Data, NREL.gov

Image Sources: Greenpower Labs, Reddit

Projection: Transverse Mercator

Coordinate System: NAD\_1983\_StatePlane\_Nevada\_East\_FIPS\_2701

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