Rooftop Solar Potential Webmap

Charlottesville, VA

Project Development Information

Charlottesville Solar: Rooftop Potential

Find my address:
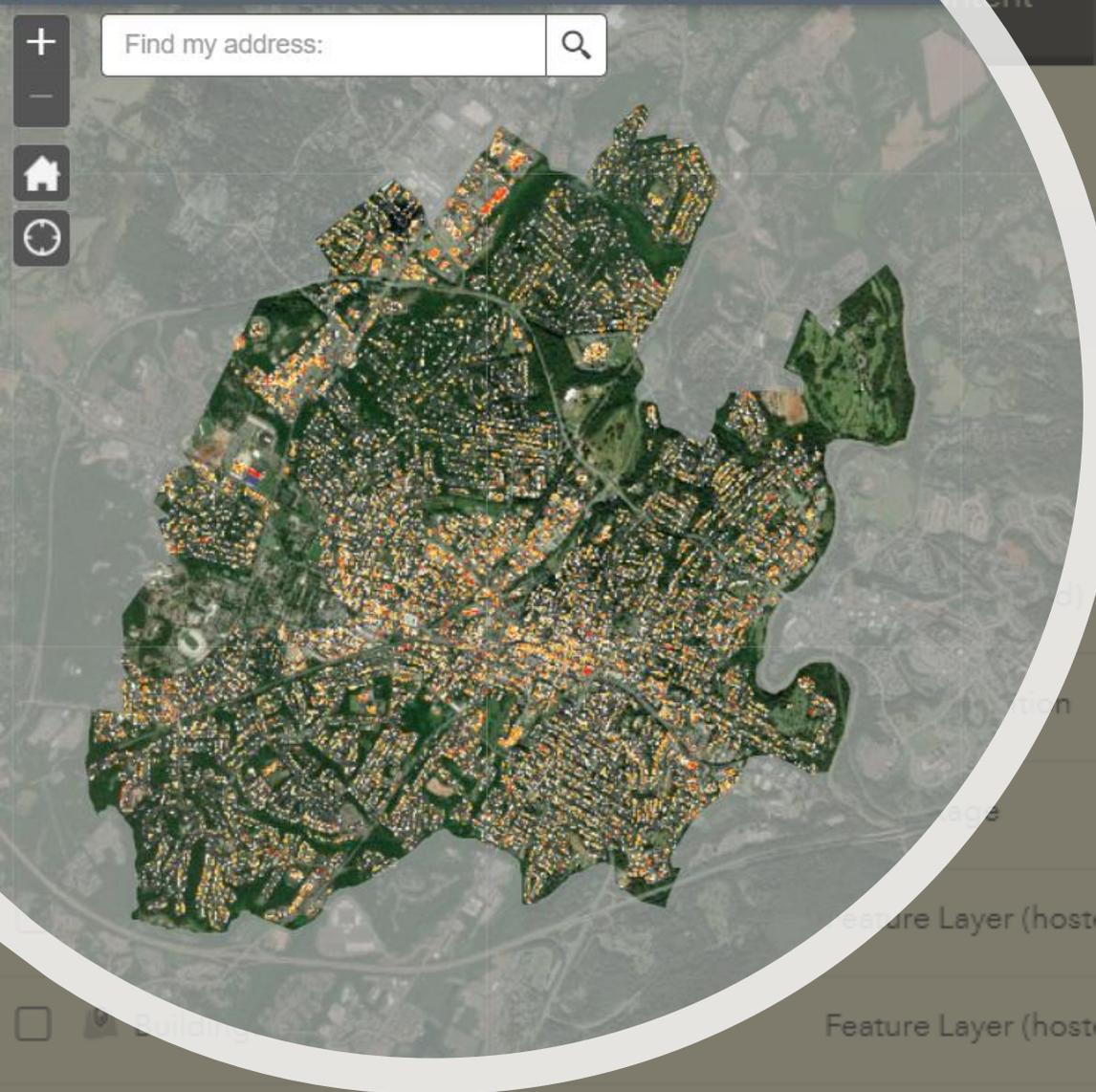
The Map

- ArcGIS Online Map

- Data Sources:
  - 3D LiDAR (2017 one-time data provided by the state)
  - Aerial Images
  - Building Footprints
  - Designated Design Control Districts/Properties

- Developed by Outside Contractor Streams Tech, Inc. mirroring solar map tool developed for the Northern Virginia Regional Commission

- Added Historic or Entrance Corridor Indicators* to note that there may be additional design requirements:
  - Architectural Design Control District Guidelines
  - Historic Conservation District Design Guidelines
  - Entrance Corridor Design Guidelines

- Updated Building Footprints to show New Developments*

*Data files current as of October 2020

Historic Property Design Protections?

If located within any of these layers:

- Architectural Design Control Districts
- Individually Protected Properties
- Conservation Districts

= Yes

Entrance Corridor Property?

If located within this layer:

- Entrance Corridor

= Yes

Data Development Notes

How is the solar PV system size calculated?

- Usable rooftops were determined by eliminating roofs having a slope greater than 50 degrees, and roof-planes facing north, north-east and north-west from the solar radiation raster

- Calculation of system size: A coefficient * (usable roof area [square feet]/average residential panel size [square feet per panel])*(kW per panel)

- To be conservative in our estimate of system size, only 75 percent of the calculated system size is retained for each usable rooftop. In other words, the value of the coefficient in the above equation is set to 0.75, which was recommended by energy experts in the region.

- Considering an average residential solar PV panel size of 17.5 square feet (3.5 ft x 5 ft) and an average panel rating of 0.3 kW (300 watts), the formula becomes:

$$\text{System Size [kW]} = 0.75 * (\text{Usable Area}/17.5)*0.3$$

Example:

For example, 608 Ridge St has a usable roof area of 362 square feet.

By applying the method above, we get:

$$0.75 * (362/17.5) * 0.3 = 4.65 \text{ kW}$$

The web map shows a 4.65 kW system.

[NOTE: This map calculations use an average ratio of kWh generation potential. A solar company would be able to provide more precise estimates.]

Other Data Development Notes

How is the Solar Radiation Raster created?

- A 1-meter resolution digital surface model (DSM) was created from the LiDAR data. The DSM was used as input for the Area Solar Radiation tool available with the ArcGIS Spatial Analyst extension, which created the solar radiation raster. The Area Solar Radiation tool employs an elaborate algorithm that calculates potential solar energy on a given surface by taking into consideration daily and annual variations of sun exposure and obstructions that would affect the amount of sunlight a surface receives.

  (See the ESRI Spring 2017 magazine article for more on the map development. The same process was used for the NVRC and Charlottesville maps.)

- These rasters essentially identify areas that get a lot of sun and areas that do not. The more red and the deeper the color of the red shown in the raster, the more solar power potential is availble.

What calculation factors were used?

- 300 watts is used for the average residential panel (reference source)
- $0.11 per kWh is used to calculate projected cost savings
- 17.5 ft panel size (based on residential 60 cell module, 3.5 ft x 5 ft panel)
- 1 kW : 1,200 kWh ratio (reference source)

Map Viewing Notes

Trees shaded this house when LiDAR data was taken.

Within a couple of years, the trees were removed. Map data reflects the conditions in the top image.

Changes in Tree Canopy and New Developments

- The data in this web map is calculated based on the 2017 LiDAR data. Any development changes – such as a new building – will not be accounted for in the map and the solar potential calculations. To update the map, new LiDAR data would be needed, and a new solar radiation raster would need to be created.

- Changes in development can also affect neighboring properties if the development alters the amount of shading on existing buildings. In the example images shown, the top image shows the site conditions and tree canopy in 2017 when the LiDAR data was recorded. Since that time, the neighboring property has been developed and the trees were removed (image on the bottom). While both aerial images can be seen in the map by zooming in/out, the data calculations are based on the conditions when the LiDAR data was collected in 2017 (the image on the top).

Charlottesville Solar: Rooftop Potential

Learn more about solar in Charlottesville: charlottesville.gov/solar

Find my address:

Search Options

Search by property address, or, click on a building to see the solar PV potential data.

New Developments

Data not available for buildings constructed since the LiDAR data was recorded.

608+ RIDGE ST

Total Roof Area (sft):	1,574
Usable Roof Area (sft):	362
Per cent Usable (%):	23
Potential System Size (kW):	5.4
Projected Annual kWh:	
Projected Annual Savings ($):	
Located in an Entrance Corridor:	
Historically Protected Property:	

Created using 2017 LiDAR data

Zoom to ...

Site Information

A pop-up table provides information for each property and a teal outline on the map indicates which buildings were assessed.

Questions?

Send a Message – Online Form

More Information: charlottesville.gov/solar
Data Access: opendata.charlottesville.org