

Introduction to GIS

ENGR 1624 – Sighting Solar Farm

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SCHOLARS' LAB

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Resources

[UVa GIS Library Guide](#) – GIS software, spatial data, consultations & learning

[UVa Enterprise ArcGIS Online](#) – spatial data, web maps, and online applications

Scenario

Locate best location for solar farms in Albemarle County. Using the County's parcel layer, identify all parcels of appropriate size (over 250 acres) and create a new dataset of those parcels. Then, determine average elevation, predominant aspect, area solar radiation for 2022 for each and distance from substations.

Process

1. Select parcels over 250 acres using [Select by Attribute](#).
2. Subset selected parcels into layer using [Export Features](#).
3. Clip elevation layer to parcels subset layer using [Extract by Mask](#).
4. Determine for each parcel distance to closest substation.
5. Run the [Area Solar Radiation](#) tool on the elevation subset.
6. Extract solar radiation, elevation and slope information for parcels using [Zonal Statistics](#).
7. Combine resultant tables into a deliverable.

Getting Started

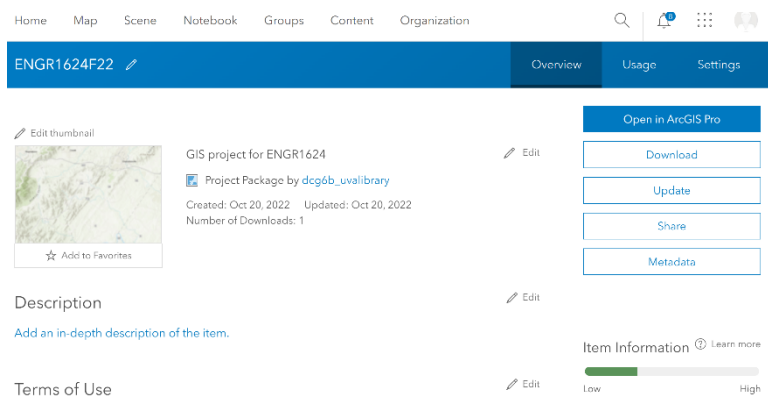
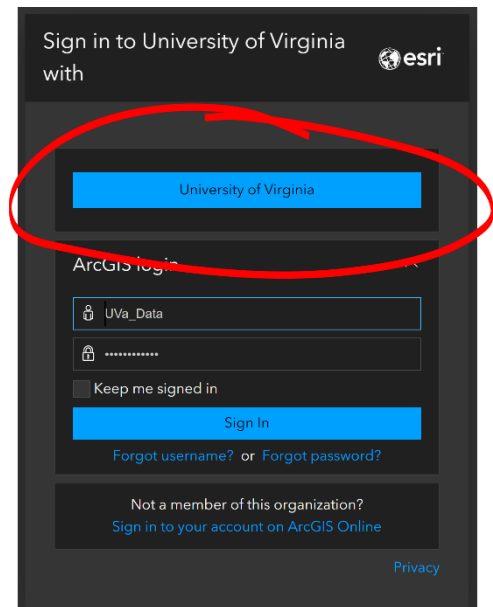
Log into ArcGIS Online by going [UVa AGOL](#) and click Sign In in the upper right corner.

Click University of Virginia on the dialog box.

Continue to authenticate through Netbadge.

If you do not currently have an ArcGIS Online account, this process will create one for you.

Once signed in, do a search for ENGR1624 and find the ArcGIS Pro project package.



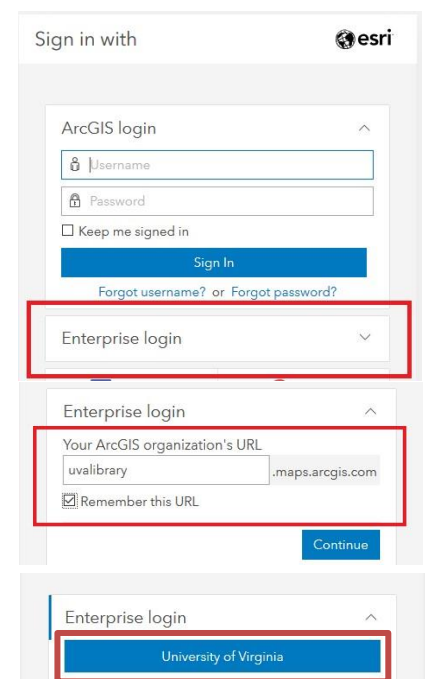
Double click downloaded package to launch ArcGIS Pro.

Login to ArcGIS Online through ArcGIS Pro.

Click **Enterprise Login**. For the organization URL, type “uvalibrary,” and click **Continue**.

Click **University of Virginia**. You will be directed to NetBadge where you will login as normal.

Licensing for ArcGIS Pro is assigned to each person through ArcGIS Online.



Subset Parcels by Size

First thing to do is to select the Albemarle parcels over 250 acres. Under the Map tab, click on Select by Attribute.

Ensure Input Rows are albParcels.

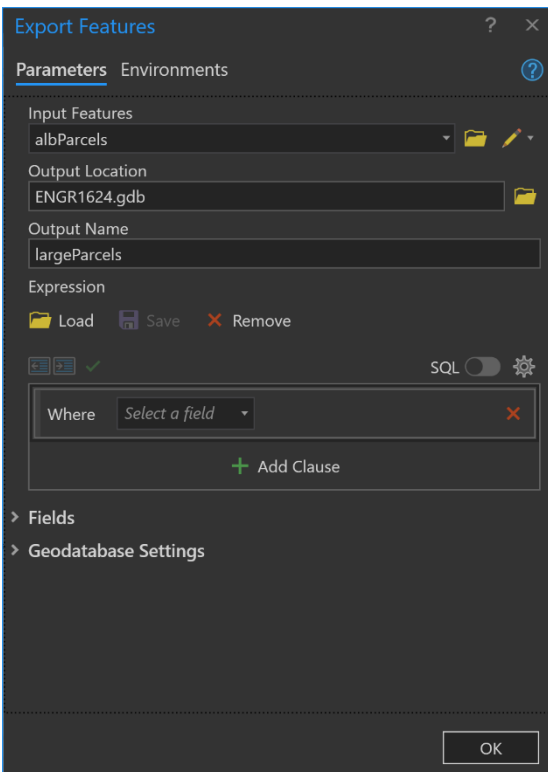
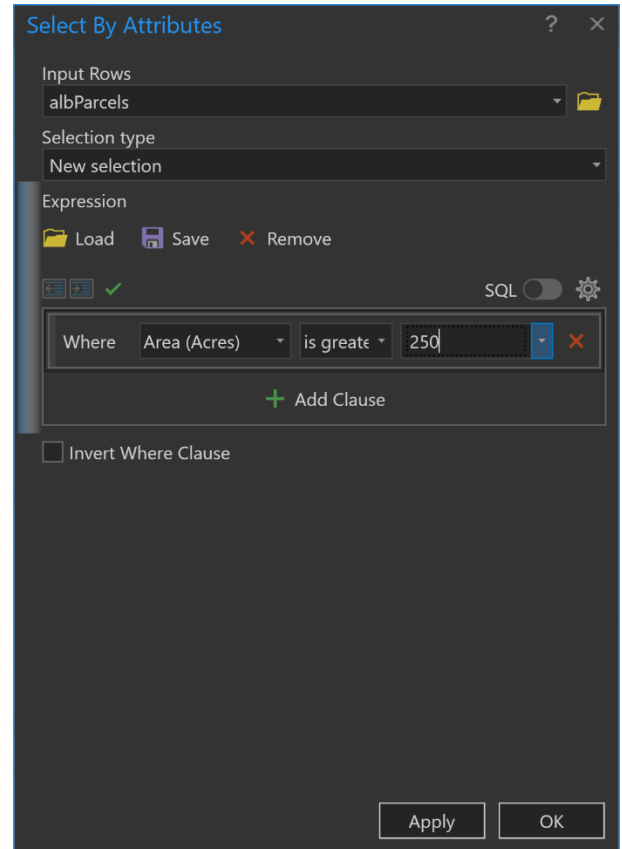
Select Area (Acres) as search attribute.

Select Is Greater Than.

Enter 250.

Hit OK.

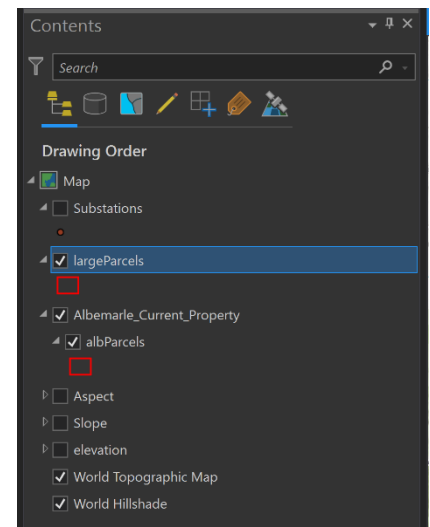
You will now see the parcels that match the query are now highlighted.



Make a new layer of the selected parcels by right clicking on the layer name in the Content pane and selecting Data > Export Features. The Output Location defaults to the project's default database. Give the new layer a meaningful name in Output Name.

Click OK.

A new layer has now been added to the Content Pane.



Calculate Distance to Nearest Substation

Go to the Geoprocessing pane.

Search for Near tool.

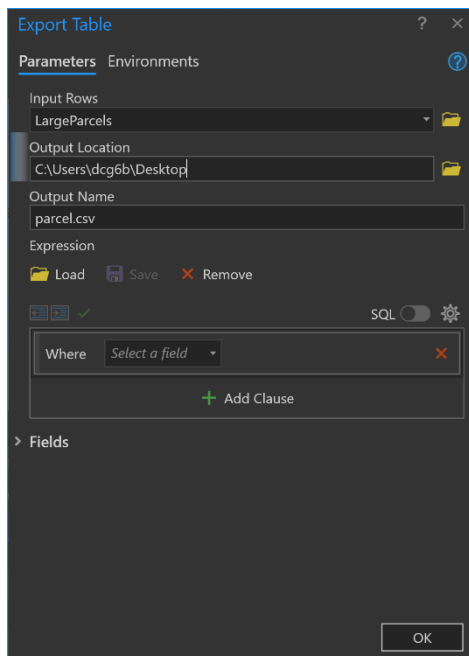
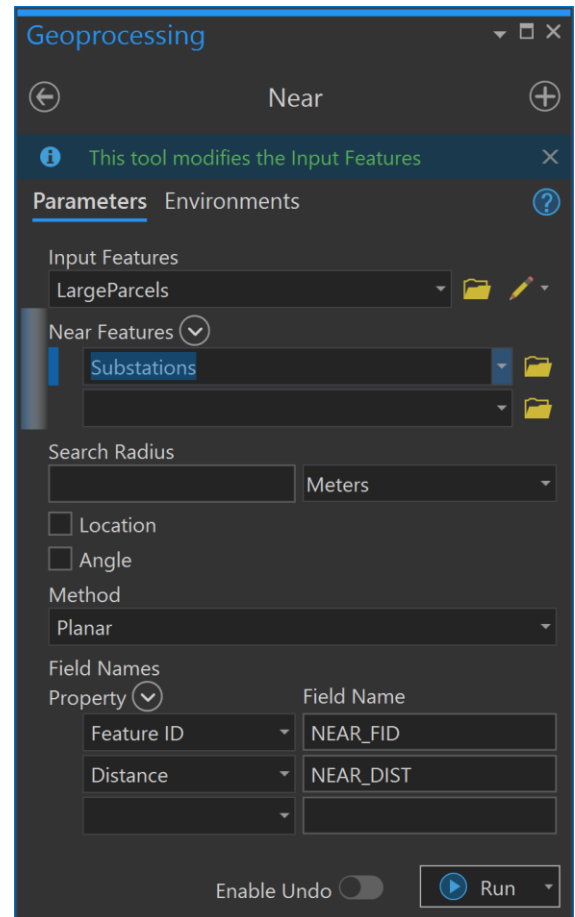
Enter target parcels layer for Input Features.

Select Substations as Near Features

Accept all other defaults

Click Run.

Review results in parcel table by right clicking on the layer in the Content pane and clicking Attribute Table.



We need the Attribute table as a standalone table.

Right click the layer in the Content pane > Data > Export Table.

Select target parcel layer as Input Rows.

Select output location (Windows directory).

Give Output Name a [name].csv.

You will see a new table at the bottom of the Content pane.

Clip Elevation Layer to Large Parcels

We only need to have solar analysis on our target parcels. Running the analysis on the entire Albemarle elevation layer would be superfluous and would take an extended time to run. Therefore, we will limit the analysis to just our parcels by extracting the elevation for the target parcels and running the solar analysis on that layer.

Use the large parcel layer as a mask to extract the underlying elevation data.

Under the Analysis tab, select Tools. This will open the Geoprocessing pane.

Search for Extract by Mask.

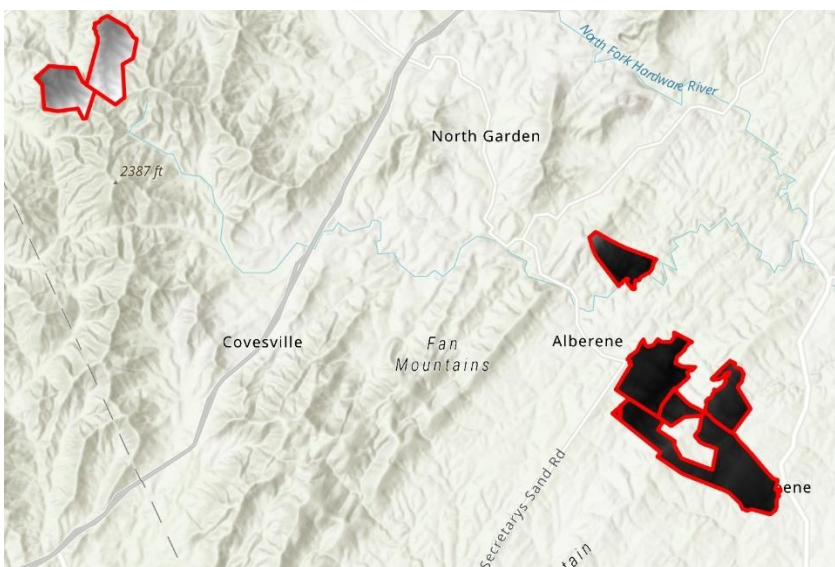
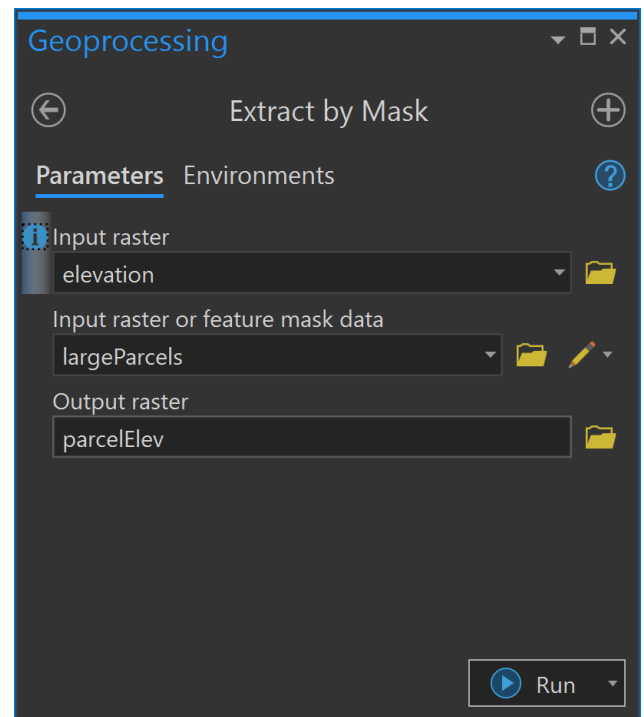
Select elevation as Input Raster

Select subsetted parcels as Feature Mask Data

Give new layer a meaningful name.

Click Run.

Notice the new elevation layer is just under our target parcels.



Run Solar Analysis

Go back to the Geoprocessing Pane and search for Area Solar Radiation.

Select parcelElev for Input Raster.

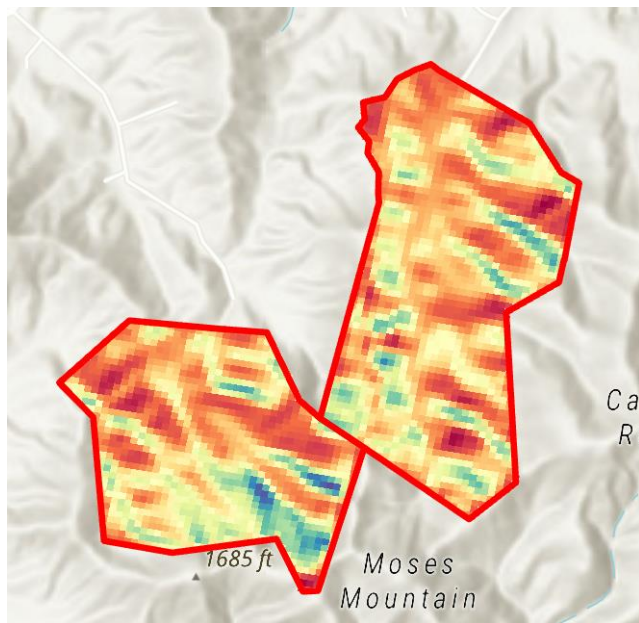
Give meaningful name for Output.

Select Whole Year for Time Configuration.

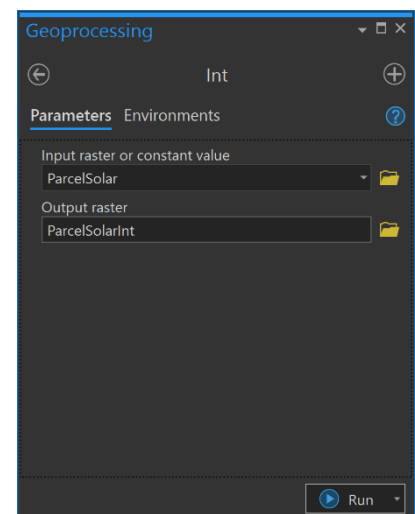
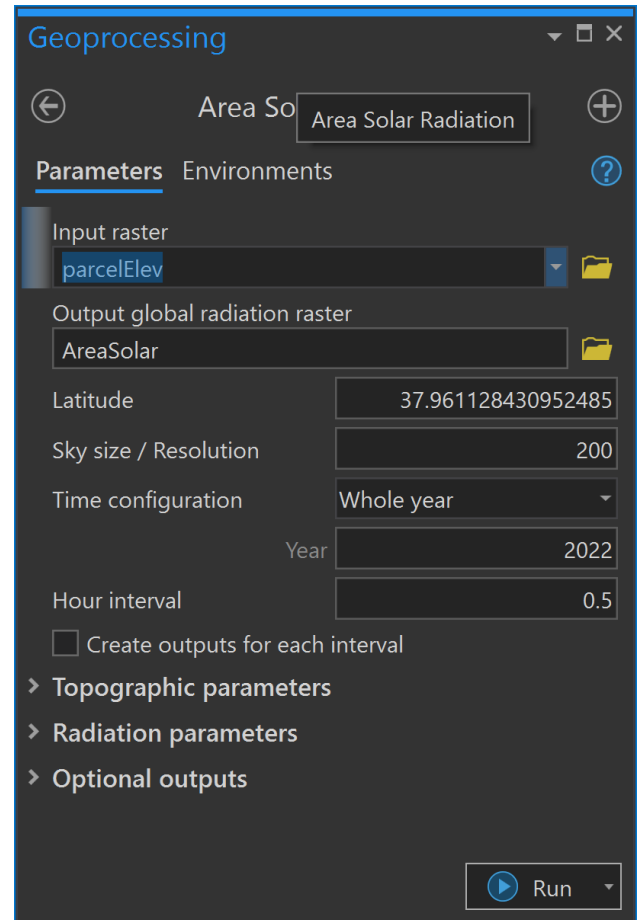
Enter 2022 for Year.

Click Run.

Review results. Do they make sense?



The output is a floating-point number. However, the next step in the analysis requires integer values for the raster. There is a geoprocessing tool that will convert the existing floating-point values to integers.



Extract Raster Surface Data to Parcels

We now have surface layers for elevation, slope, aspect & solar radiation. We need to extract the statistics for each target parcel for the underlying surface layers.

Go back to the Geoprocessing pane.

Search for Zonal Statistics as Table.

Use the target parcels layer for Feature Zone Data.

Use GPIN (parcel ID) for Zone Field.

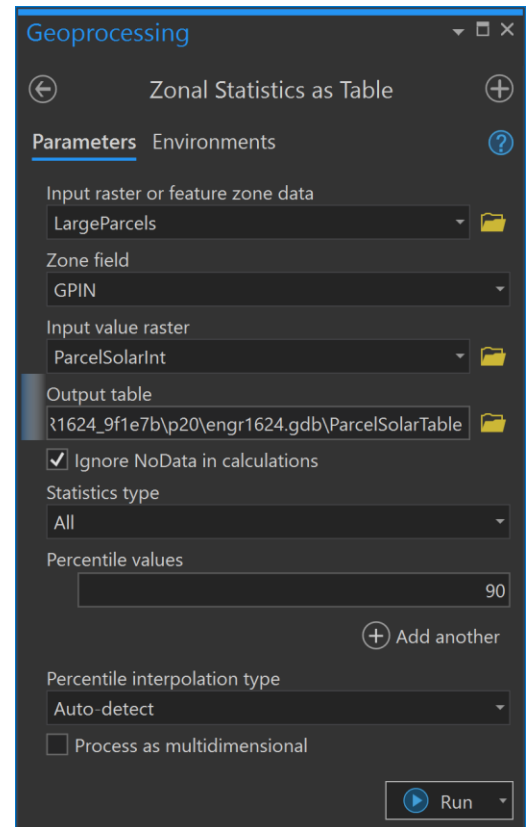
v

Give Output table meaningful name.

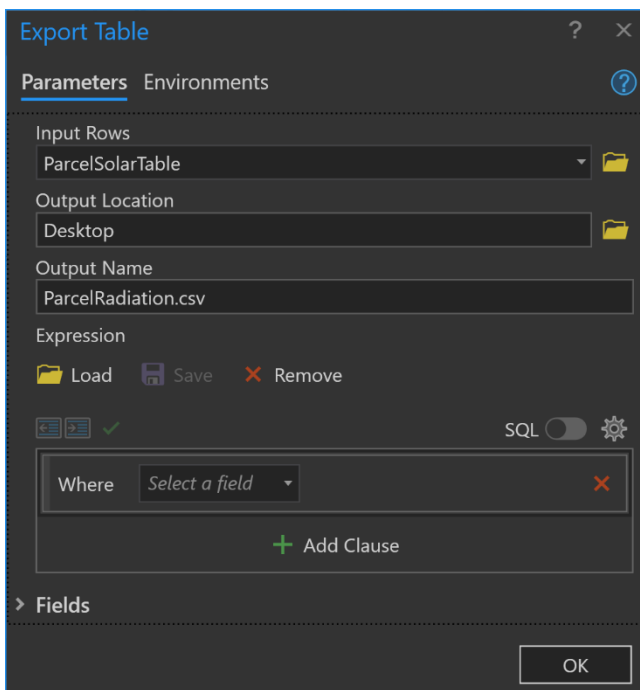
Click Run.

Review resultant table in Content pane.

Repeat for other surface layers.



Each resultant table is a native ArcGIS tabular layer and must be exported to CSV to use outside of ArcGIS Pro.



Right click on table name on Content pane > Data > Export Table.

Define Windows directory for Output Location.

Enter [meaningful name].csv for Output Name

Click Run.

Repeat for all tables.

Analysis Wrap Up

You should now have CSV tables for parcels w/ substation distance information, solar data, elevation data and slope data.

In Excel, or similar tool, combine data using the GPIN values.

Turn in combined table named for group members.