TUTORIAL 3 | PARCELS AND VISUAL ANALYSIS

Goals

- Examine Roanoke parcel layer
- Edit Attribute Table
- Style parcel data by Attribute Table property
- Collect geographic data into spreadsheet
- Import spreadsheet point data into QGIS

Introduction

In this tutorial, you'll be looking more closely at the social and built aspects of Roanoke by comparing parcel data (how lots are used and their value) with the locations of hospitals and clinics. You'll learn how to modify Attribute Tables of existing datasets, and how to create and add your own datasets. The parcel data has already been downloaded and cleaned, and you will create the hospital / clinic data yourself from Google Maps.

Where did the parcel data come from?

Often you can find a city's parcel data by searching for its GIS portal. Many cities have a dedicated GIS database, which is often freely available at least in part. You will almost always find at least a city's searchable, interactive parcel map. You may not always be able to download parcel data for free, but there are a few places you can look before you give up.

For instance, the parcel data that you'll use for this class came not from Roanoke's GIS portal, which wasn't available to download, but from Virginia's GIS portal. Virginia makes all parcel data throughout the state available to download. Of course this is a massive file, so my first steps were to crop it to show only Roanoke, and clean it up by reducing the number of data fields.

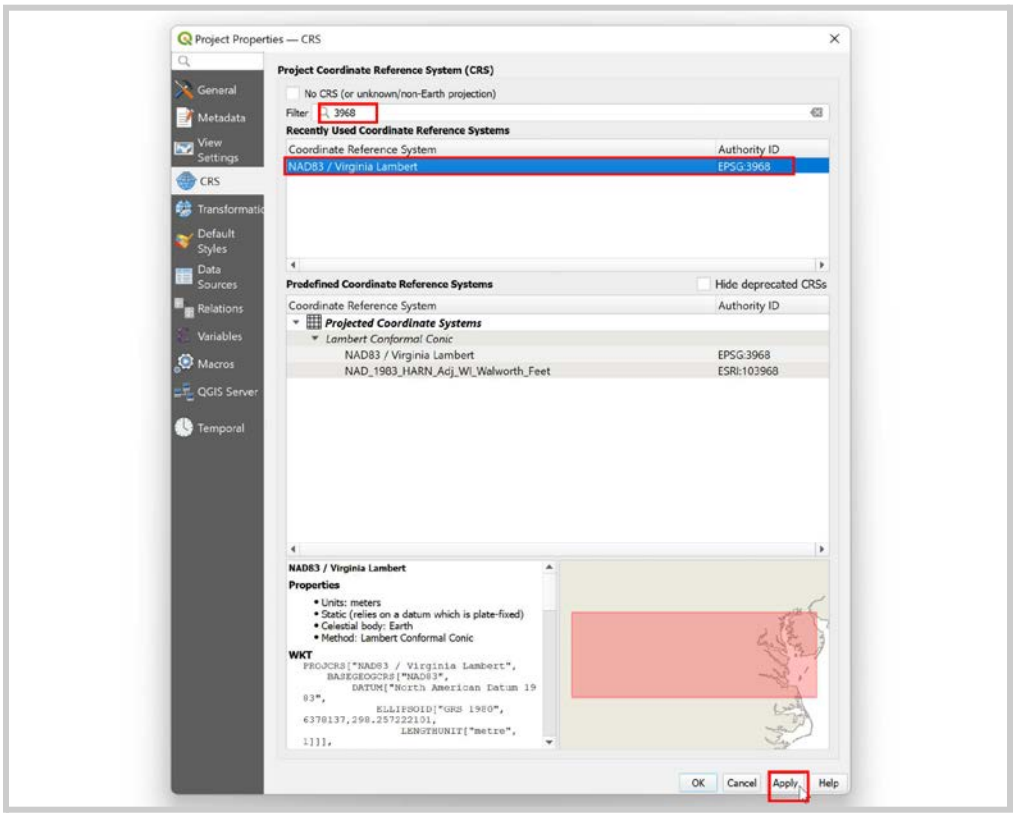
In this case, the parcel shapefile data and additional property information were separate files. This is because property information is tracked by the municipality, not the state. My second steps, then, were to download the additional interesting property information, which in Roanoke's case includes fields like landuse, zoning, property owner name, sale date, sale amount, assessed land value, assessed building value, plot size, and so on. These are some of the variables that you'll be looking at in this tutorial.

I downloaded the GIS information from:

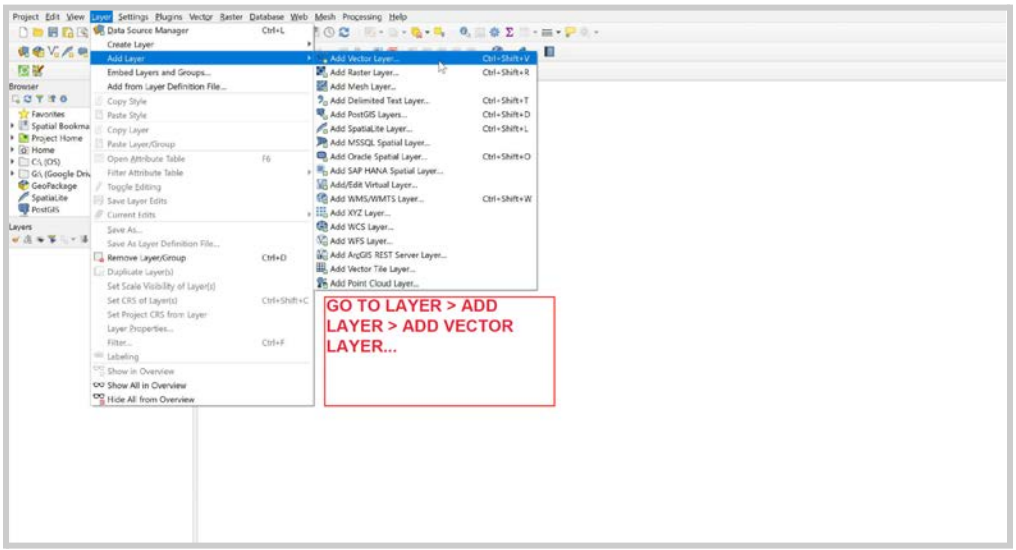
- parcel data for VA: https://vgin.vdem.virginia.gov/datasets/virginia-parcels/about
    - and additional info to be joined to parcel data: https://vgin.vdem.virginia.gov/datasets/virginia-parcels-local-schema-tables/about

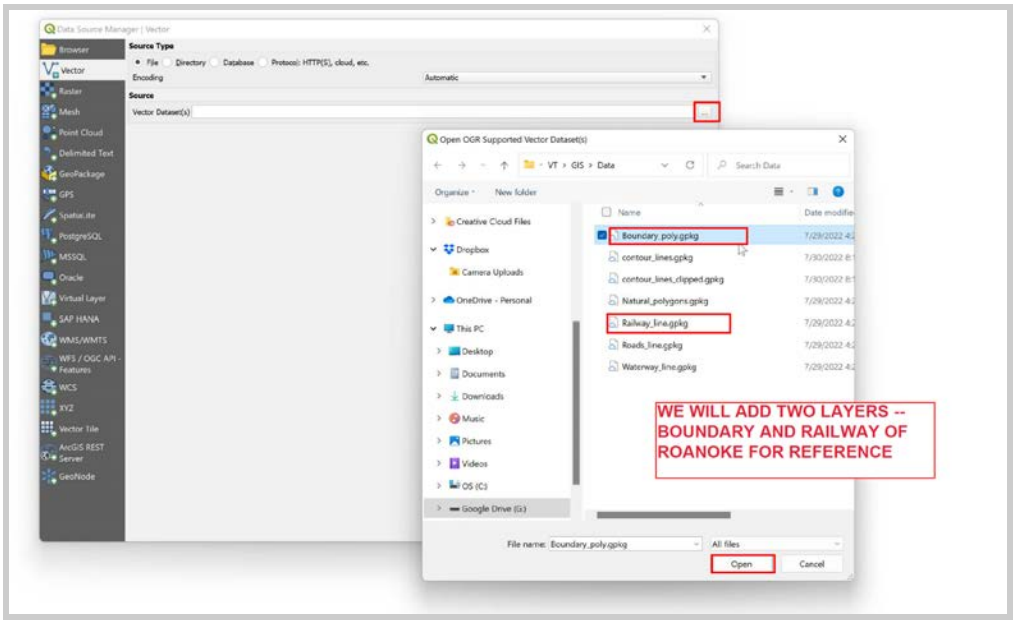
Step 1: Add parcel data to a new QGIS file.

1a First, create a new file. For this one, set your **CRS** to "**NAD83 Virginia Lambert**", which is the CRS used by the state for its parcel data (Project > Properties > CRS).



1b A few landmarks will be useful to understand the property divisions in Roanoke. Go to Layer > Add Layer > Add Vector Layer and select the city boundary and railroad layers that you saved from the Tutorial 1-2 file (which should be in your "Data" folder).




Data Source Manager | Vector
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MSSQL
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WFS / OGC API - Features
WCS
XYZ
Vector Tile
ArcGIS REST Server
GeoNode
Source Type
File
Directory
Database
Protocol: HTTP(S), cloud, etc.
Encoding
Automatic
Source
Vector Dataset(s)
Open OGR Supported Vector Dataset(s)
VT › GIS › Data
Search Data
Organize
New folder
Creative Cloud Files
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Camera Uploads
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contour_lines_clipped.gpkg
Natural_polygons.gpkg
Railway_line.gpkg
Roads_line.gpkg
Waterway_line.gpkg
WE WILL ADD TWO LAYERS -- BOUNDARY AND RAILWAY OF ROANOKE FOR REFERENCE
File name: Boundary_poly.gpkg
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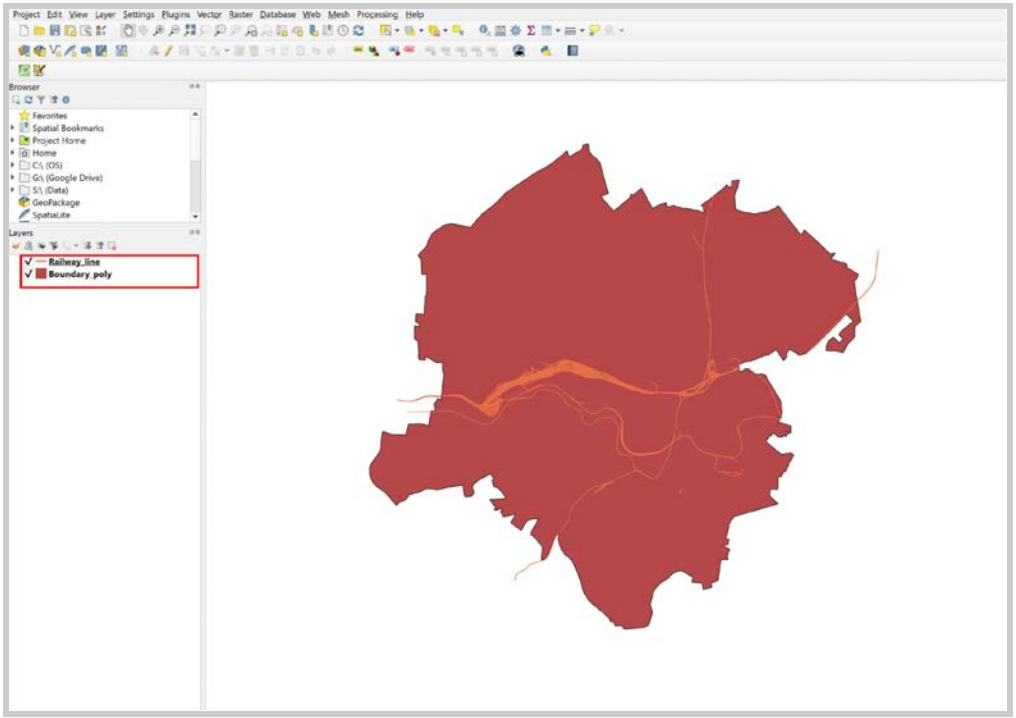
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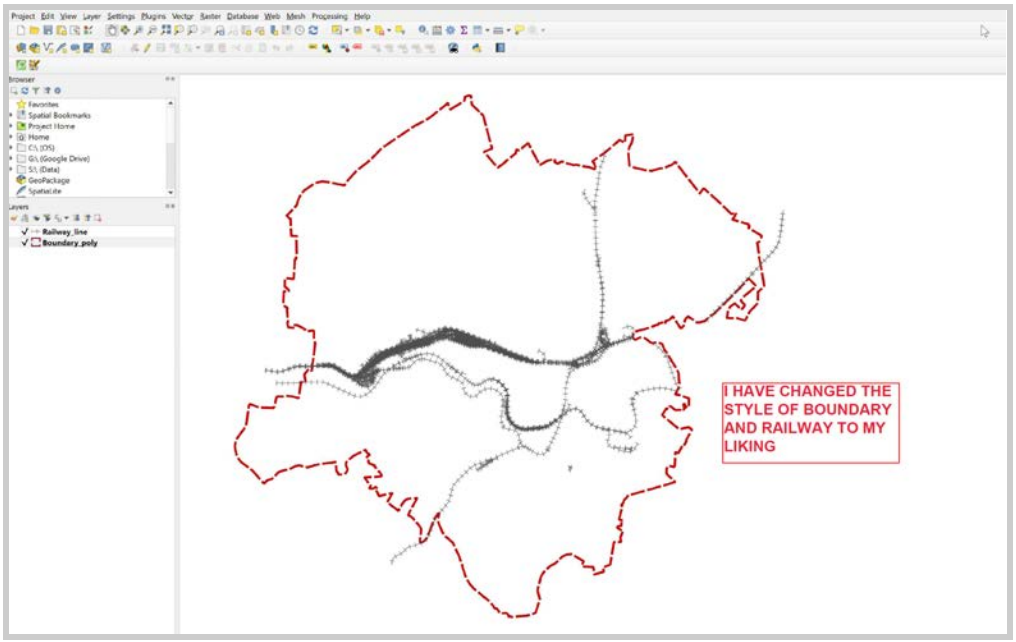
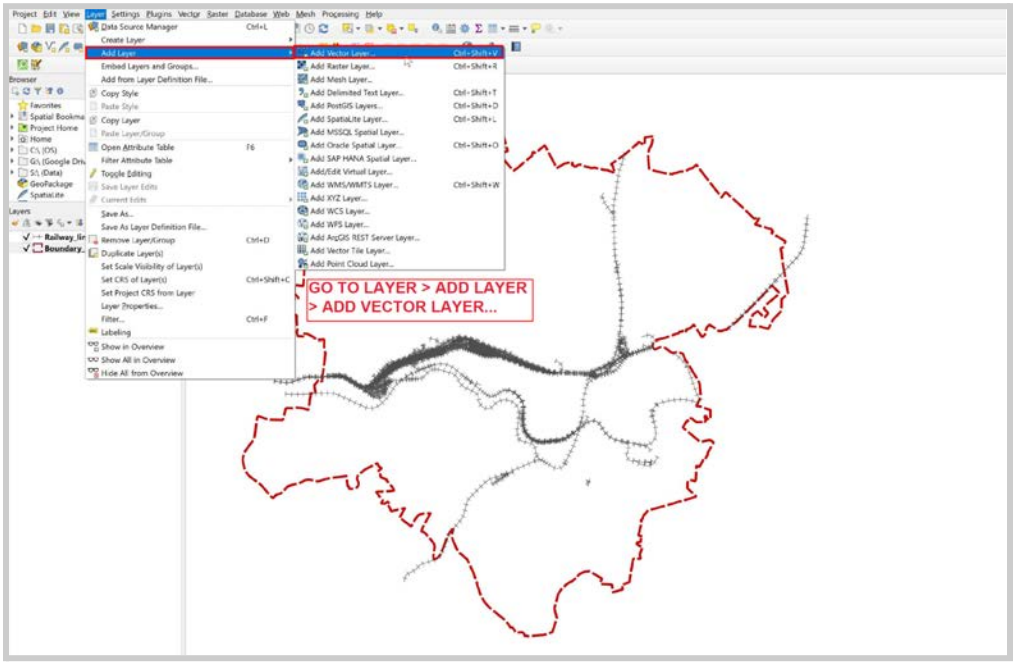
Railway_line
Boundary_poly

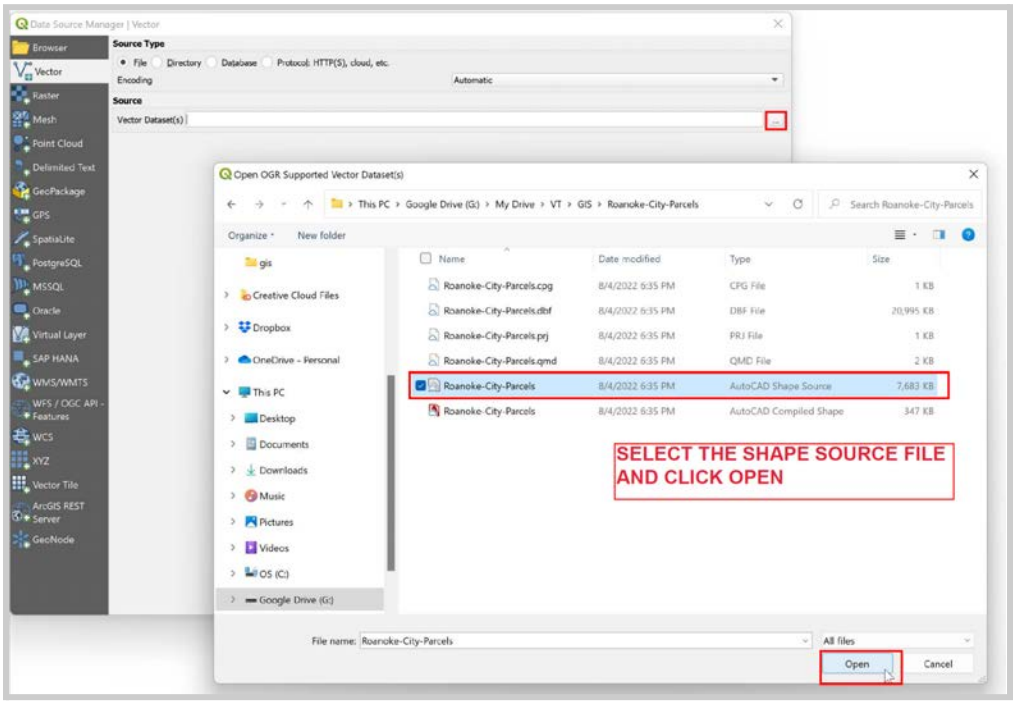


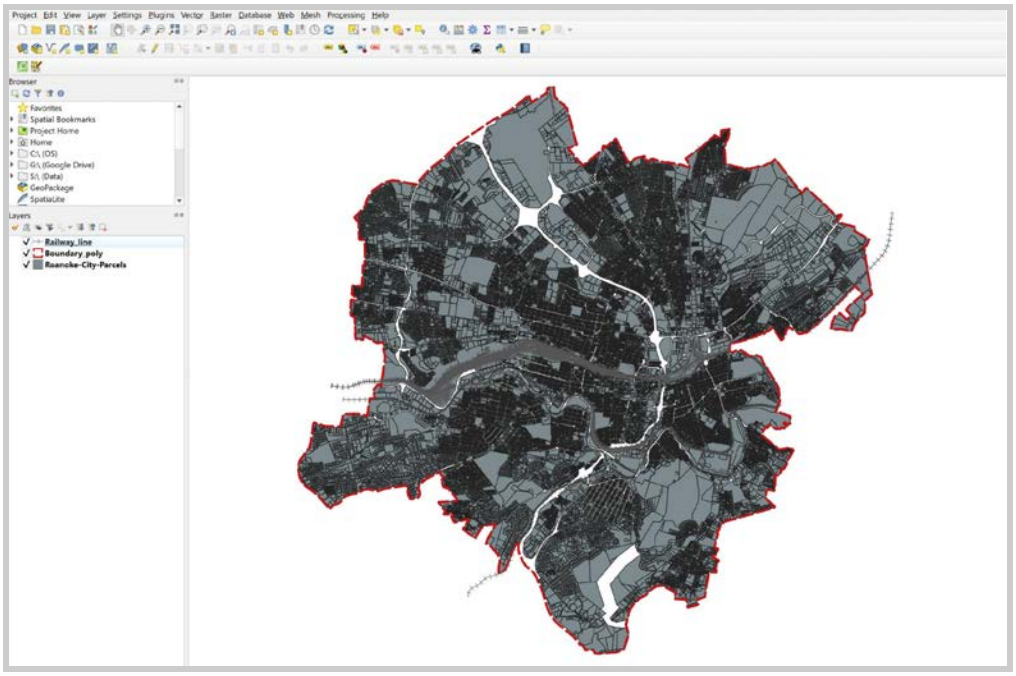
1b Download the zipped parcel data from Google Drive:
https://drive.google.com/drive/folders/1xJrziwmgYLDu2W6PQZ74tAmz5zgwRel1?usp=sharing

Unzip and move the data into your data folder. Note: keep ALL the files.

1c In QGIS, go to **Layer > Add Layer > Add Vector Layer**. Navigate to your data folder and select the parcel data. Click “Add”.





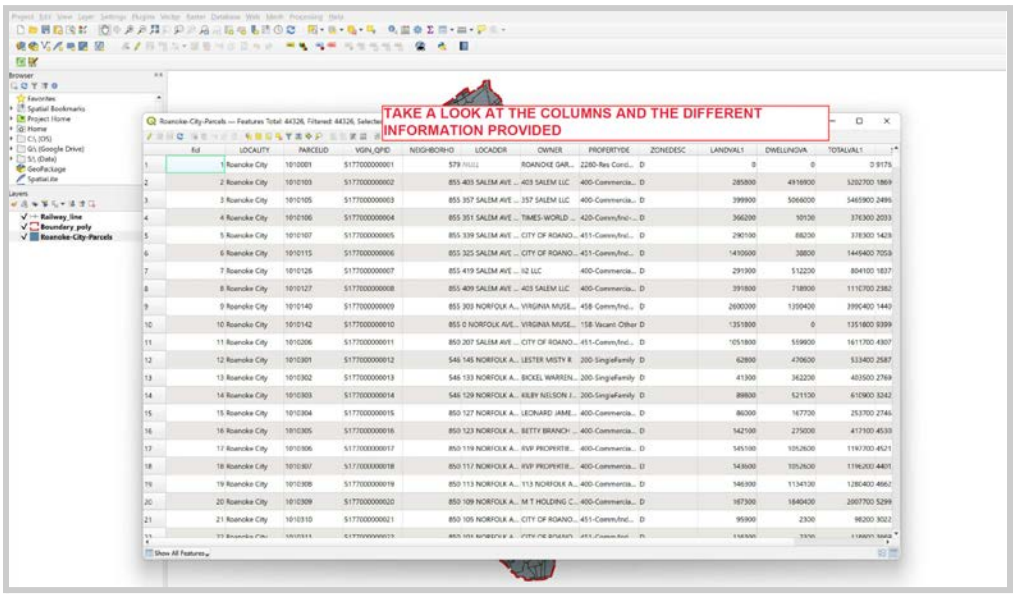


Note: Once your layers are imported, if you notice that the map looks squished, go back to **Properties > CRS** and re-set it to Lambert.

Step 2: Style parcel data by Total Value.

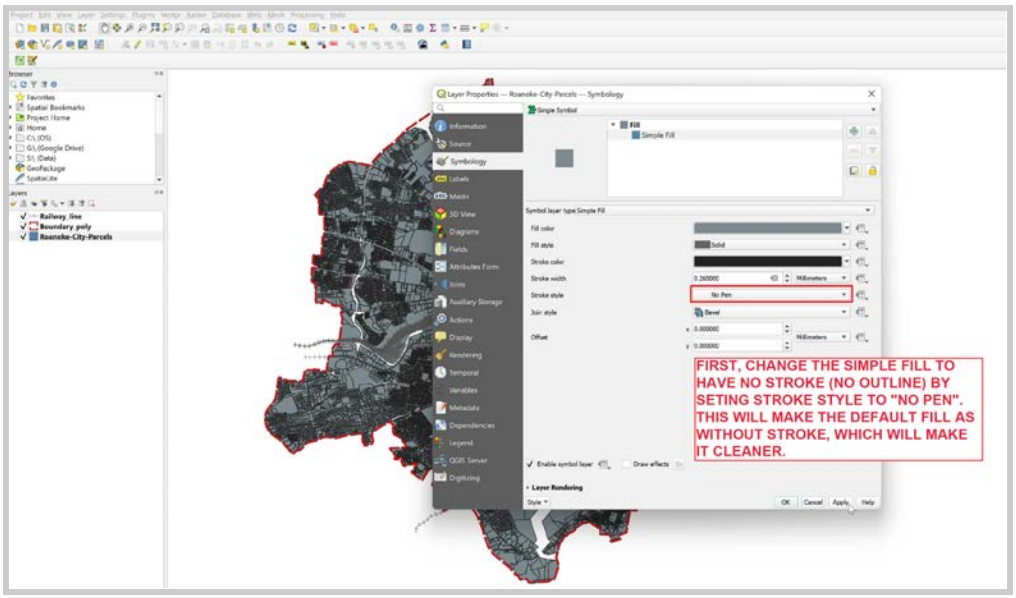
Usually when you import a shapefile, the first step will be to understand what you have to work with. In the last tutorials we looked at OSM data attribute tables to see what properties different features have. We'll do that now with the parcel data, to see what kinds of variables are available to style the data and start to look for trends.

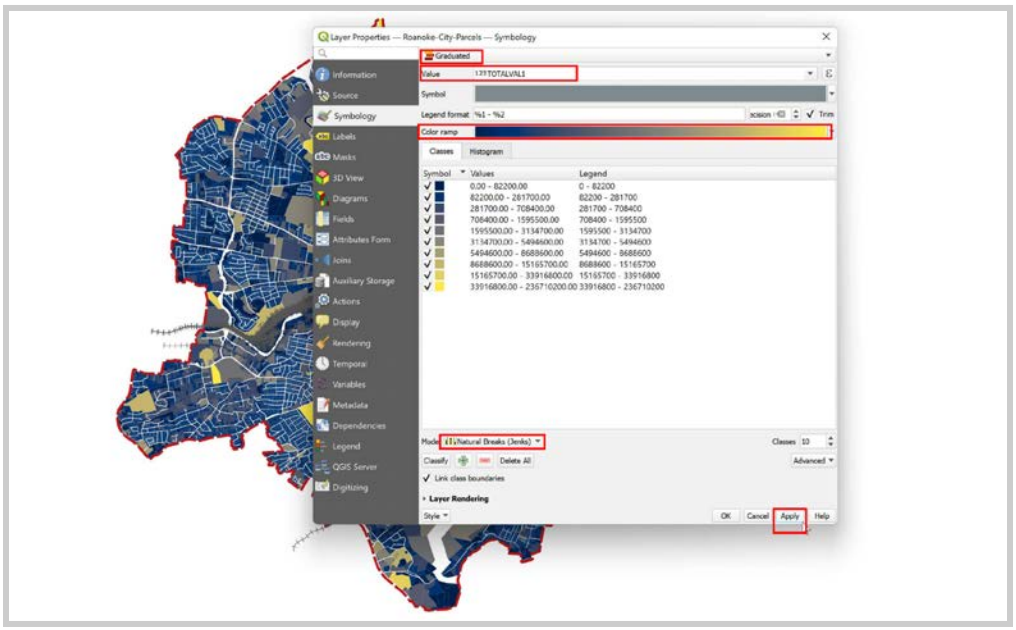
2a Open the parcel layer's **Attribute Table** (right click menu). Take a look at the many columns or information available, and notice how complete and thorough this dataset is. You'll see most cells filled in for almost every parcel. This means that you can use these attribute fields to accurately visualize patterns in the parcels. Look through the different fields and think about what they could tell you about the parcels and the city.

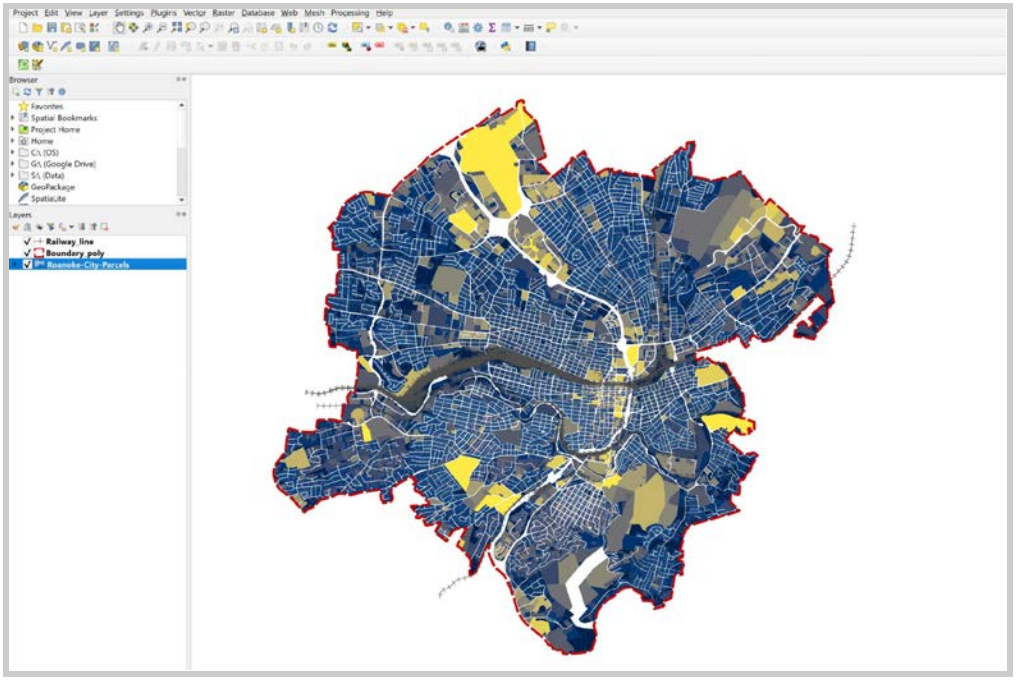


2b First, we'll look at the Assessed Value of the parcels. Double click on the parcel layer to pull up the **Symbology** window. Choose the "**Graduated**" style from the top dropdown menu, and for "**Value**" select the **TotalVal1** field (land value + property value). Choose a gradient color spectrum and make sure that "**Mode**" (bottom left) is set to "**Natural Breaks (Jenks)**". Click **"Classify**", and then "**Apply**".

> Note 1: "Natural Breaks" works well to show the range of this data, which contains a huge range unevenly distributed. Try some different Modes to see how different breakdowns of the data look.
>
> Note 2: the graduated style only works with number data, also called "int" (integer) fields. Sometimes numbers are stored as text data (also called "strings") in spreadsheets. If you don't see the field you want to use in graduated style, check that the field is an "int" and not a "string" by selecting the "Fields" tab on the left side. You'll see an "abc" beside string fields, and a "123" beside int fields. We'll talk about converting string to int fields in a later tutorial.


FIRST, CHANGE THE SIMPLE FILL TO HAVE NO STROKE (NO OUTLINE) BY SETING STROKE STYLE TO "NO PEN". THIS WILL MAKE THE DEFAULT FILL AS WITHOUT STROKE, WHICH WILL MAKE IT CLEANER.




Project Edit View Layer Settings Plugins Vector Raster Database Web Mesh Processing Help
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GeoPackage
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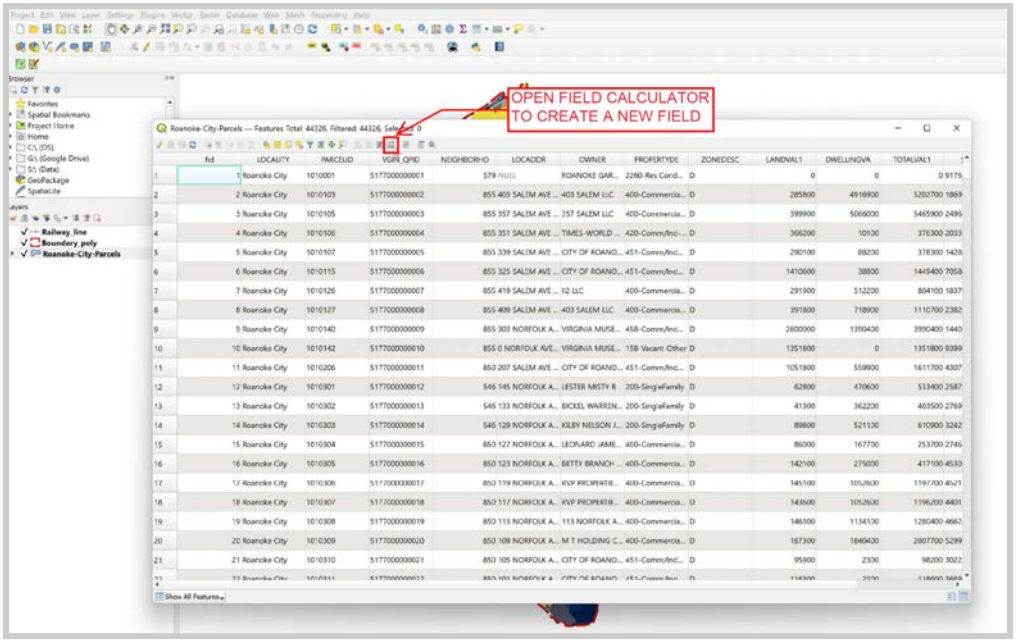
Layers
Railway_line
Boundary_poly
Roanoke-City-Parcels

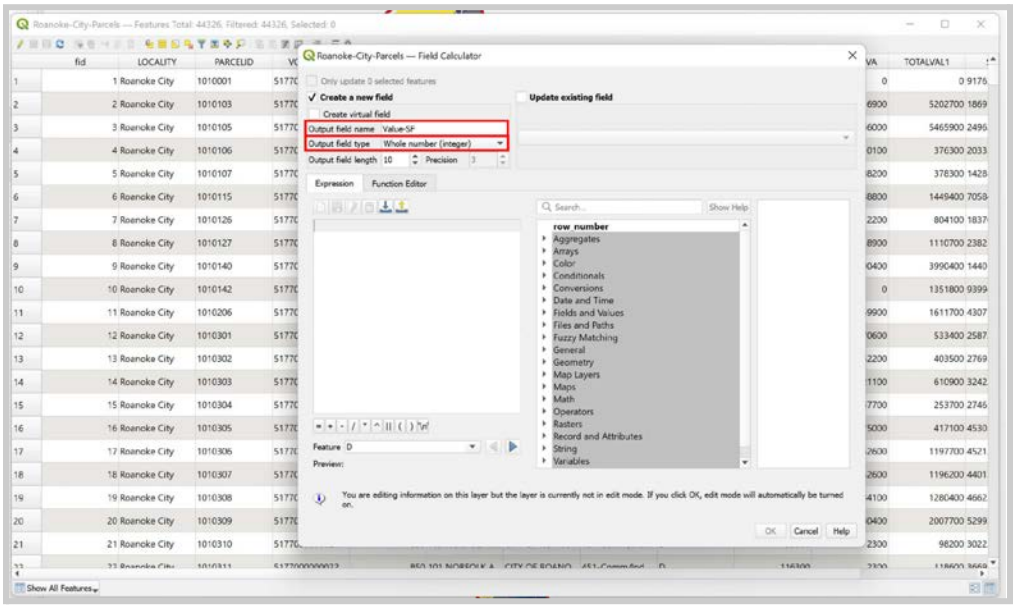
Step 3: Create a new attribute to style parcel data.

The current style shows the value of different parts of Roanoke. You can see that certain neighborhoods (especially the South-West) have generally higher property values than others (notably the North-West). However, this might be attributable to a difference in parcel size. If parcels in the North-West are generally smaller than those in the South-West, that might explain the difference in value. However, because we have the square footage of each parcel, we can find the value per SF to more accurately compare them. To do this, we'll need to create a new field.

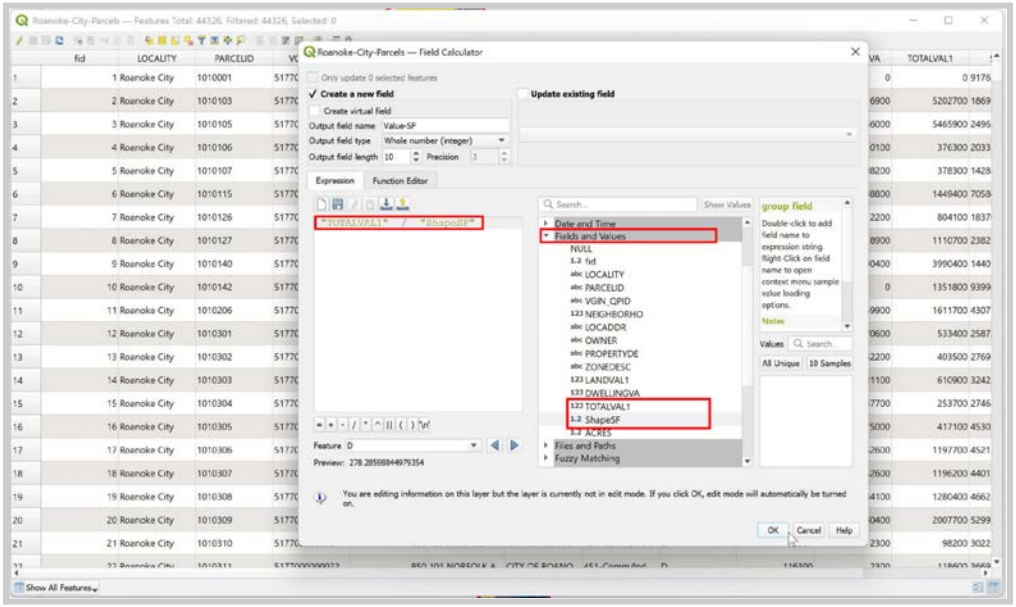
3a Open the **Attribute Table** again. Since we're creating a new field based on two existing fields (Total Value and Acreage), we'll use the **Field Calculator.** Click the abacus symbol on the upper toolbar, fourth from the right.



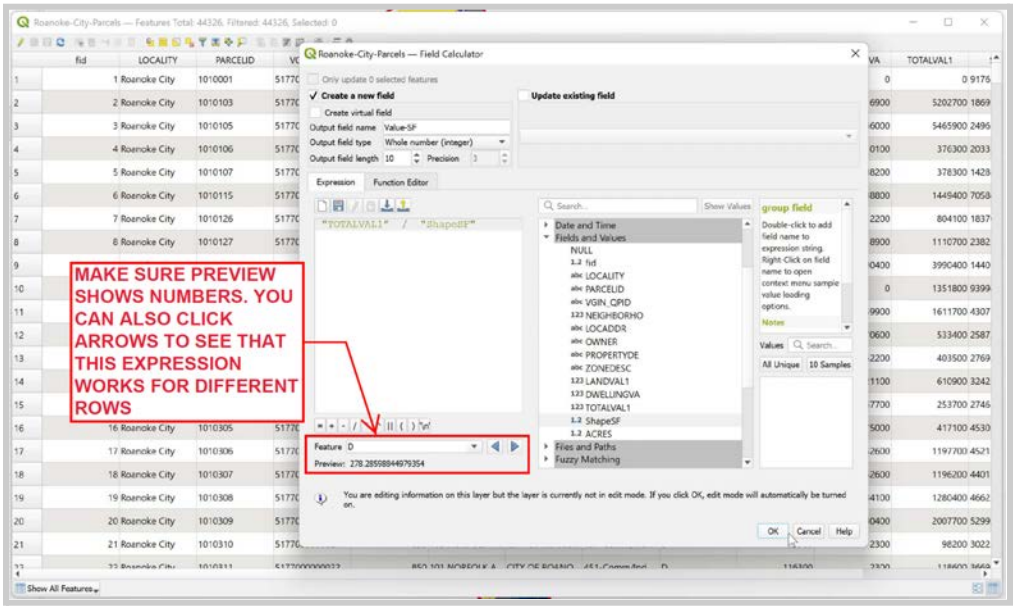
3b Make sure that “**Create a New Field**” is checked. In “**Output Field Name**”, write “Value-SF”. Output Field type should be “Whole number (integer)”.



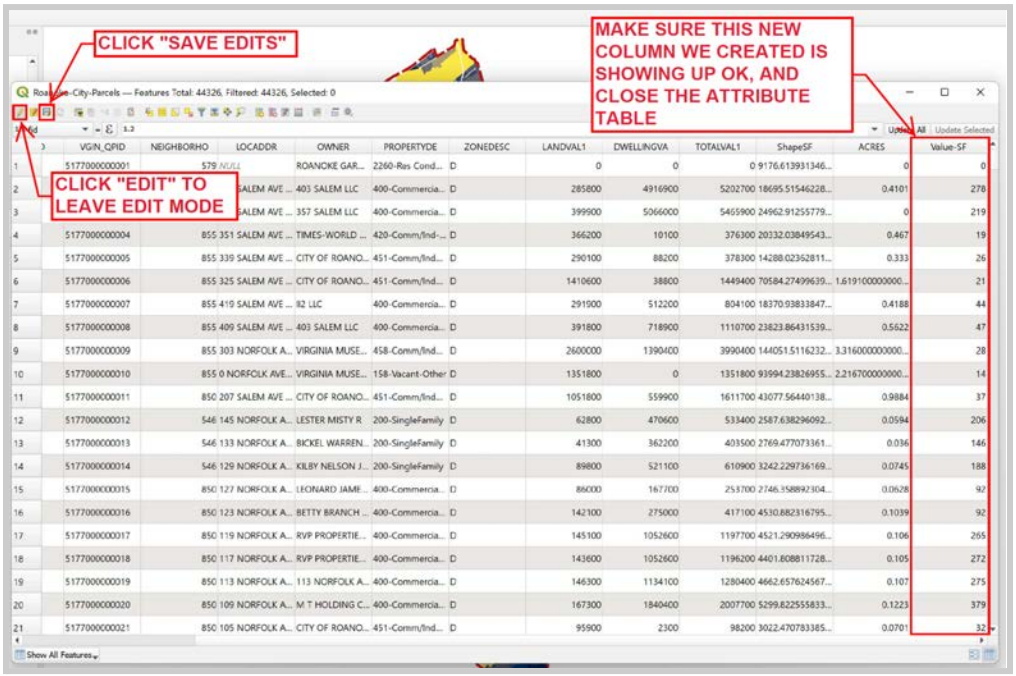
3c You’ll build the expression for the new field in the empty space under “Expression”. The simplest way to do this is by double clicking on fields and symbols from the right-side window, which contains a series of expandable menus. First, click on “**Fields and Values**” to see the exact names of each field in the parcel Attribute Table. Since we want to get the cost per acre, we’ll divide Total Value by Square Footage. Double click on “TOTALVAL1”, then type a “/” division symbol, and then double click on “Shape-SQFT”.



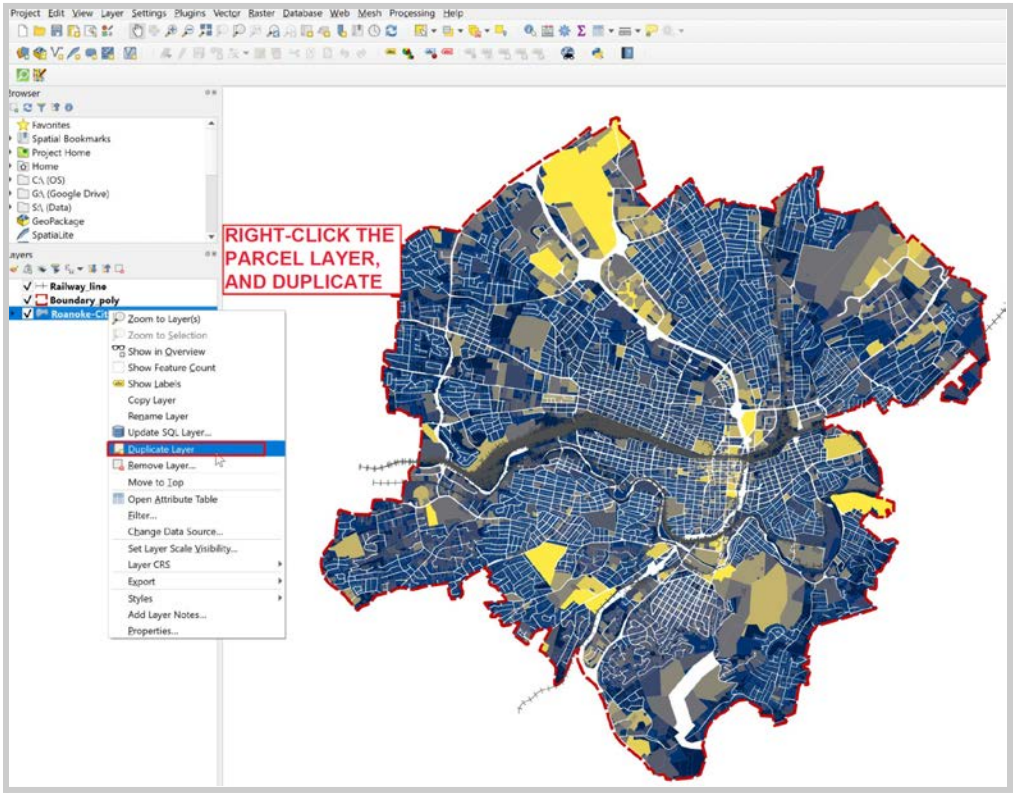
3d Before you click “OK”, check to make sure the “**Preview**” in the bottom left does not say “Expression is invalid”. It’s alright if it says “Null”. It’s always a good idea to check the Preview before finishing an expression. If that looks good, click “Ok” to create the new field. **This may take a while**. Don’t close the Attribute Field before completing the next step.

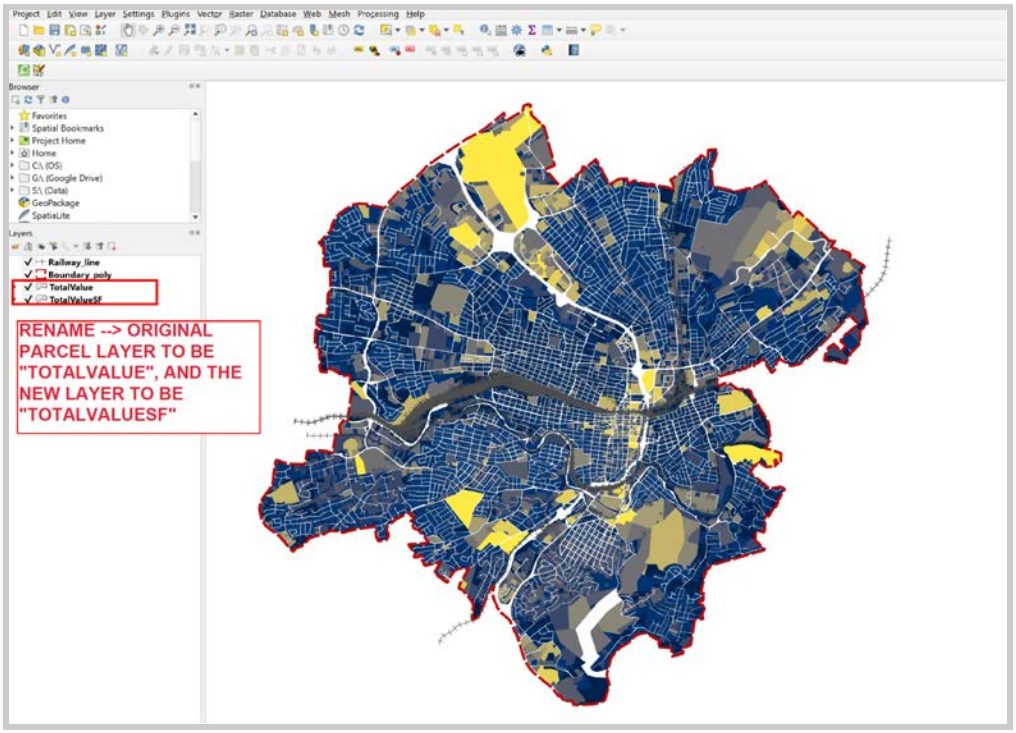


3e Before styling the data by the new field, check that the new field looks right in the Attribute Table. Open the parcel layer’s Attribute Table, scroll over to the “Value-SF” field, and make sure that you see values. If the expression failed, you will see only *null* in the cells. If the field looks correct, click “**Save Edits**” (upper toolbar, near the left; this may also take a long time), and then click the “**Edit**” pencil symbol on the far left to *leave* edit mode. You can then close the attribute table.

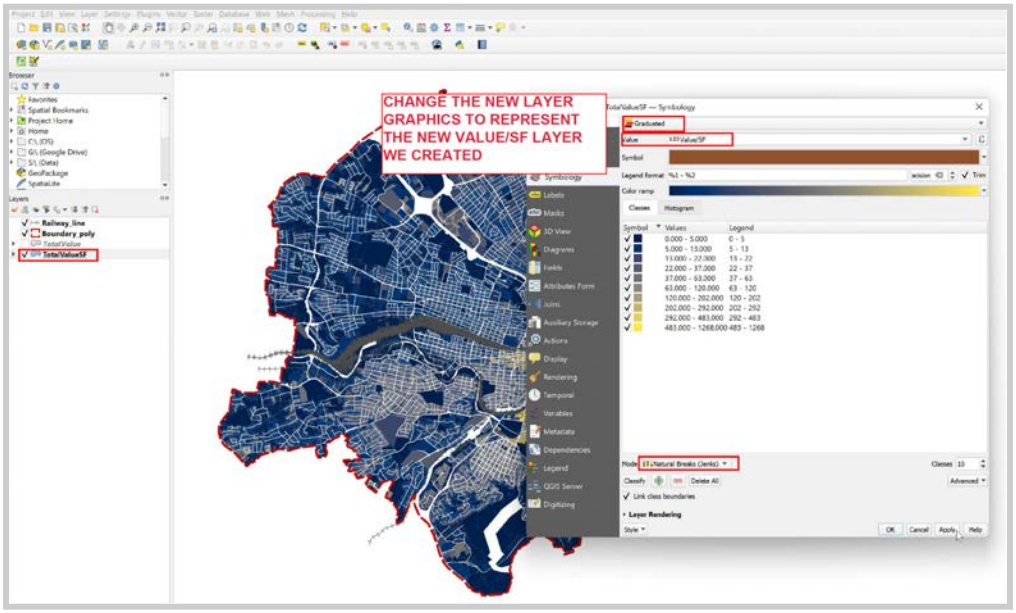


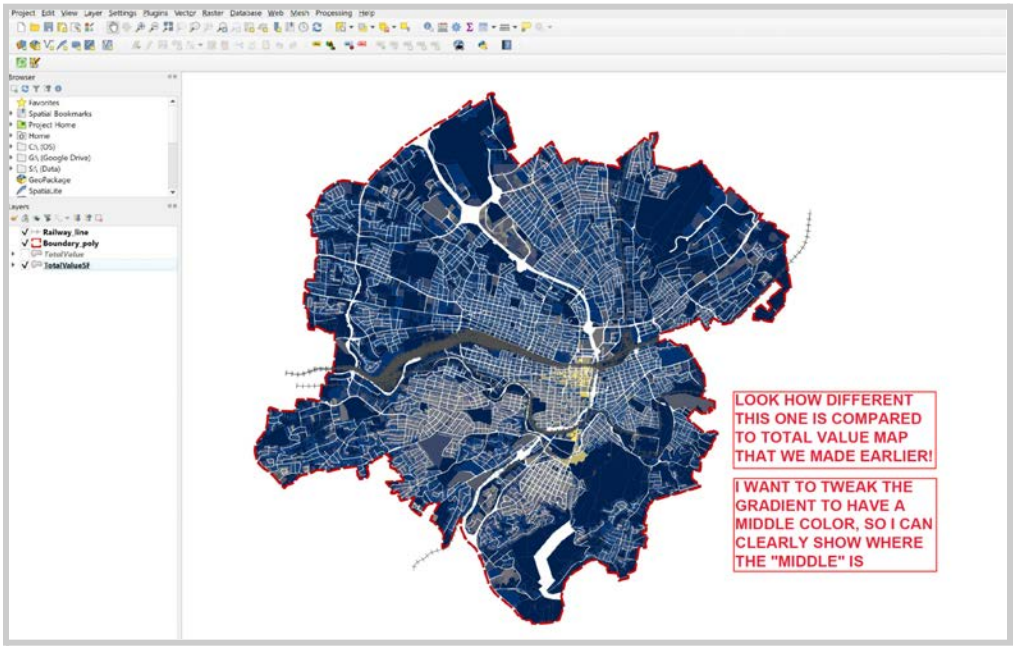
3f For the final map, you will show both the “Total Value” map and the “Total Value per SF” map. The easiest way to do this is to copy the parcel layer and style the two separately. Right click on the Parcel layer and click “**Duplicate Layer**”. **Rename** the original layer (right click > “Rename”) to “TotalValue”, and the new layer to “TotalValueSF”.

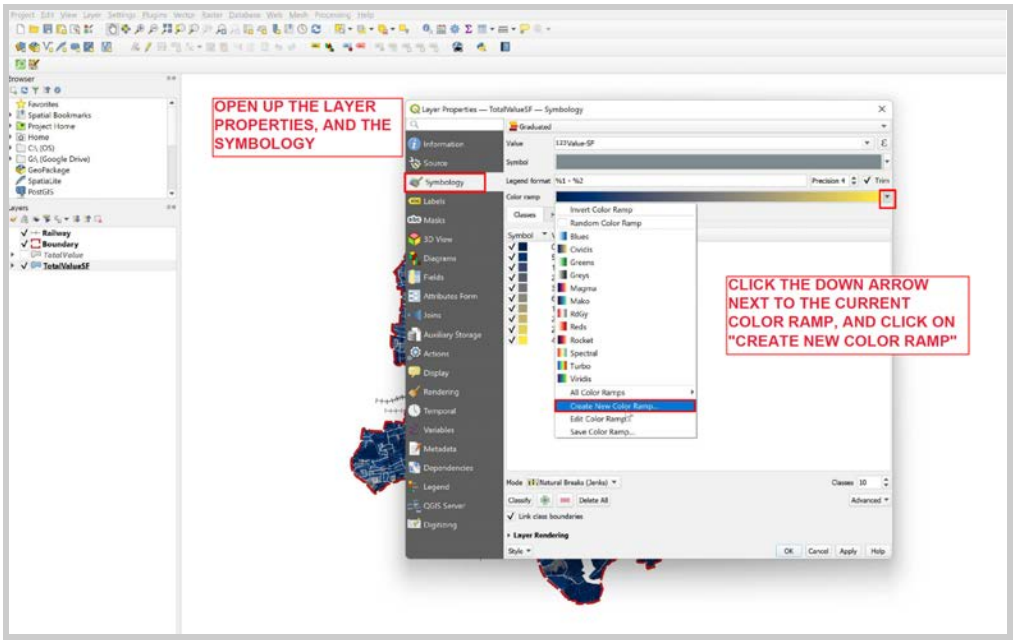


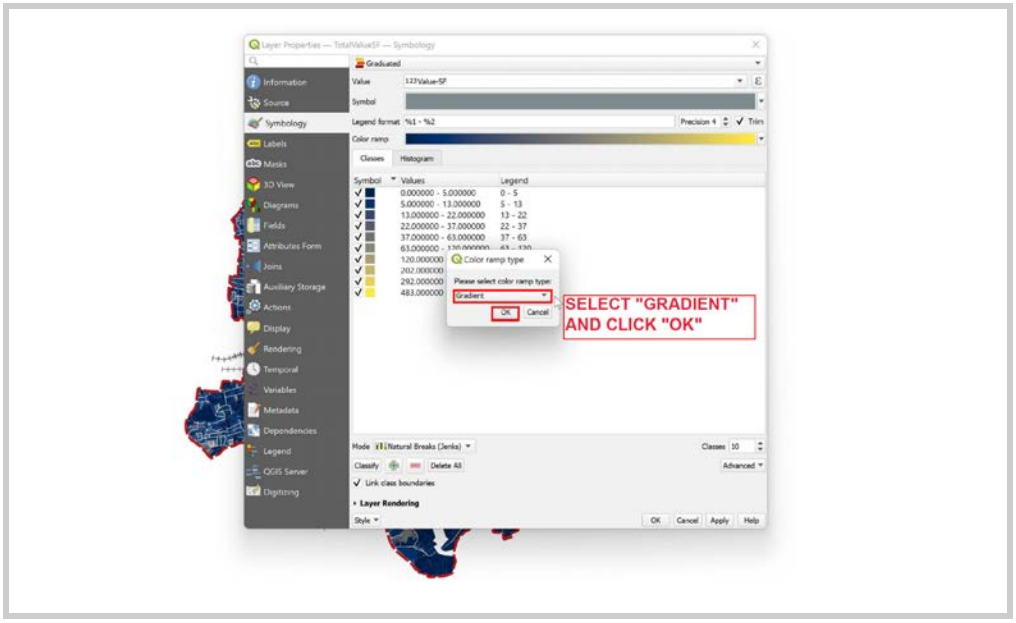


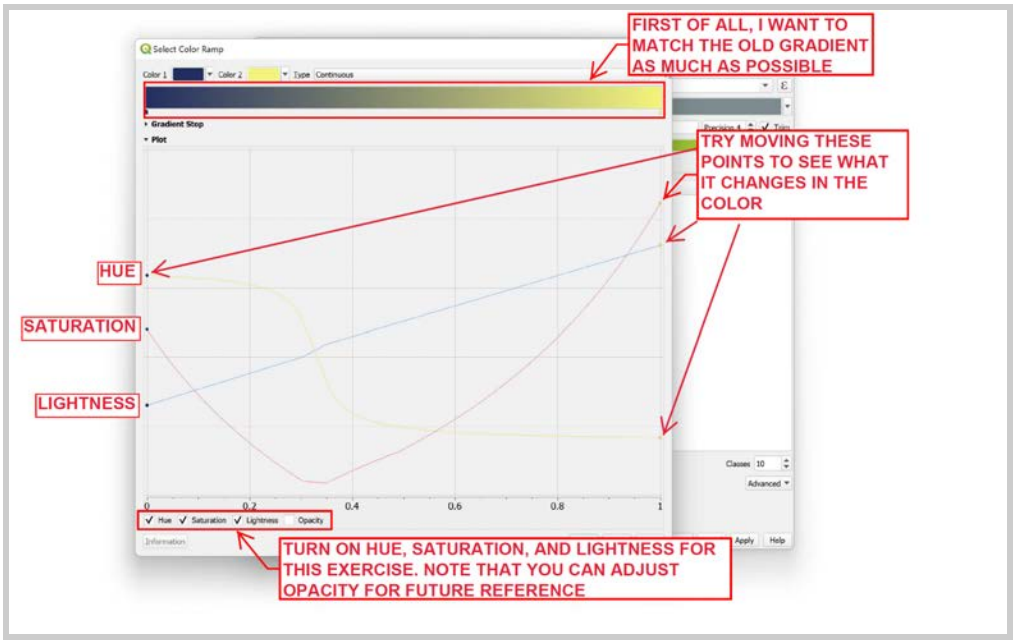
3g In the “TotalValueSF” layer, go to the **Symbology** tab and color the parcels by the new Value-SF field (**Graduated, Natural Breaks**). Notice that the difference between the city’s north-west and south-west quadrants persists. This indicates that the difference in value relates to neighborhoods more than parcel size.



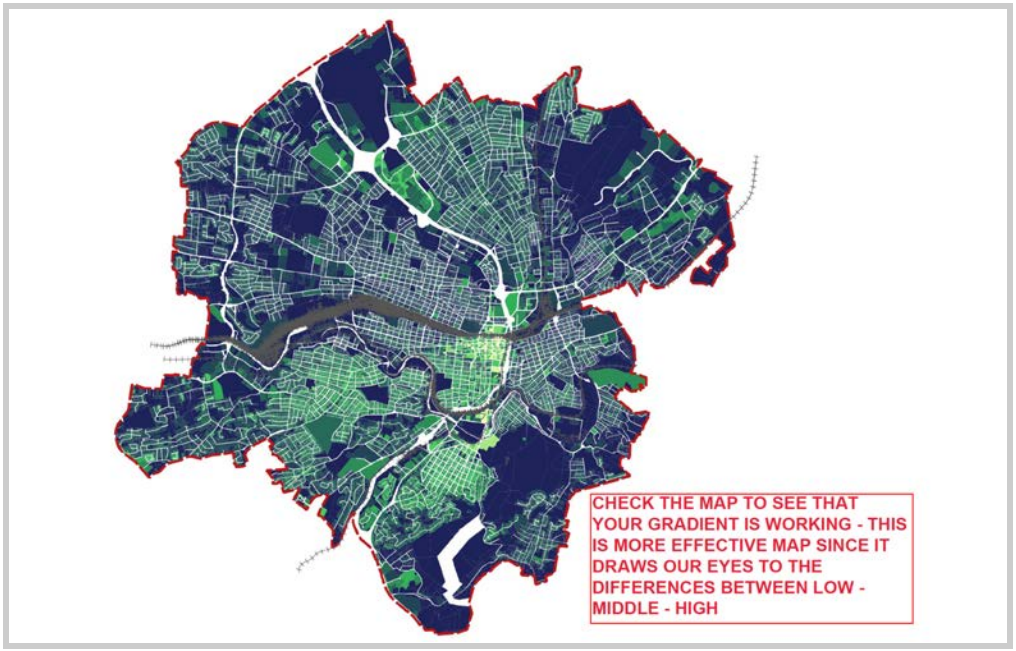


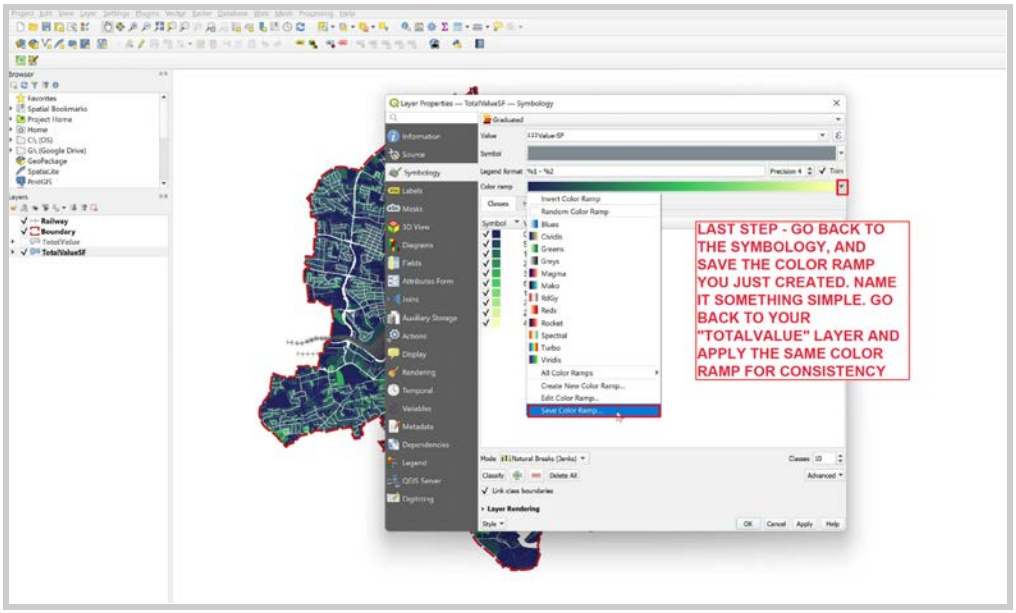

OPEN UP THE LAYER PROPERTIES, AND THE SYMBOLOGY
CLICK THE DOWN ARROW NEXT TO THE CURRENT COLOR RAMP, AND CLICK ON "CREATE NEW COLOR RAMP"


SELECT "GRADIENT" AND CLICK "OK"


FIRST OF ALL, I WANT TO MATCH THE OLD GRADIENT AS MUCH AS POSSIBLE
TRY MOVING THESE POINTS TO SEE WHAT IT CHANGES IN THE COLOR
HUE
SATURATION
LIGHTNESS
TURN ON HUE, SATURATION, AND LIGHTNESS FOR THIS EXERCISE. NOTE THAT YOU CAN ADJUST OPACITY FOR FUTURE REFERENCE


DOUBLE-CLICK THE MIDDLE OF THIS COLOR BAR TO ADD A STOP
MOVE THE DOTS FOR HUE, SATURATION, AND LIGHTNESS UP AND DOWN TO FIND A GOOD MIDDLE COLOR FOR YOUR GRADIENT. I CHOSE BRIGHT GREEN FOR THIS TUTORIAL.
SELECT OK WHEN DONE

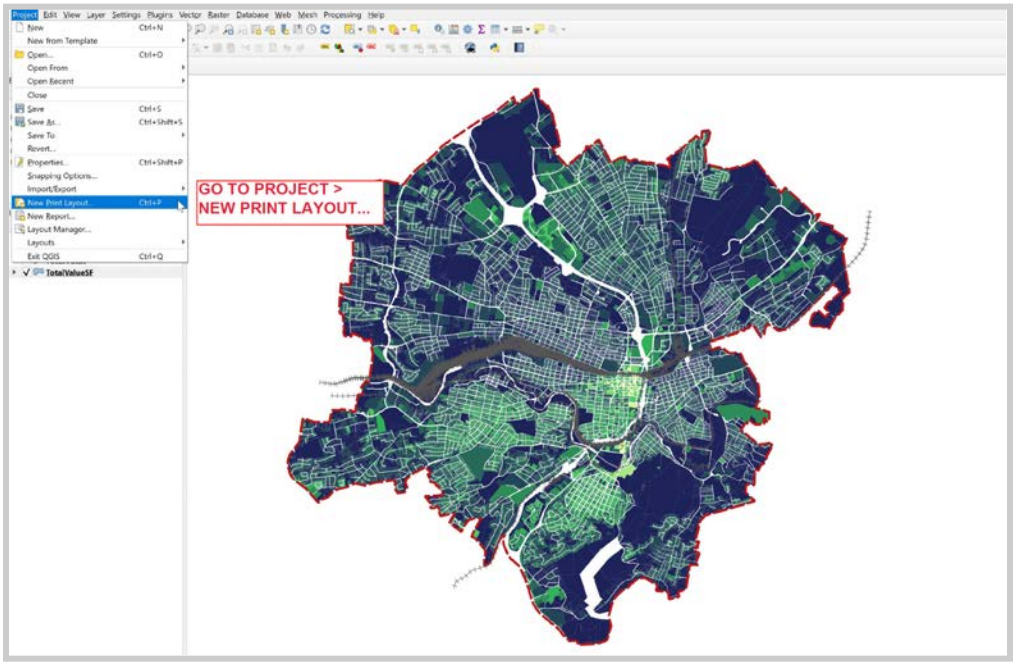

CHECK THE MAP TO SEE THAT YOUR GRADIENT IS WORKING - THIS IS MORE EFFECTIVE MAP SINCE IT DRAWS OUR EYES TO THE DIFFERENCES BETWEEN LOW - MIDDLE - HIGH

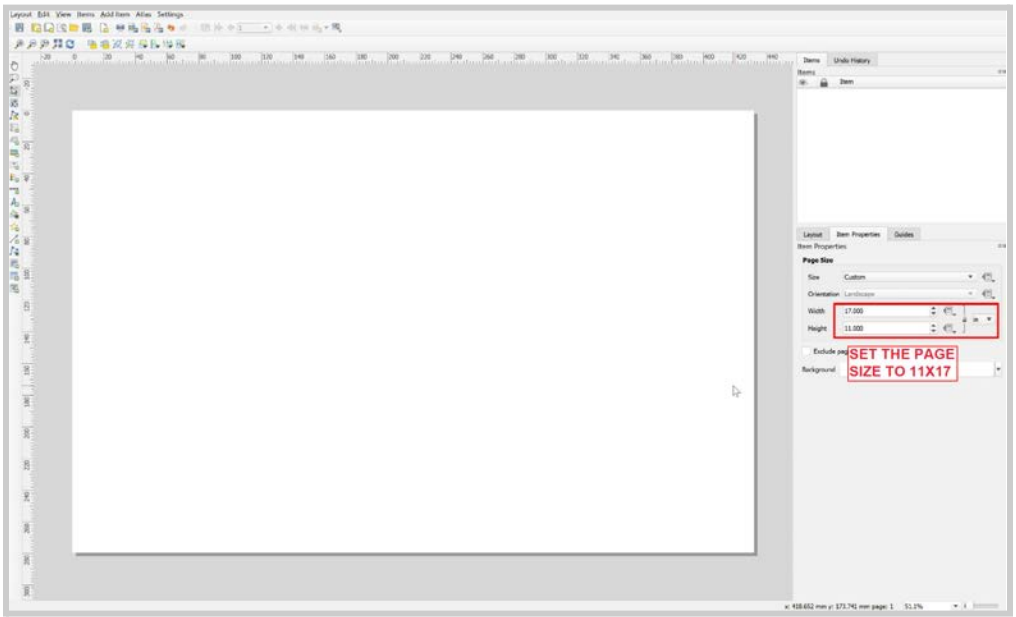

LAST STEP - GO BACK TO THE SYMBOLOGY, AND SAVE THE COLOR RAMP YOU JUST CREATED. NAME IT SOMETHING SIMPLE. GO BACK TO YOUR "TOTALVALUE" LAYER AND APPLY THE SAME COLOR RAMP FOR CONSISTENCY

Step 4: Create a map in Print Layout.

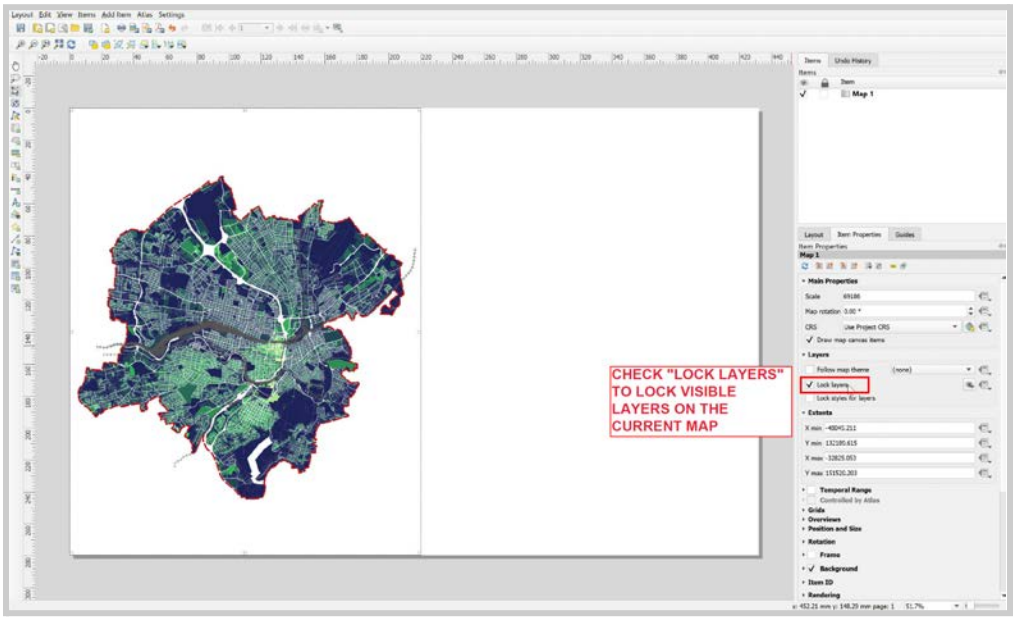
In this print layout, and in the colors and lines of your map, draw attention to some of the geographical patterns visible in Roanoke. What can you learn about Roanoke by comparing parcel value per square foot to the location of healthcare facilities? Think about an appropriate title and subtitle, and think about what should and should not be in the map's legend.

4a Create a new Print Layout and set the size to 11x17".

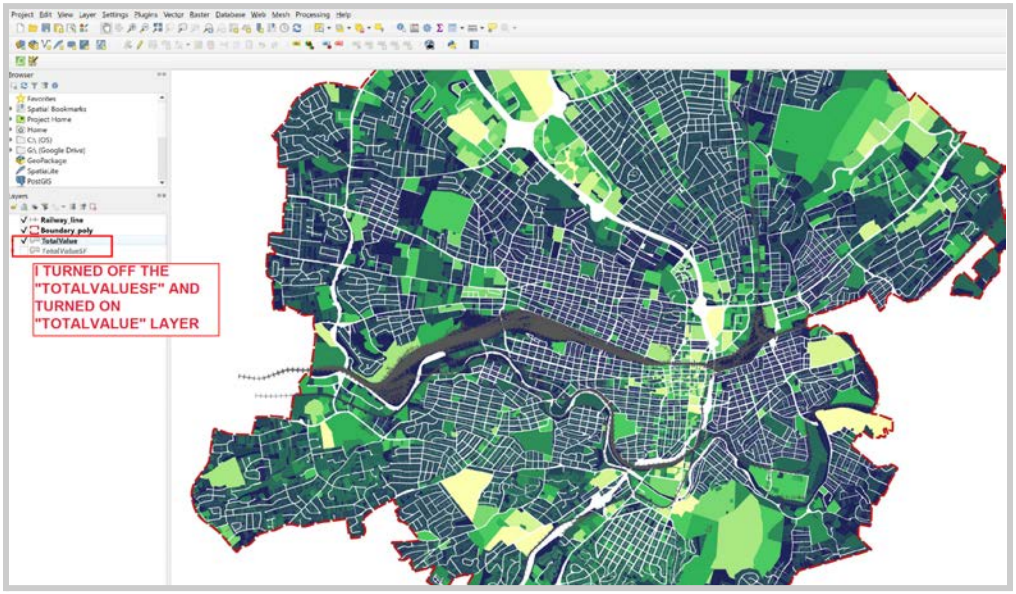


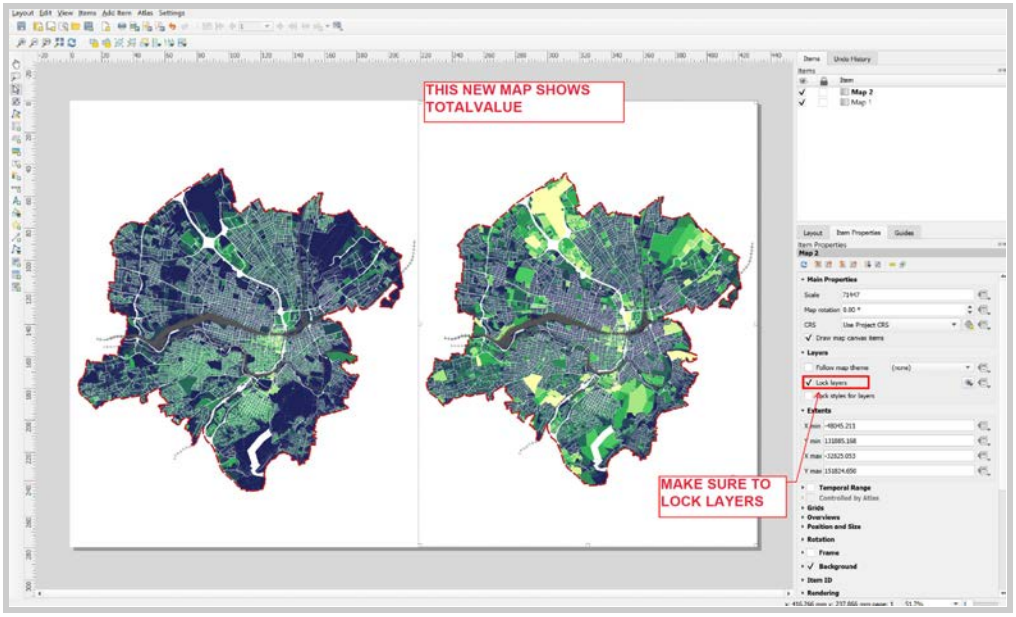


4b Add a **Map** on one half of the layout. This will show the current top layer. In “**Item Properties**” on the right, under “Layer”, check “**Lock Layers**”. This will preserve the current visible layers in this map.

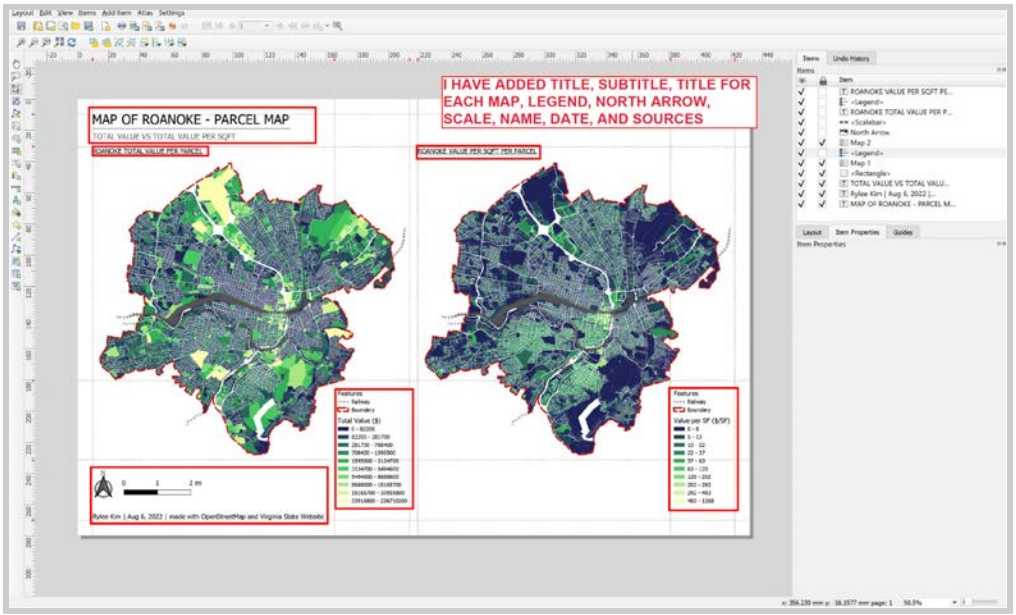


4c Go back to your QGIS data and turn off the first parcel layer (**uncheck**), and turn on the second parcel layer. Back in the Print Layout, add a second **Map.** Again, check “**Lock Layers**”. You should now have two maps, side by side, showing different parcel information.





4d Add a scale, title, descriptions of each map, byline (your name, date, and data sources). Add a legend to each map. Make sure that legend **units** are correctly labeled ($/SF and $ respectively; you can either add these symbols before each line in the legend, or add a note at the top "**in dollars per SF**")



- **Bonus** -

Step 5: Add a third map to your print layout.

Step 6: Create a **new field in the Attribute Table** which helps further explain or nuance the two layers already shown.

Step 7: Clearly explain why you chose this third field through titles and map captions; map captions should include your observations about the map so that the overall relationship between variables shown in each map is obvious.