

# IGIC 2017 - QGIS WORKSHOP

Short Presentation Before getting started!

[Find workshop Materials zip file here.](#)

[Link to most recent version of this document.](#)

QGIS features referred to will be in a **purple** font.

Files in “qgis\_igic2017” directory referred to will be in a **red** font.

“Tip Stops,” or helpful notes, will appear in a grey box like this one.

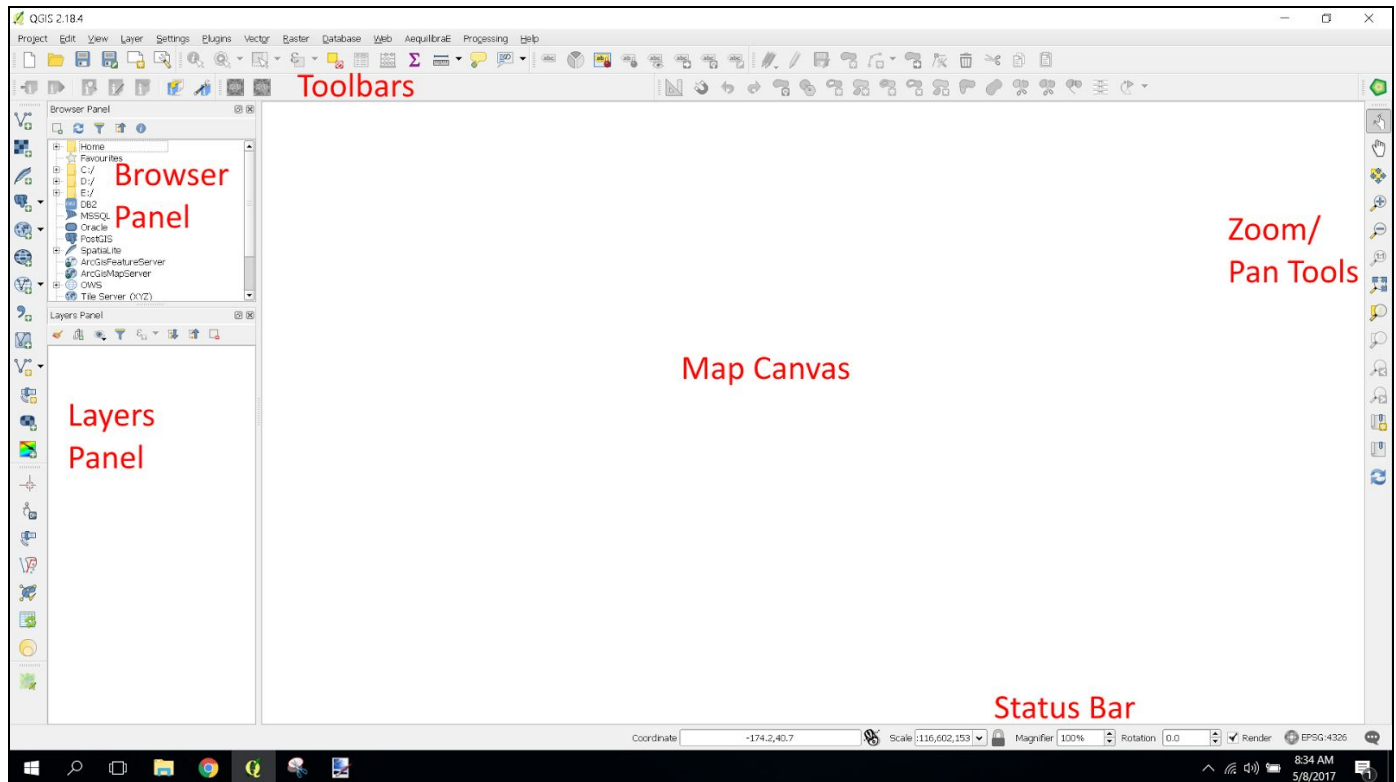
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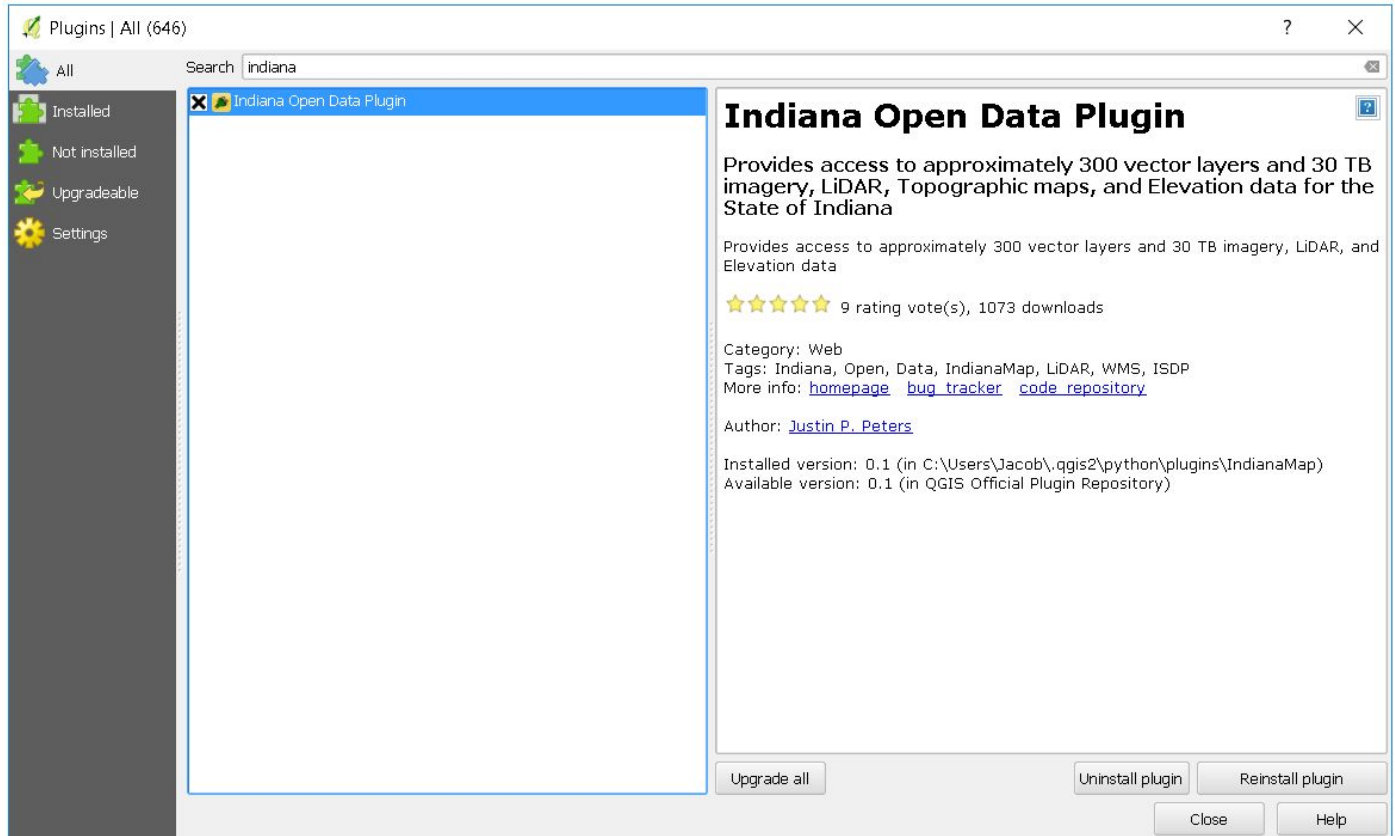
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# 1. Introduction to GUI



## Plug Ins:

**This one was created by Justin!**



[Time Manager](#) Plugin (8:05)

To View Session History & Errors

View>>>Panels>>>Log Messages Panel  
(just discovered this recently!)

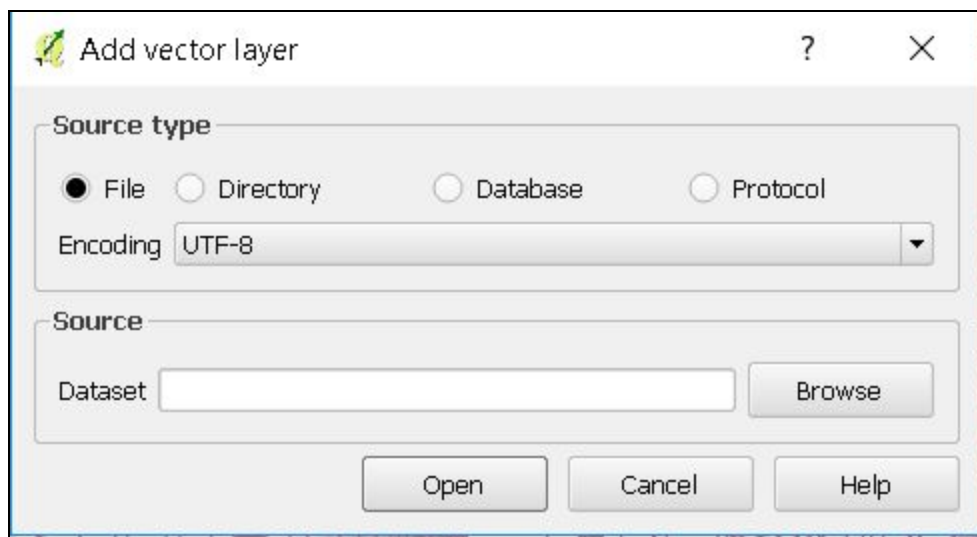
---

## 2. Loading & Exploring A Map

### A. Loading Data/Layers

>>> Click Add Vector Layer icon: 

This window should pop up:



>>>Be sure that Source type **File** is selected.

>>>Click **Browse** and select: **shapefiles/roads.shp** from the "Indy" Dataset.

>>>Click **Open**.

>>>Do the same for: **buildings.shp**,  
**natural.shp**,  
**places.shp**, and  
**Stream.shp**.

**Tip Stop:** you can drag the shapefiles into QGIS!

## B. Exploring Layer Attributes

>>>Click **Open Attribute Table** icon:



roads :: Features total: 13127, filtered: 13127, selected: 0

	osm_id	name	highway	waterway	aerialway	barrier	man_made	z_order	other_tags
1	17430952	Central Court ...	residential					3	"tiger:cfcc"=>...
2	17430963	Crooked Cree...	residential					3	"tiger:cfcc"=>...
3	17430980	Pamona Circle	residential					3	"tiger:cfcc"=>...
4	17431047	Luzzane Lane	residential					3	"tiger:cfcc"=>...
5	17431056	Luzzane Lane	residential					3	"tiger:cfcc"=>...
6	17431061	Luzzane Lane	residential					3	"tiger:cfcc"=>...
7	17431237		motorway_link					29	"bridge"=>"y...
8	17431247		residential					3	"tiger:cfcc"=>...
9	17431250		service					0	"access"=>"p...
10	17431276		motorway_link					9	"oneway"=>"...
11	17431287		residential					3	"tiger:cfcc"=>...
12	17431466		residential					3	"tiger:cfcc"=>...
13	17431471		residential					3	"tiger:cfcc"=>...
14	17431651		residential					3	"tiger:cfcc"=>...
15	17431696		unclassified					3	"oneway"=>"...
16	17431741	North West St...	motorway_link					9	"oneway"=>"...

Show All Features

**Bonus:** What is another way of getting to the **Attribute Table**?

**Tip Stop:** You can make selections from inside the table, add/delete fields, and much more.

## C. Identifying Features

>>>Click [Open Identify Features](#) icon:



**Your cursor will change** and will have an “i” attached to the pointer.

>>>In the [Layers Panel](#), select the layer you want to investigate.

>>>Click on any feature in the selected layer.

Identify Results
×

⏴ ⏵ ☀ ⏶ ⏷ 📄 🖨

Feature	Value
[-] roads	
[-] name	West 63rd Street
+ (Derived)	
+ (Actions)	
osm_id	17451213
name	West 63rd Street
highway	residential
waterway	
aerialway	
barrier	
man_made	
z_order	3
other_tags	"tiger:cfcc"=>"A41", "tiger:c...

Mode Current layer ⏴ ⏵

Auto open form


View Tree ⏴ ⏵

Help

## D. Feature Selection/Querying

*Feature selection in QGIS will be familiar for those who have experienced it in ArcGIS. It works basically the same way. There are many ways to select data from layers. We will go over a few.*

>>>In the [Layers Panel](#), click on the layer of interest.

>>>From the menu bar, click [Select Feature by Area](#): .

>>>Try clicking on individual features **in the selected layer**.

>>>By holding down the [shift](#) or [ctrl](#) key, you can select multiple features!

>>>You can **also draw a rectangle** which selects all of the features within it.

A few more ways to select:

>>>Click on the arrow next to the [Select Feature by Area](#) button: .

>>>Try [Select Features by Polygon](#).

>>>Draw your own polygon and **right click** to close it.

>>>Explore [Select Features by Freehand](#) and [Select Features by Radius](#)

**Tip Stop:** The default selection color is bright yellow. If you wish to change this, go to:

[Project](#) > [Project Properties](#) > [General](#) > [Selection color](#)

**Tip Stop:** If you wish to pan around the map while in “selection mode,” and if you’re using a mouse, you can hold down the middle scroll bar and panaway!

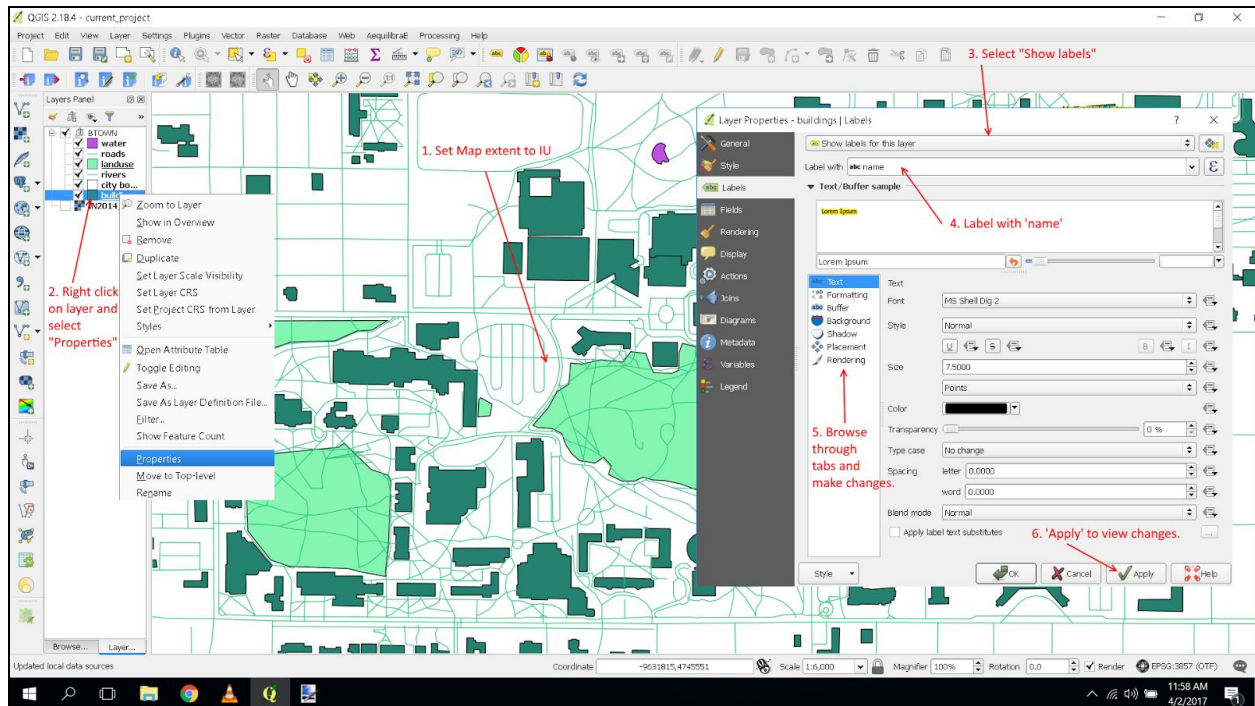
Item of interest: [Selection Sets plugin](#)



## 3. Labeling

For **Buildings**, what field should we use to label?

### A. Using & Changing Labels



>>>Move through the Label editing tabs and explore different ways to change labels.

**Tip Stop:** Another way to access Layers/Symbology:



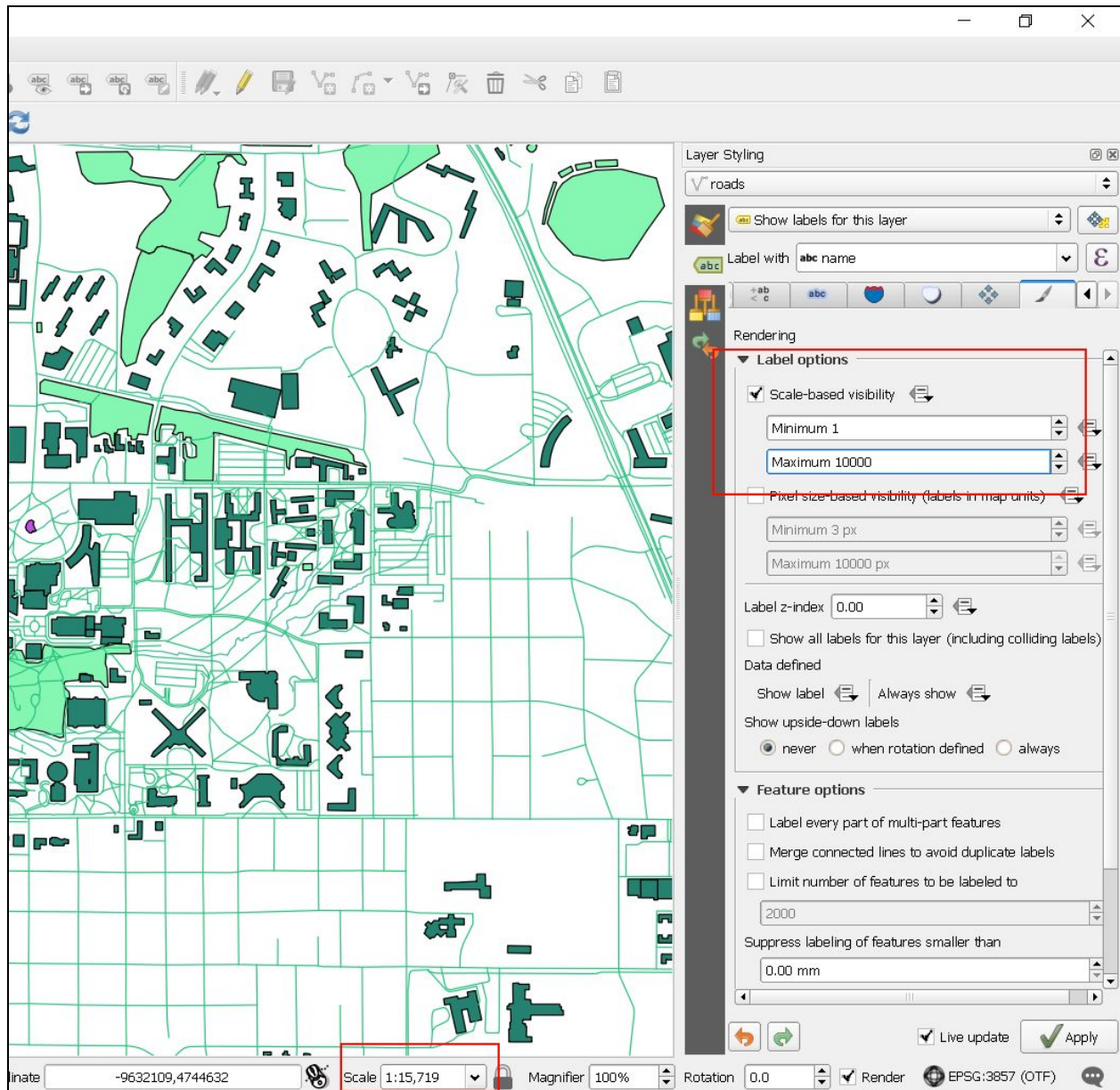
This is how we will edit moving forward. It offers greater visibility and "Live Updating."

## B. Road Labels

>>>Be sure to have **“Live Updates”** Checked

The screenshot displays the QGIS interface with a map of a university campus. The 'Layer Styling' panel for the 'roads' layer is open on the right side. The 'Label with' field is set to 'abc name'. The 'Placement' dropdown menu is open, showing '1. 'Placement' Tab' with a red arrow pointing to it. Below this, the 'Orientation' is set to '2. 'Curved' Orientation'. The 'Allowed positions' are set to 'Above line'. The 'Distance' is 0.0000, and the 'Repeat' is 'No repeat'. The 'Maximum angle between curved characters' is set to 25.0 for both 'inside' and 'outside'. The 'Data defined' section shows 'Coordinate X' and 'Y' fields, 'Alignment' set to 'horizontal', and 'Rotation' checked. The 'Priority' slider is set to 'Low'. At the bottom of the panel, the 'Live update' checkbox is checked.

### C. Scale-Based Labeling






## 4. Symbology (aka Styling)

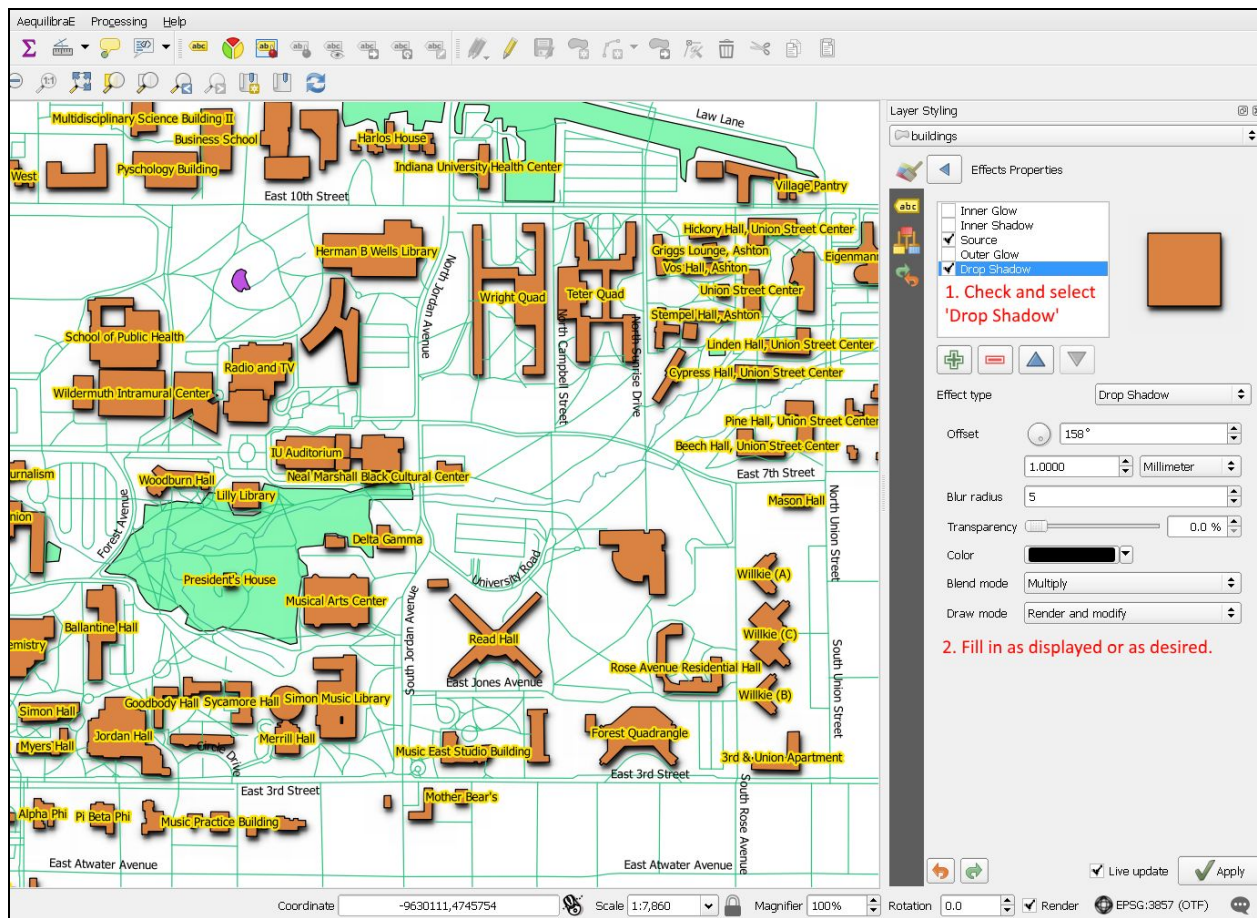
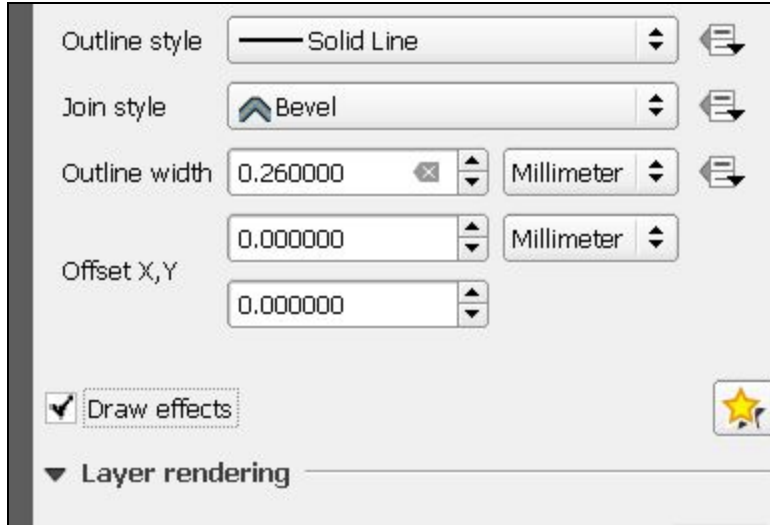
### A. Changing Colors

>>> Set it to any color of your choice!

The screenshot displays the QGIS interface with a map of a campus. The 'Layer Styling' panel on the right is open for the 'buildings' layer. The 'Symbol layer type' is set to 'Simple fill'. The 'Fill' color is selected using a color picker, and the 'Fill style' is set to 'Solid'. Red annotations highlight the steps: '1. select 'buildings' and 'single symbol'' and '2. Select 'simple fill''. The map shows various buildings labeled, such as 'Science Building II', 'Business School', 'Indiana University Health Center', 'President's House', and 'Mason Hall'. The status bar at the bottom shows the coordinate as -9631399,4745296, scale as 1:7,860, and rotation as 0.0.

## B. Draw Effects

In the symbology window for the building layer, check “Draw Effects” and click on the **Star** .



## C. Rule-Based Symbolology: Polygon Layer

1. Select 'Rule-based' as symbology type.

Layer Styling

buildings

Rule-based

Label

Dorms

3. Name the rule 'Dorms'

2. Add a rule.

Symbol levels...

Refine selected rules

Layer rendering

The screenshot shows the 'Layer Styling' window for a 'buildings' layer. The symbology type is set to 'Rule-based'. A rule named 'Dorms' is selected in the 'Label' list. A red arrow points to the '+' icon in the bottom toolbar, indicating the step to add a rule. The background shows a map with building footprints and street names like 'North Union Street' and 'South'.

>>>Double-Click on the 'Dorms' rule to open editing dialog.

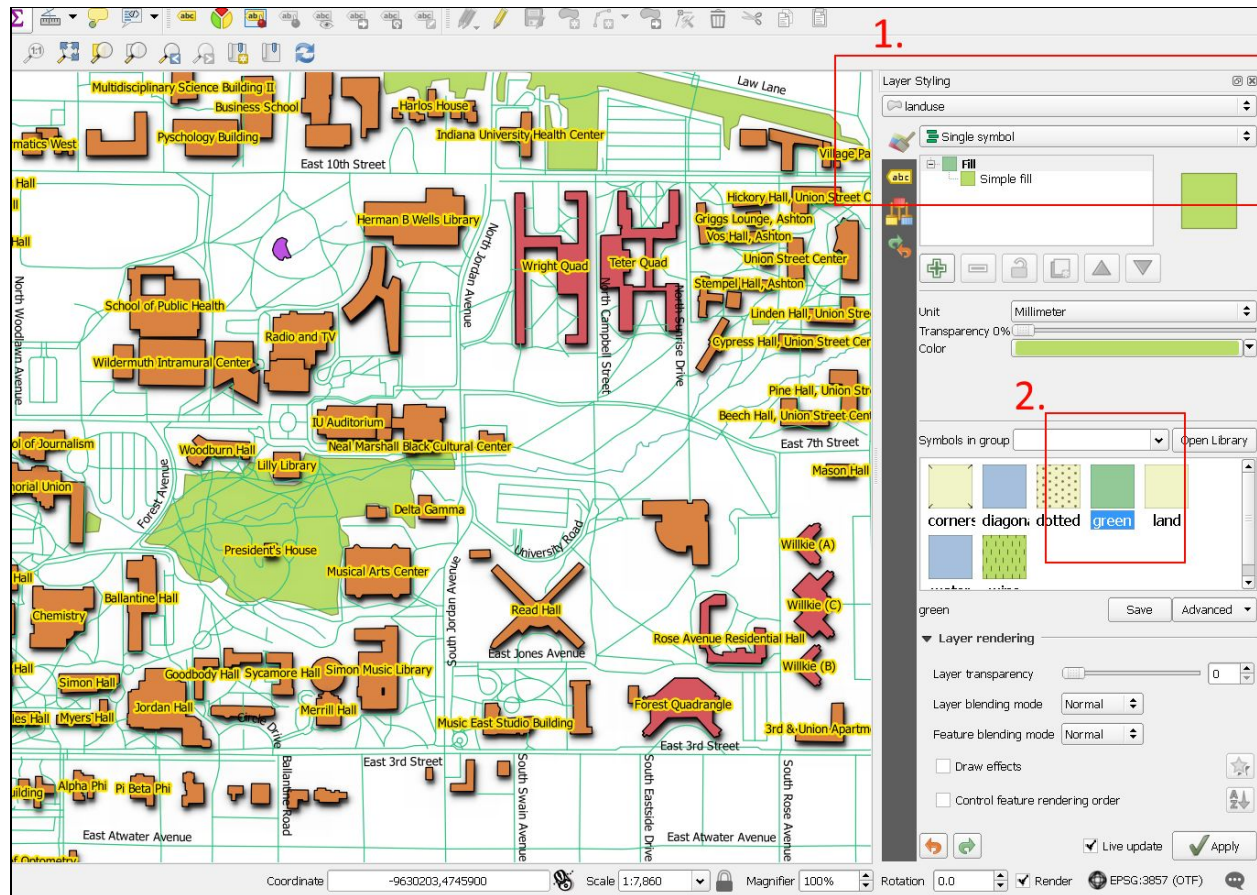
The screenshot shows the QGIS interface with the 'Expression string builder' dialog box open. The dialog has several panes and sections:

- Expression:** Contains the text `&building' = 'dormitory}`. A red arrow points to the equals sign with the annotation "3. Click equal sign button."
- Fields and values:** A list of fields with 'building' selected. A red arrow points to 'building' with the annotation "2. Under 'Fields and values' double-click 'building'".
- Values:** A list of values with 'dormitory' selected. A red arrow points to 'dormitory' with the annotation "5. Double Click 'Dormitory'".
- Load values:** A dropdown menu set to 'all unique'. A red arrow points to it with the annotation "4. Click 'all unique'".
- Buttons:** 'OK' and 'Cancel' buttons are at the bottom. A red arrow points to 'OK' with the annotation "6. Click 'OK'".
- Top right:** The 'Layer Styling' panel shows the 'Dorms' rule selected. A red arrow points to the '...' button with the annotation "1. Select '...' to open expression builder window".

A [good example](#) of using rule-based symbology.



## D. Preset Symbols



## E. Rule-Based Symbolology: Line Layer

In this lesson, we will edit the symbology in the **roads** layer in order to distinguish between roads and paths.

>>>Proceed as outlined in [lesson 4C](#). Name existing rule **'Roads.'** Add a rule and name it **'Paths.'**

>>>Change the transparency of the 'Roads' rule to 65% (right-click and select "Change Transparency").

>>>Filter the **'Paths'** rule with the following expression: **"highway" = 'footway'**

>>>Under **Simple Line**, change the color to any shade of red.

>>>Change the **Pen style** to 'Dot line'

Check out another way to style layers: [Geometry Generator Symbol Layers](#). ([Tapered Rivers](#))

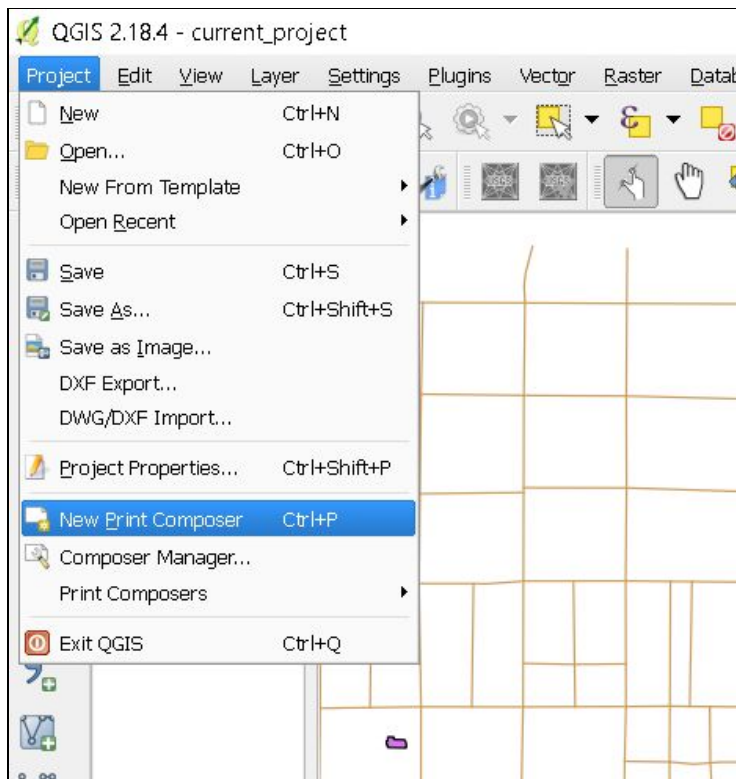


## 5. Map Composer

Now we can make a map with QGIS's Map Composer!

### A. Basic Composition

Project > New Print Composer



(Or Ctrl + P.)

>>>Name the Composer

>>>A new window will open

>>>Click the **Add new map** icon



>>>**Drag the cursor** across the canvas to the extent you want the map to appear.

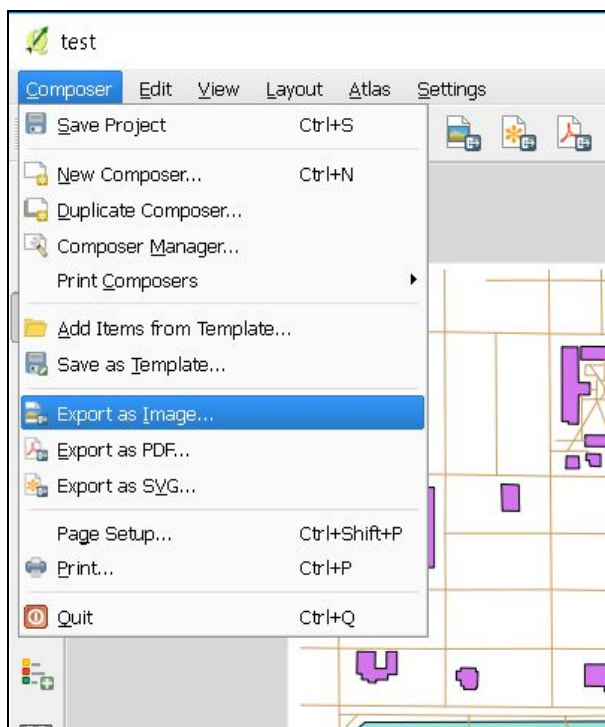
>>>Under Main properties, click "**Set to map canvas extent**" to sync composer with map

## B. Title & Legend

>>>Add new label 

>>>Add new legend 

## C. Exporting



**Inspiration!** Gallery of QGIS [Cartography](#)

## 6. Classification & Joins

For this section, we will move to a different dataset - **IndianaMap County Census Data**.

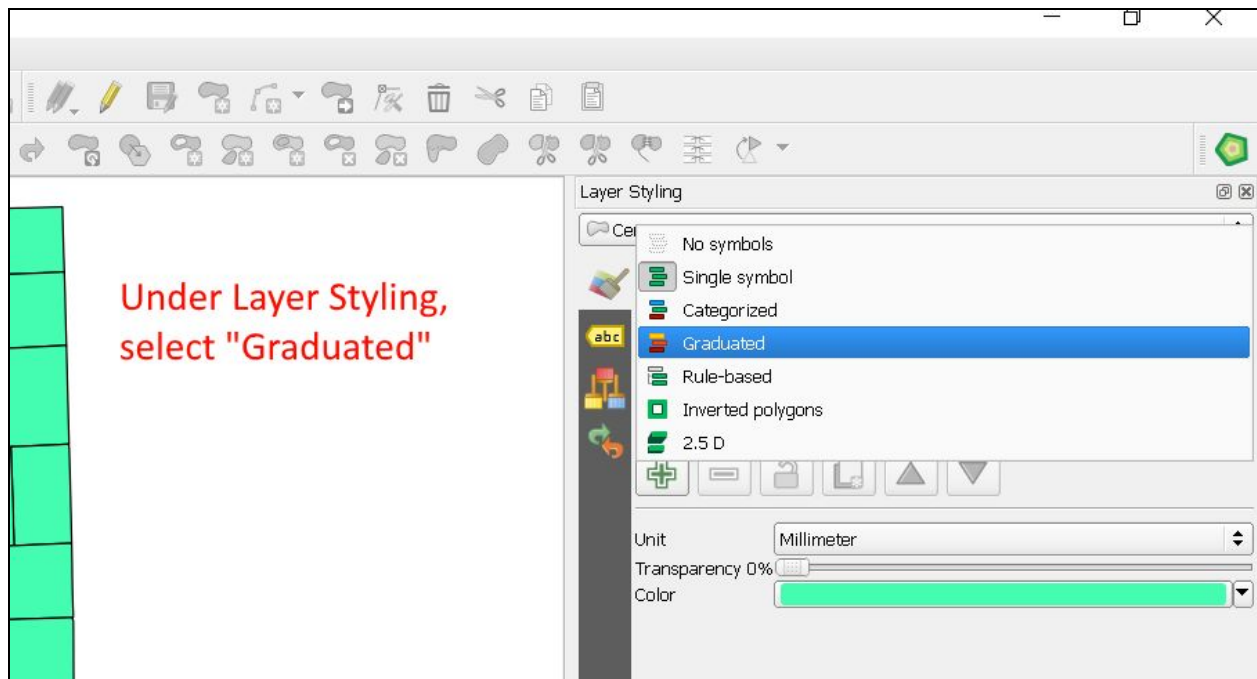
### A. Ratio Classification

*We will look at population density in Indiana counties.*

>>> **New Project**

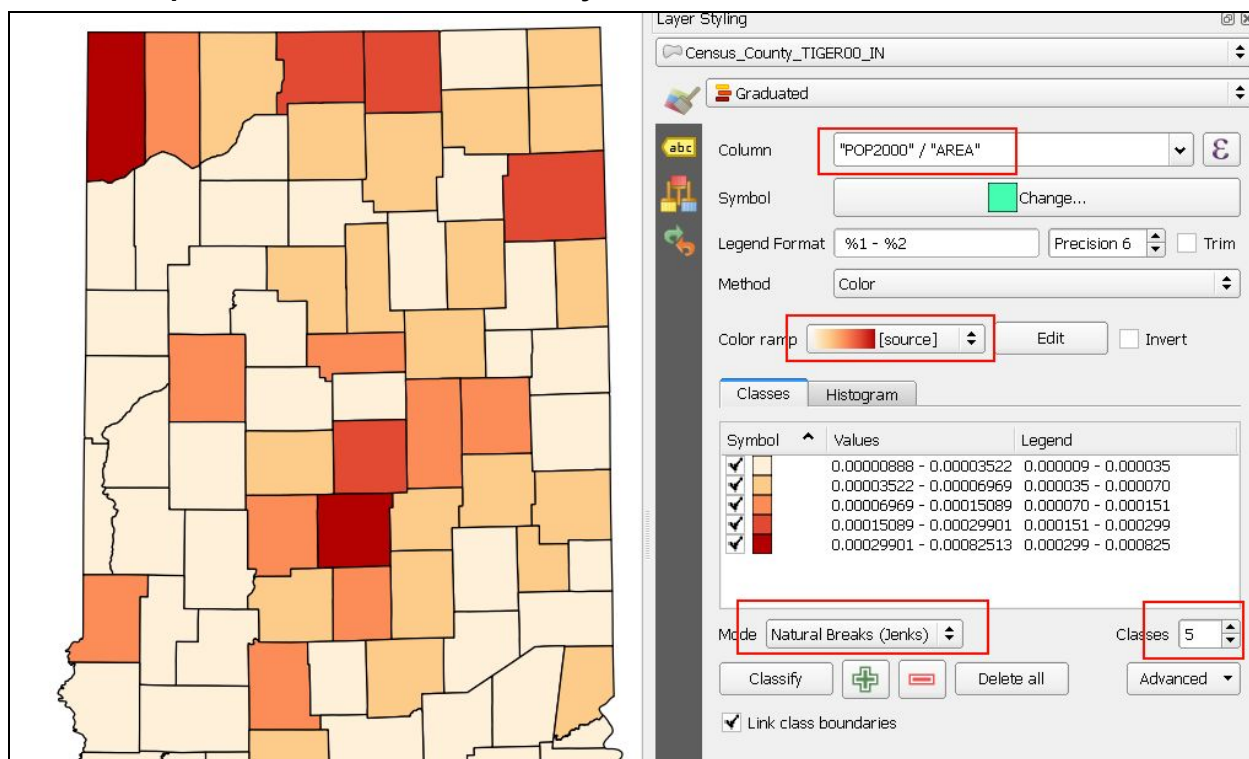
>>> Import shapefile from **IN Census Data** folder

Change Layer Styling:



The layer is going to “disappear”! But don’t be frightened, as I was the first time. It will be invisible until we classify it. See below!

Set desired parameters and click “Classify”:



**Tip Stop:** You can also do rule-based, like we did in the Symbology section.

## B. Join Tabular Data to Shapefile

I found a [great scraped dataset](#) of 2016 Presidential voting data by county:


votes_dem	votes_gop	total_votes	per_dem	per_gop	diff	per_point_diff	state_abbr	county_name	combined_fips
93003.0	130413.0	246588.0	0.37715947248	0.528870018006	37,410	15.17%	AK	Alaska	2013
93003.0	130413.0	246588.0	0.37715947248	0.528870018006	37,410	15.17%	AK	Alaska	2016

I am interested in visualizing the “**per\_point\_diff**” field. This will show us which counties were more split in the election than others. I grabbed all of Indiana’s 92 counties.

\*\*\*The problem is that when a csv is imported into QGIS, each field is assumed to have a “string” data type. We need to create a sidecar (‘buddy’) file to accompany the csv. This file will specify the data type of each field. To simplify things, I just kept three fields: **county**, **fips**, and **per\_point\_diff**.

This is what the buddy file looks like:

```
1 "string", "integer", "real"
```

>>>From the [Layers Panel](#) on the left, select [Add Delimited Text Layer](#) .

>>>Specify parameters like so:

File Name:

Layer name:  Encoding:

File format:  CSV (comma separated values)  Custom delimiters  Regular expression delimiter

Record options: Number of header lines to discard:   First record has field names

Field options:  Trim fields  Discard empty fields  Decimal separator is comma

Geometry definition:  Point coordinates  Well known text (WKT)  No geometry (attribute only table)

Layer settings:  Use spatial index  Use subset index  Watch file

	county	fips	per_point_diff
1	Adams County	18001	0.52
2	Allen County	18003	0.2
3	Bartholomew County	18005	0.00

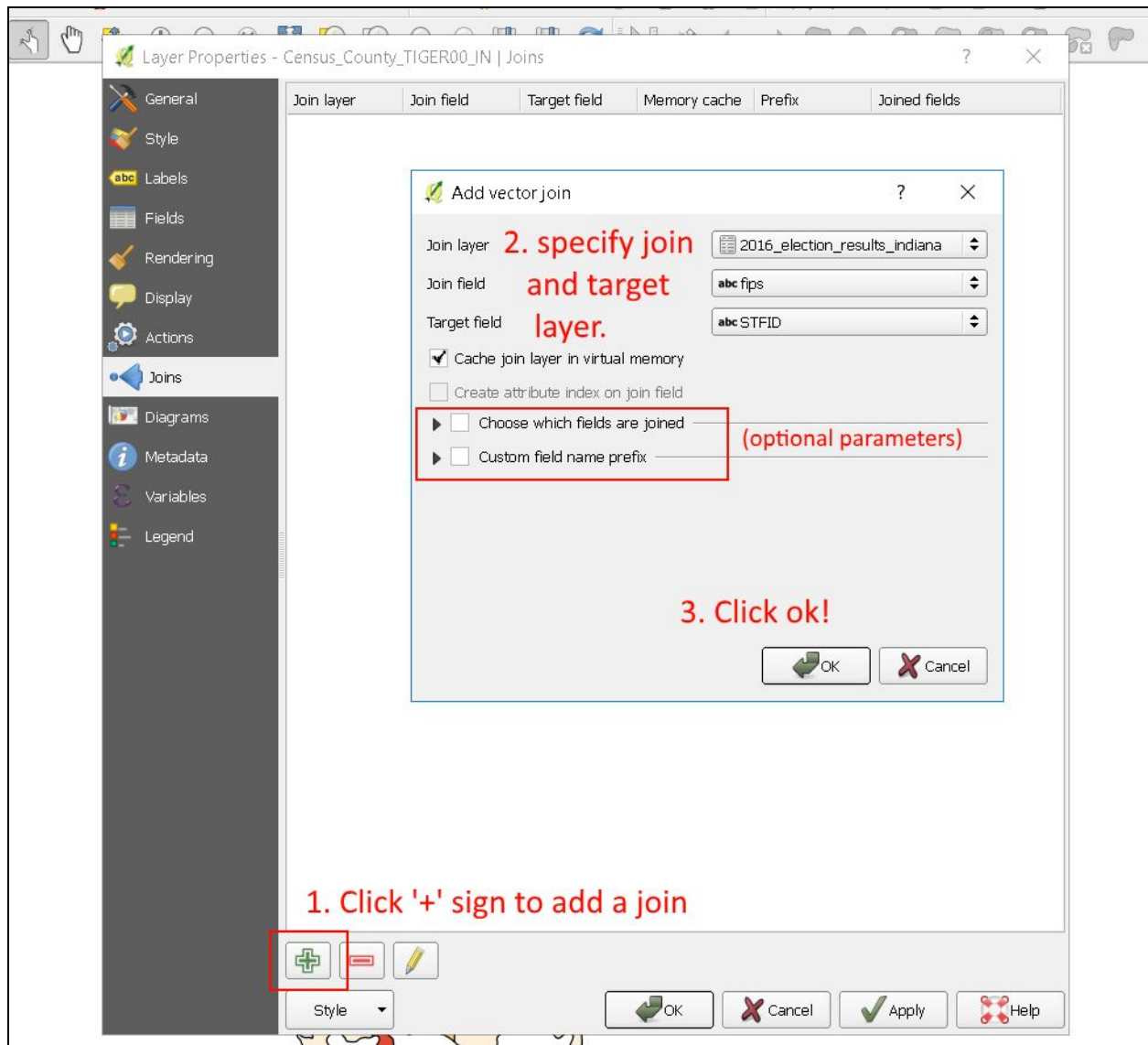
>>>Let's check the layer's data types. [Layer Properties>Fields](#).

>>>Try to drag the csv in and look at the data types. They're all strings!

>>>Now Look at the csv's [Attribute Table](#).

>>>Will the "county" field be the easiest to join? If not, which one would be better?

>>>Go to the **census data's** Layer Properties and to the **Joins** section.



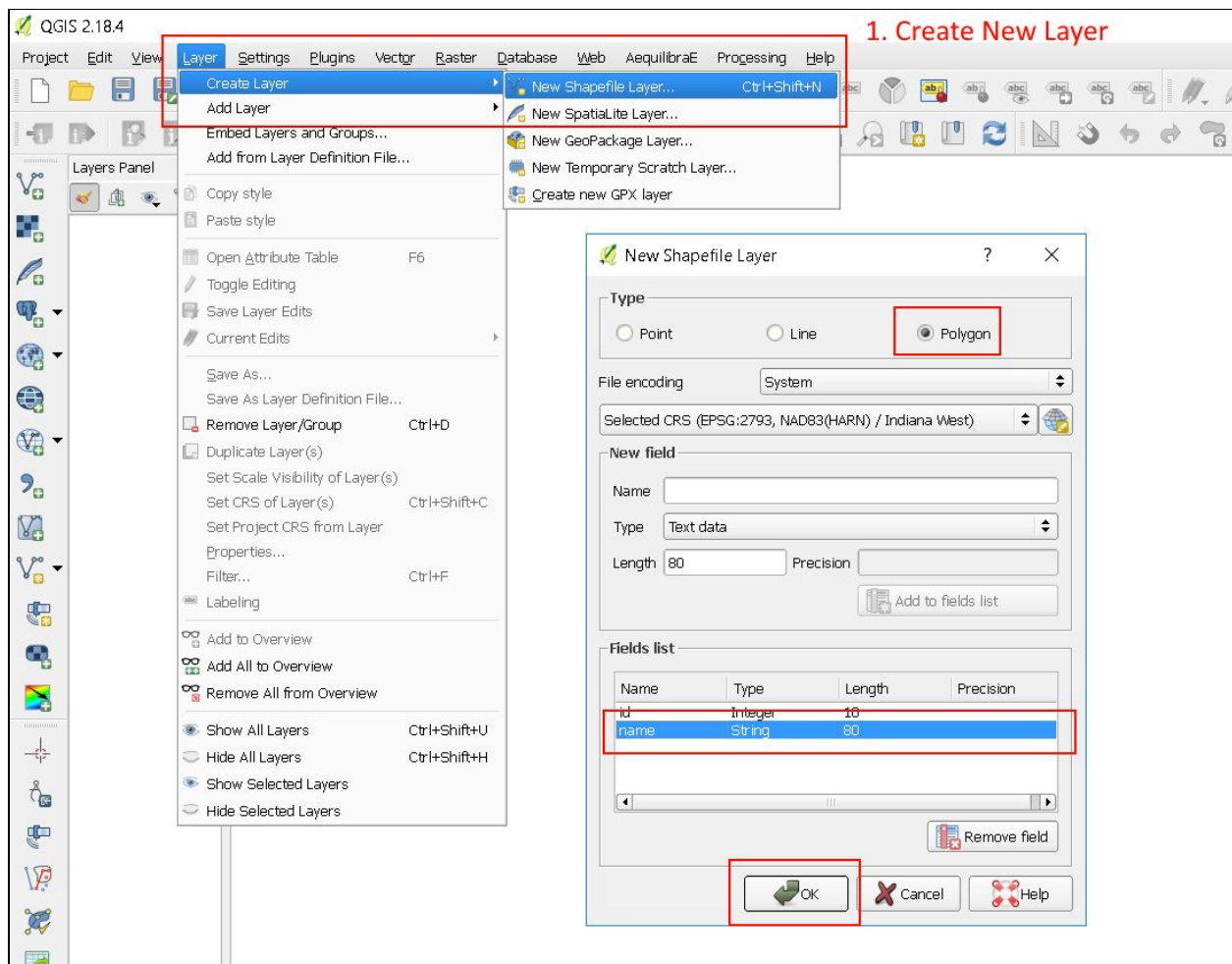
Now apply graduated symbology technique for the “**per\_point\_diff**” field! The lighter the county, the more even the political field.

## 7. Creating Vector Data

Let's see how easy it is to **create our own shapefiles!**

>>>New Project

>>>Create a Shapefile:



>>>Name the file whatever you want and save it in the **“Vector Creation”** folder.

>>>Open the attribute table. Oh, nothing there!

>>>Import the **IN2014\_31001430\_06.tif** file into QGIS from the **Vector Creation>Bloomington Aerial** folder. This is a small section of Bloomington. File courtesy of [Indiana Spatial Data Portal](#).


### Let's trace some buildings!


>>>Click on the **Toggle Editing** button  to enable the feature editing tool.


>>>Trace a building using the **add feature** icon . **Right click** when you want to finish the polygon.

>>>Fill in the fields as you desire!

>>>**Repeat the process for one or two more buildings.**

>>>Now use the move feature(s) icon  to reposition your polygons.

>>>If you want to a more fine-tuned edit of your polygon select the Node tool . Select a node and move it around as you wish.

>>>Click  to save your layer edits.

>>>**You can also copy, paste and cut features!**   

### Neat Sidenote

Add OSM roads layer. What's up with Vernal Pike?! Tiff is from 2014! OSM is quick!  
(Vernal Pike on [Google Maps!](#))



## 8. Feature Topology

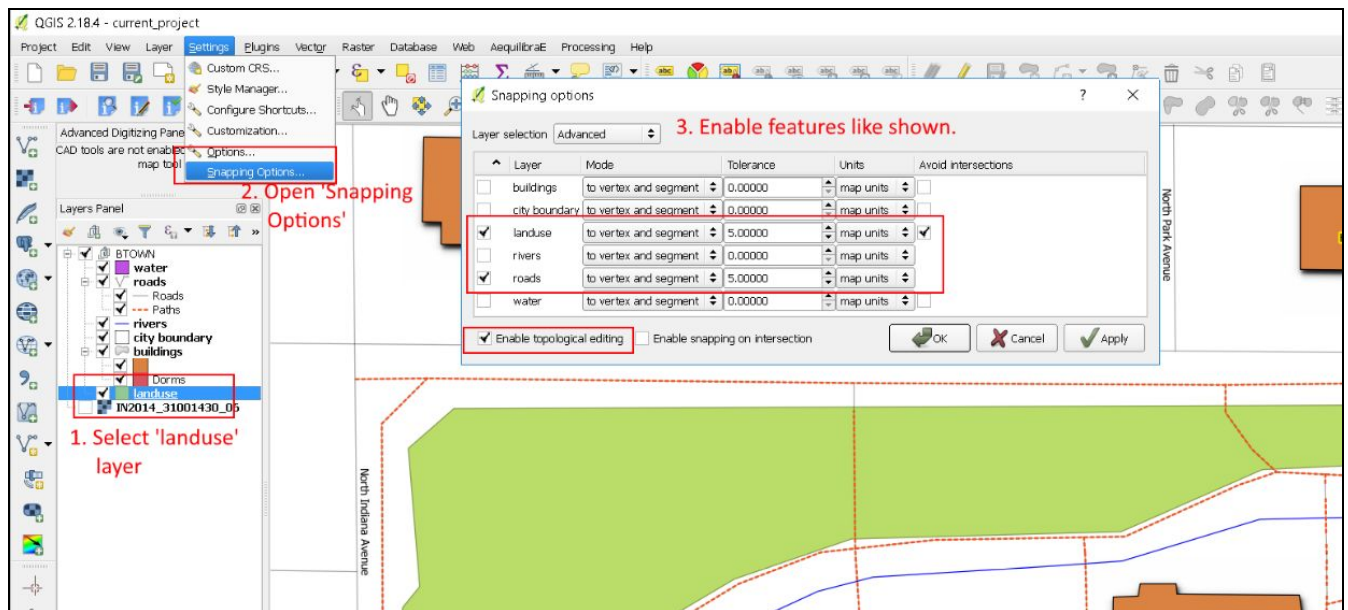
This section will go over **basic topology editing in QGIS**. The software has many advanced features in this area and deserves much more exploration.

### A. Snapping

Sometimes we may want to Edit topological features already created. The first step in properly doing so is enabling feature **Snapping**.

First, add in all of the OSM layers from earlier.

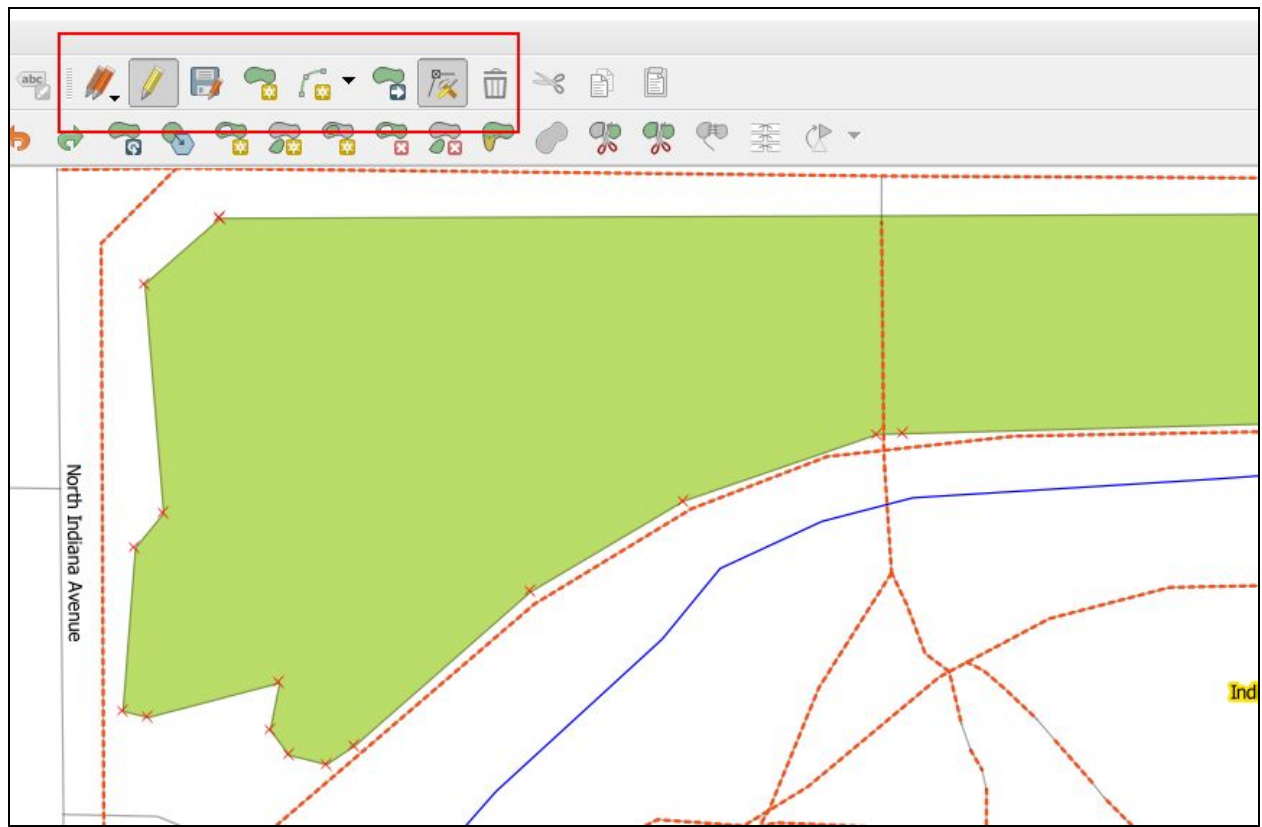
**Enable Snapping:**



Be sure you have the **Digitizing Toolbar** visible.

If not, go to **View>>>Toolbar** and Select **Digitizing Toolbar**.

Enable editing on **landuse** layer and click on the **Node Tool**, like so:

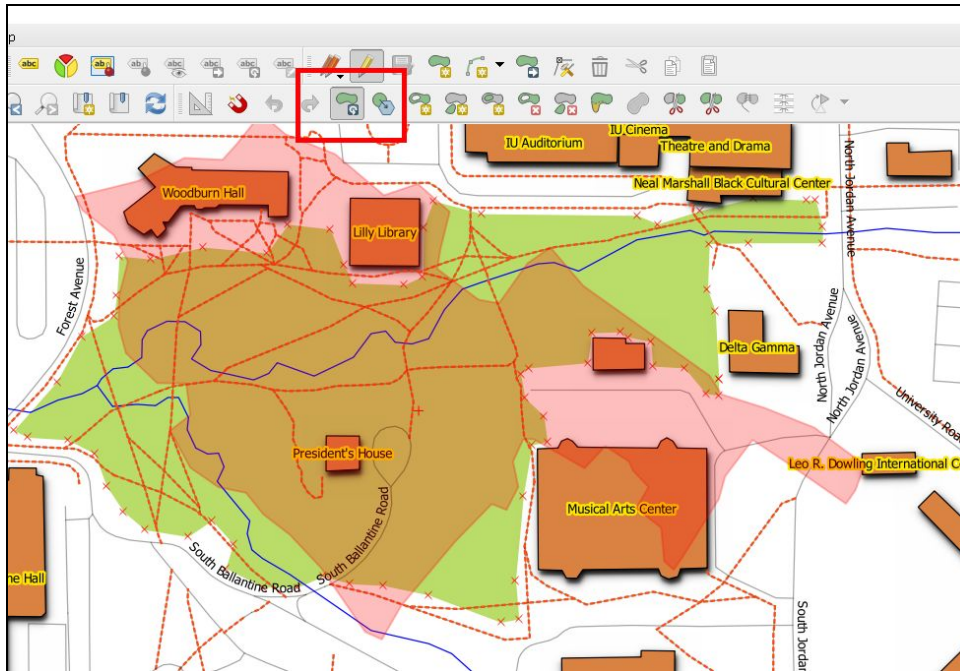


Now you can edit the polygons by moving the nodes. They will snap more easily to other features. Double-click anywhere on the polygon border to create additional nodes.

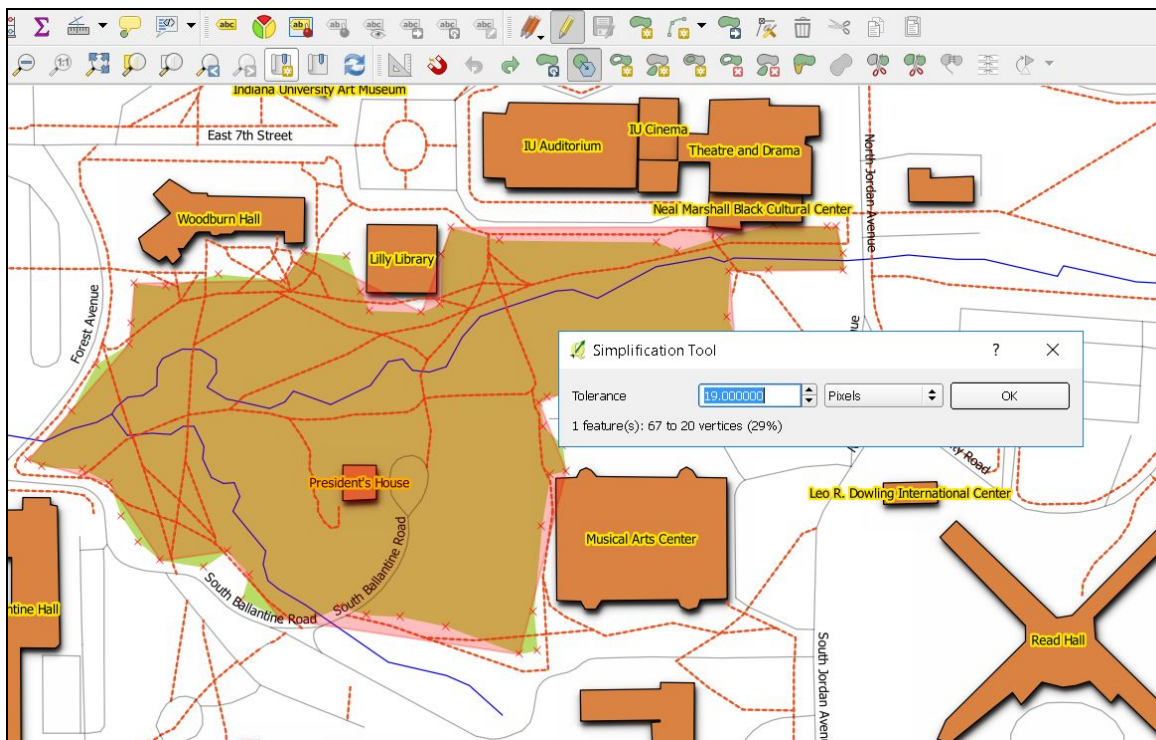
## B. Advanced Digitizing Toolbar

**Right-click** in toolbar area. Under **Toolbars** select 'Advanced Digitizing Toolbar'

**Rotate Feature:**



**Simplify Feature:**



Notice how the # of nodes decreases as the tolerance goes up. This is a very neat feature!


## C. Add Part


Use the **Add Part** button () to add to an existing polygon.

**Tip Stop:** Remember, a right click closes the polygon.

## D. Split & Merge Features

>>>Be sure snapping is enabled for the **landuse** layer.

>>>Click **Split Features** -  - and cut a polygon by selecting two nodes across from one another. You will now see two distinct polygon where there was only one before.

>>>Now select both features and then click **Merge Selected Features** -  .

>>>Click **OK**.

---

## 9. Vector Data Formats & Analysis

All the previous sections have been useful and necessary, but now it's time to actually start **answering questions**. In this section, we will upload Indiana data layers (from [IndianaMap](#)) and perform some vector analysis. Along the way, we will explore a few more vector data formats.

### A. Add a Geodatabase File + Query Builder

Import the 'Vector Analysis/Street Centerlines/County\_Street\_Centerlines\_IDHS\_Dec2015.gdb' folder.

1. Source Type = 'Directory'

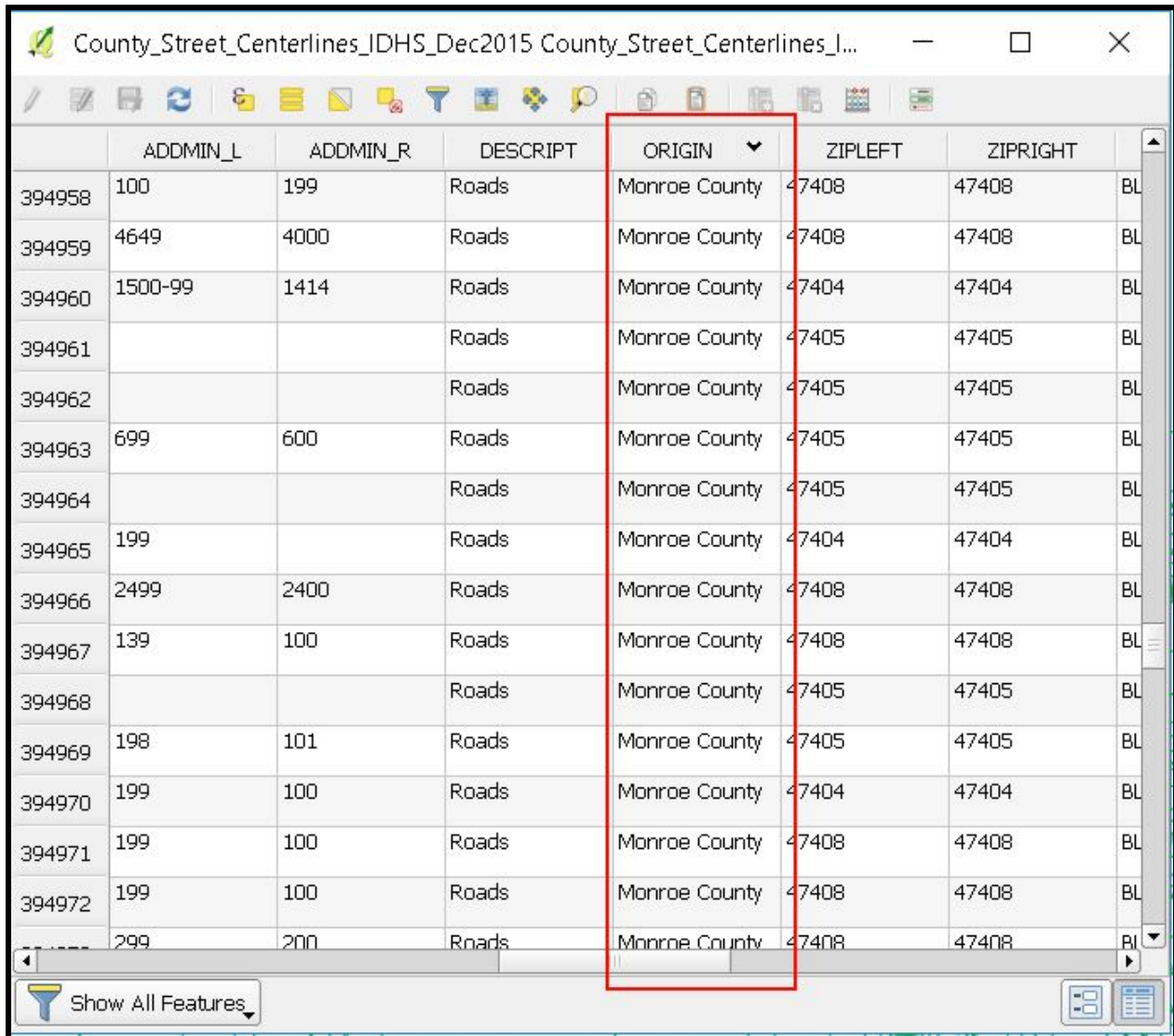
2. Browse for files

3. Locate files in project directory:

4. click 'Select Folder'

The screenshot displays two windows from the ArcGIS interface. The top window, titled "Add vector layer", has the "Source type" section with "Directory" selected. The "Source" section has "Type" set to "UK. NTF2" and a "Browse" button. The bottom window, titled "Open Directory", shows the file path "indy\_qgis\_igic2017 > Vector Analysis > Street Centerlines" and a list of folders, including "County\_Street\_Centerlines\_IDHS\_Dec2015.gdb". The "Folder:" field at the bottom contains the selected folder name, and the "Select Folder" button is highlighted.

Go to the layer's **Attribute Table** to determine which field will help us extract the Monroe County streets:



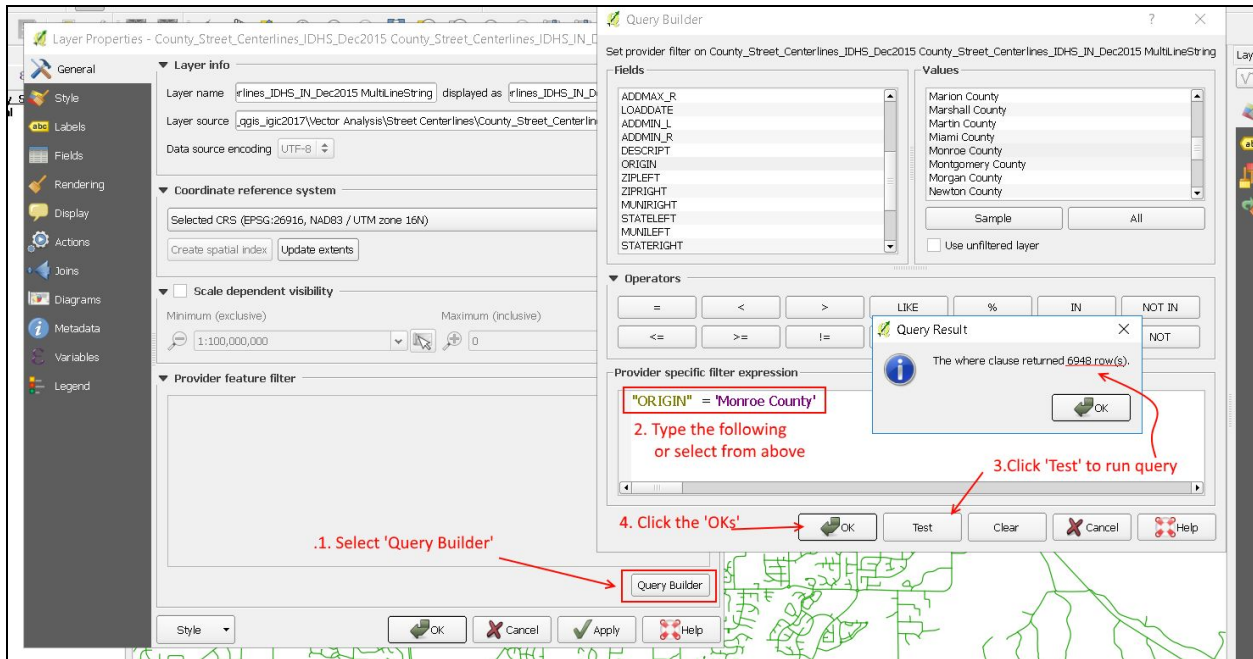
County\_Street\_Centerlines\_IDHS\_Dec2015 County\_Street\_Centerlines\_I...

	ADMIN_L	ADMIN_R	DESCRIPT	ORIGIN	ZIPLEFT	ZIPRIGHT	
394958	100	199	Roads	Monroe County	47408	47408	BL
394959	4649	4000	Roads	Monroe County	47408	47408	BL
394960	1500-99	1414	Roads	Monroe County	47404	47404	BL
394961			Roads	Monroe County	47405	47405	BL
394962			Roads	Monroe County	47405	47405	BL
394963	699	600	Roads	Monroe County	47405	47405	BL
394964			Roads	Monroe County	47405	47405	BL
394965	199		Roads	Monroe County	47404	47404	BL
394966	2499	2400	Roads	Monroe County	47408	47408	BL
394967	139	100	Roads	Monroe County	47408	47408	BL
394968			Roads	Monroe County	47405	47405	BL
394969	198	101	Roads	Monroe County	47405	47405	BL
394970	199	100	Roads	Monroe County	47404	47404	BL
394971	199	100	Roads	Monroe County	47408	47408	BL
394972	199	100	Roads	Monroe County	47408	47408	BL
394973	299	200	Roads	Monroe County	47408	47408	BL

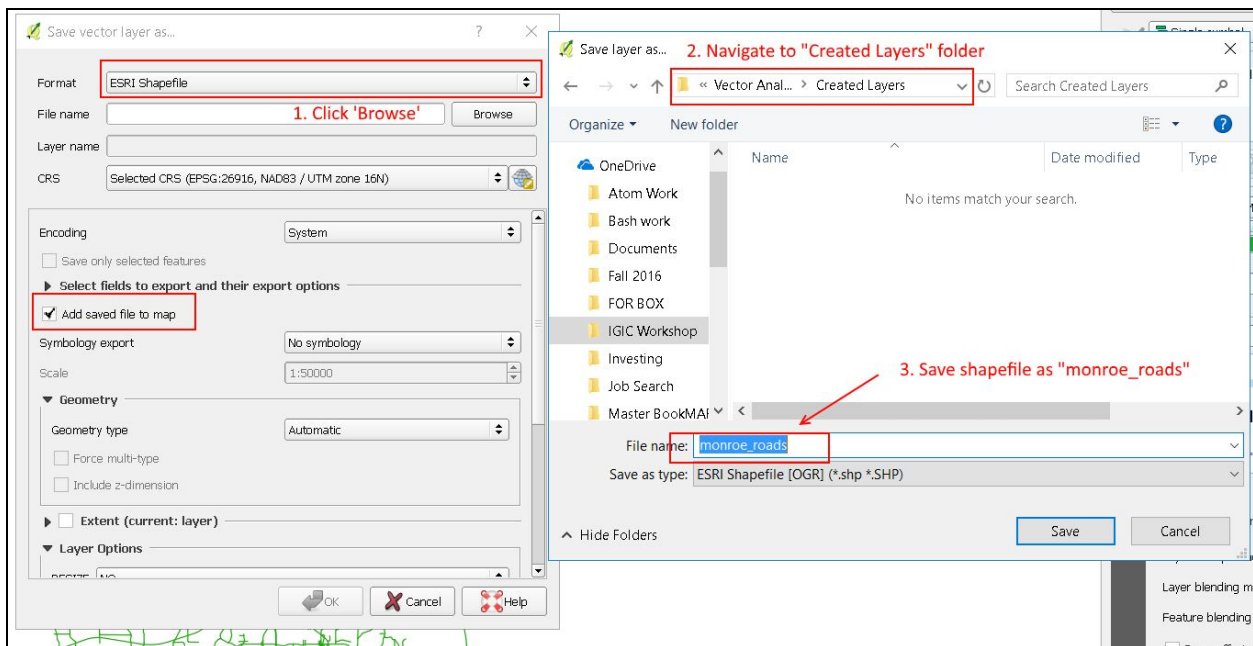
Show All Features



We will use the 'Origin' field.  
Go to **Layer Properties**>>>**General**



You should now just have Monroe county streets. Now we will save this as a shapefile.  
>>>**Right click** on the layer and select **'Save As'**  
**NOTE: set CRS to EPSG 102674**



Delete the **County\_Street\_Centerlines** layer, leaving only our new **monroe\_roads** layer.

## B. Add a Geojson layer

- >>>From [this link](#), click [Map Service](#) under the “Schools” layer.
- >>>Under [Layers](#), select “Schools (MHMP)”
- >>>Look at the [Fields](#) in order to decide how to query the layer.
- >>>Under [Supported Operations](#) (bottom the the page), select “Query”

To get a peek at the data, perform a general query to receive all records in the layer:

**Query: Schools (MHMP) (ID: 0)**

Where: 1. Set general "WHERE" clause

Text:

Object IDs:

Time:

Input Geometry:

Geometry Type:

Input Spatial Reference:

Spatial Relationship:

Relation:

Out Fields: 2. Receive all attributes

Return Geometry:  True  False

Return True Curves:  True  False

↓ 3. Be sure 'JSON' is selected below under "Format" ↓

- >>>Be sure ‘JSON’ is selected as the [Format](#)
- >>>Click [Query \(Get\)](#) on the bottom for the results.



Scroll down to the first records/feature to see what information is provided:

```

"features": [
  {
    "attributes": {
      "SchoolId": "IN061177",
      "EfClass": "EFS1",
      "Name": "Theodore Potter School 74",
      "Address": "1601 E 10th St",
      "City": "Indianapolis",
      "Zipcode": "46201-1901",
      "Contact": "Indianapolis Public Schools",
      "PhoneNumbe": "(317) 226-4274",
      "YearBuilt": 0,
      "NumStories": 0,
      "Cost": 515,
      "NumStudent": 0,
      "District": "5385",
      "Comment": "5574",
      "OBJECTID_1": 1,
      "GlobalID": "{24068EE6-39D7-4B26-918E-1660CF8229CC}"
    },
    "geometry": {
      "x": 574385.14300000016,
      "y": 4403839.3834000006
    }
  }
]

```

City seems to be the attribute we want to isolate in our query.

We will type `city='Bloomington'` and keep everything else the same:

**Query: Schools (MHMP) (ID: 0)**

Where:	city='Bloomington'
Text:	<input type="text"/>
Object IDs:	<input type="text"/>
Time:	<input type="text"/>

>>>Click **Query (Get)** on the bottom for the results.

>>>Under **Add Vector Layer**, this time we will choose **Protocol**, rather than File or Directory.

**Add vector layer**

Source type

File  Directory  Database  Protocol

Encoding: System

Protocol

Type: GeoJSON

URI: [http://maps.indiana.edu/arcgis/rest/services/Infrastructure/Critical\\_Fa](http://maps.indiana.edu/arcgis/rest/services/Infrastructure/Critical_Fa)

Open Cancel Help

**FINALLY:** Save the query as a shapefile with the consistent projected coordinate system:

**EPSG 102674**

## C. On Your Own

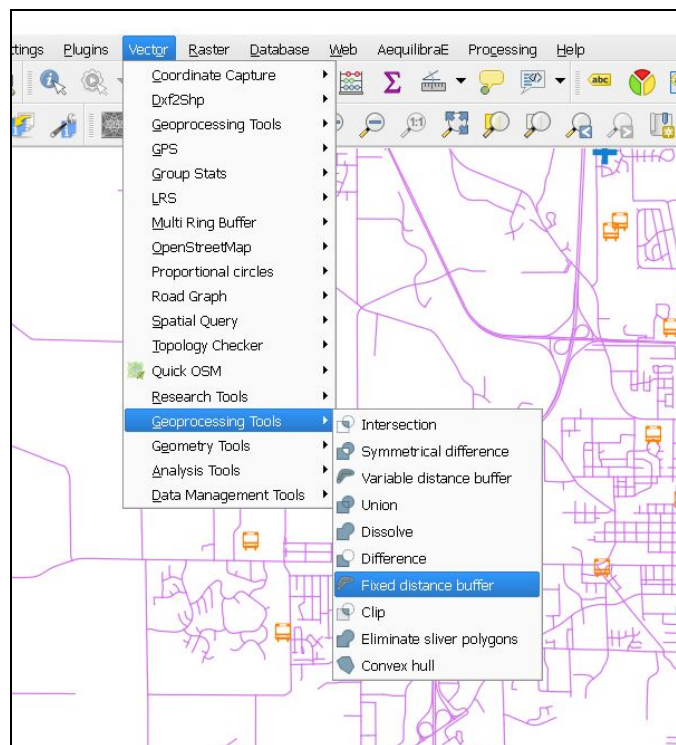
Import **fire stations** shapefile and use the query builder to isolate monroe county fire stations. Save as shapefile with **EPSG 102674** projection.

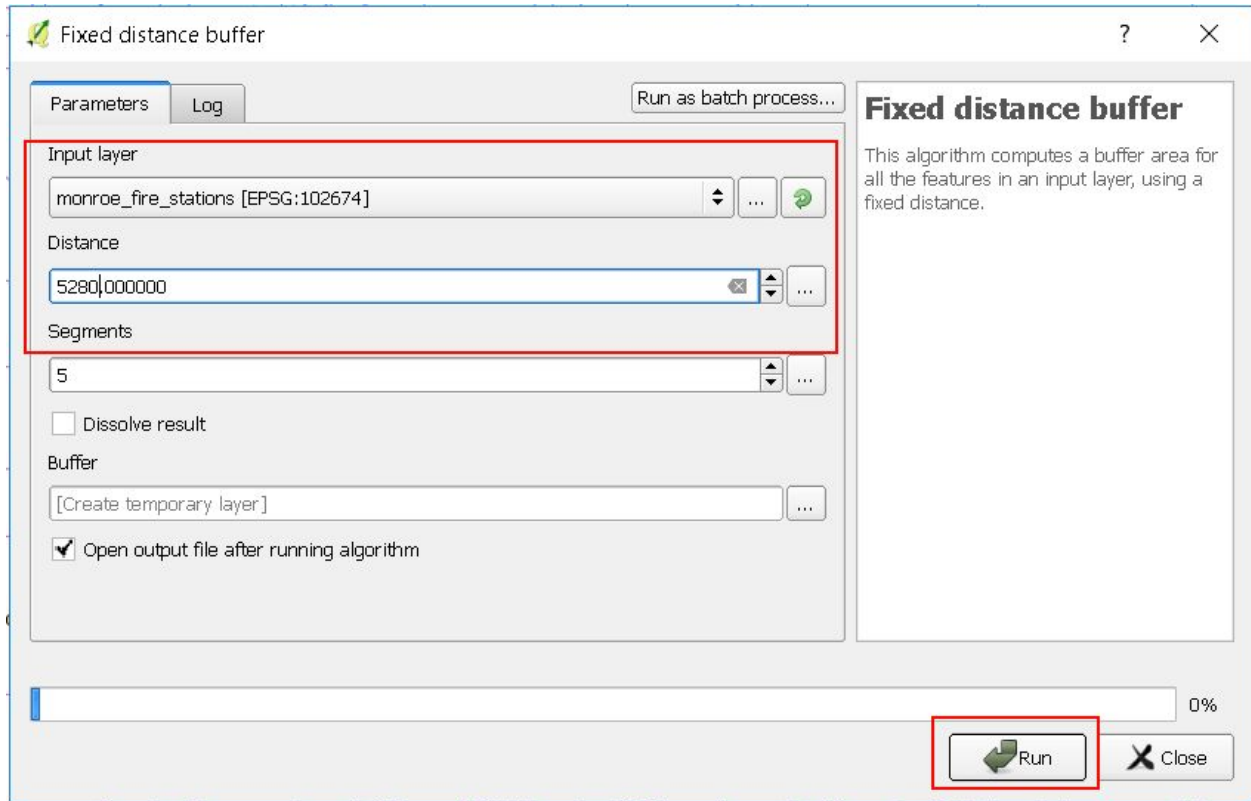
**Tip Stop:** For the Fire Stations & Schools layers, use “SVG Marker” instead of “Simple Marker.” This can be done in symbology editor. Choose symbols that best represent the entities.

## D. Distance Buffer

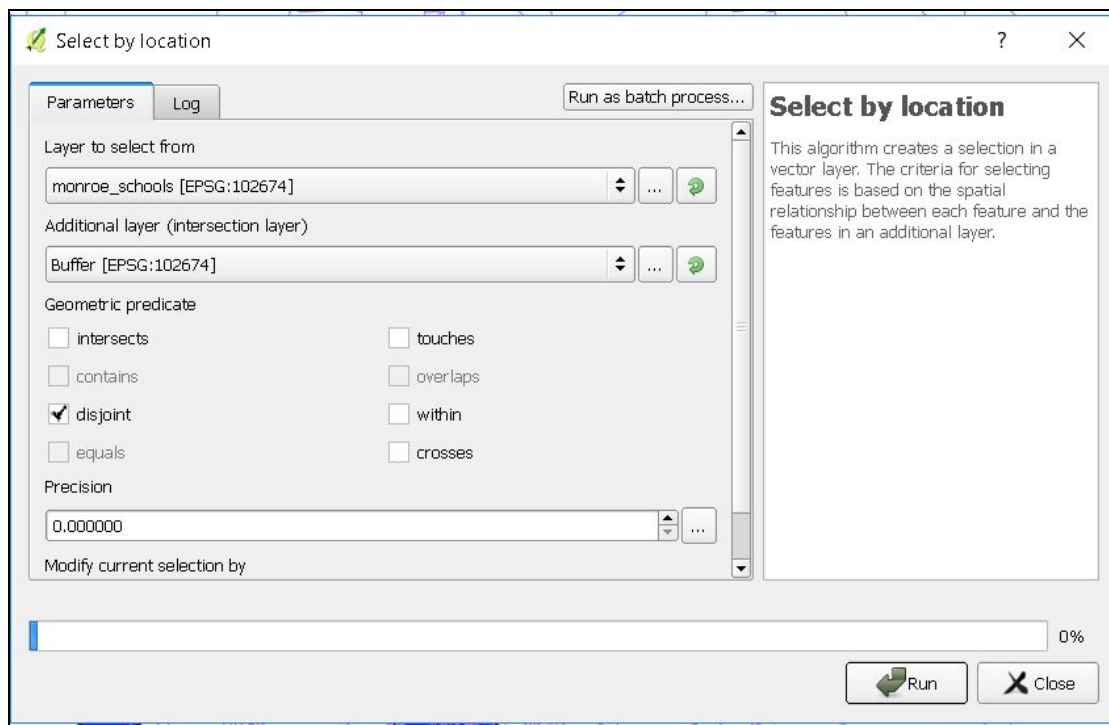
Let's answer the question: **What schools are not within one mile of a fire station?**

Here we will use the **Fixed distance buffer** tool.

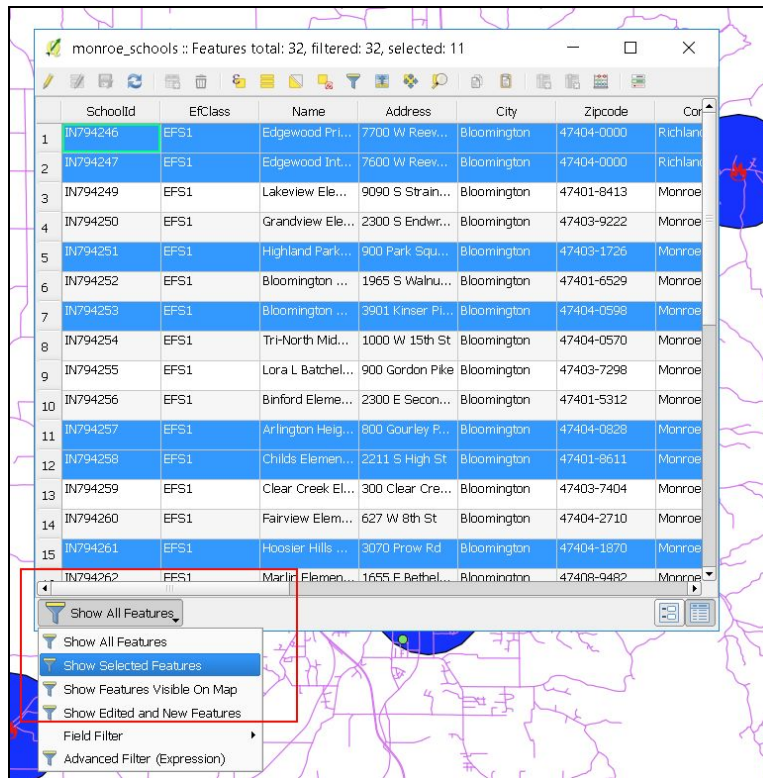




Now we can use the [select by location](#) tool to isolate which schools are not within 1 mile of a fire station. Go to [Vector > Research Tools > Select by location](#)



Click on **Open Attribute Table** icon and select **“Show Selected Features”**



monroe\_schools :: Features total: 32, filtered: 32, selected: 11

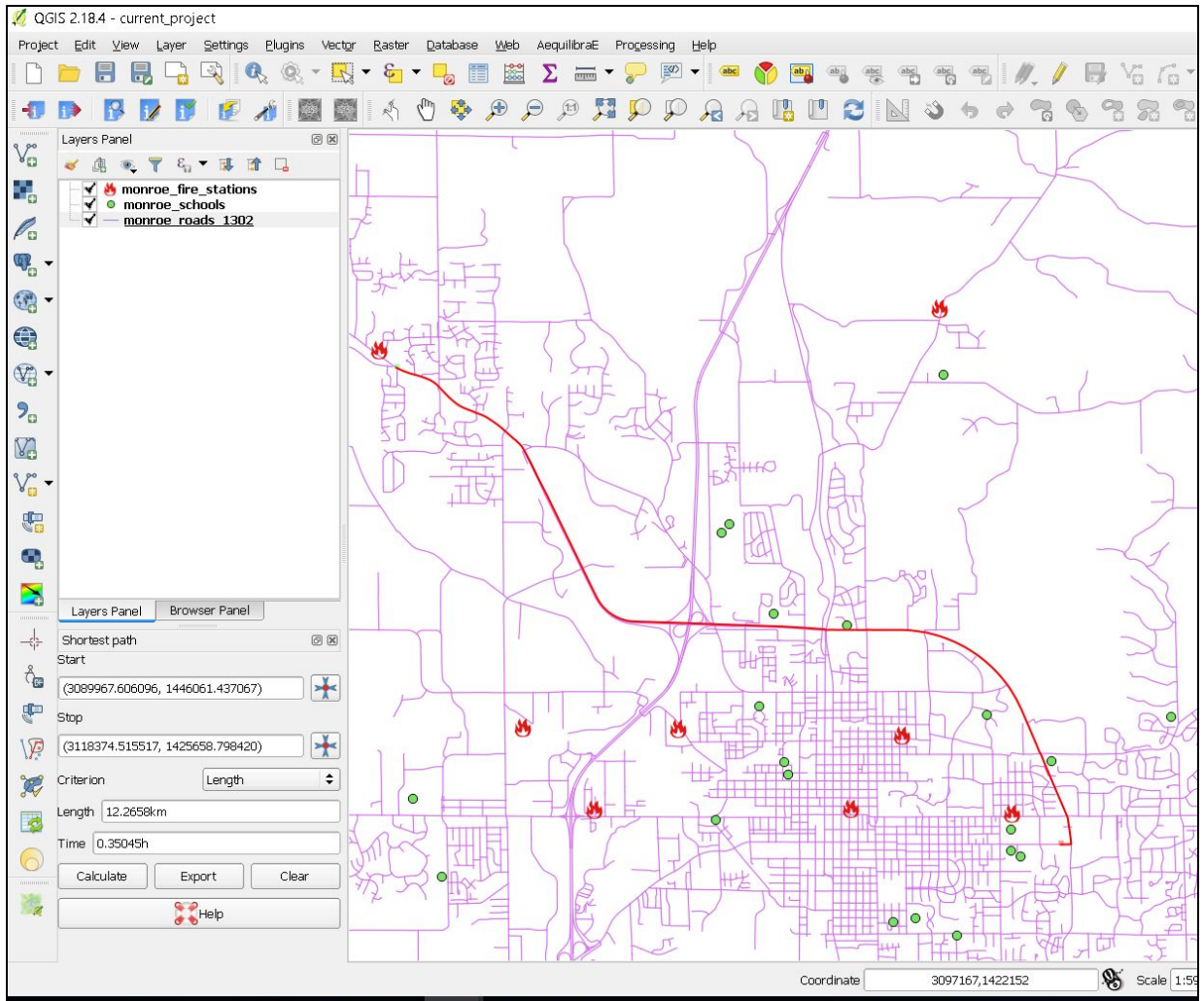
	Schoolid	EFclass	Name	Address	City	Zipcode	Cor
1	IN794246	EFS1	Edgewood Pri...	7700 W Reev...	Bloomington	47404-0000	Richland
2	IN794247	EFS1	Edgewood Int...	7600 W Reev...	Bloomington	47404-0000	Richland
3	IN794249	EFS1	Lakeview Ele...	9090 S Strain...	Bloomington	47401-8413	Monroe
4	IN794250	EFS1	Grandview Ele...	2300 S Endwr...	Bloomington	47403-9222	Monroe
5	IN794251	EFS1	Highland Park...	900 Park Squ...	Bloomington	47403-1726	Monroe
6	IN794252	EFS1	Bloomington ...	1965 S Walnu...	Bloomington	47401-6529	Monroe
7	IN794253	EFS1	Bloomington ...	3901 Kinser Pl...	Bloomington	47404-0598	Monroe
8	IN794254	EFS1	Tri-North Mid...	1000 W 15th St	Bloomington	47404-0570	Monroe
9	IN794255	EFS1	Lora L. Batchel...	900 Gordon Pike	Bloomington	47403-7298	Monroe
10	IN794256	EFS1	Binford Eleme...	2300 E Secon...	Bloomington	47401-5312	Monroe
11	IN794257	EPS1	Arlington Heig...	800 Gourley P...	Bloomington	47404-0828	Monroe
12	IN794258	EPS1	Childs Elemen...	2211 S High St	Bloomington	47401-8611	Monroe
13	IN794259	EPS1	Clear Creek El...	300 Clear Cre...	Bloomington	47403-7404	Monroe
14	IN794260	EPS1	Fairview Elem...	627 W 8th St	Bloomington	47404-2710	Monroe
15	IN794261	EPS1	Hoosier Hills ...	3070 Prow Rd	Bloomington	47404-1870	Monroe
	IN794262	EPS1	MacLir Elemen...	1655 E Bethel...	Bloomington	47408-9482	Monroe

Show All Features

- Show All Features
- Show Selected Features
- Show Features Visible On Map
- Show Edited and New Features
- Field Filter
- Advanced Filter (Expression)

## E. Shortest Path

>>>Install the “Road Graph” plugin.



## F. Spatial Statistics Tools

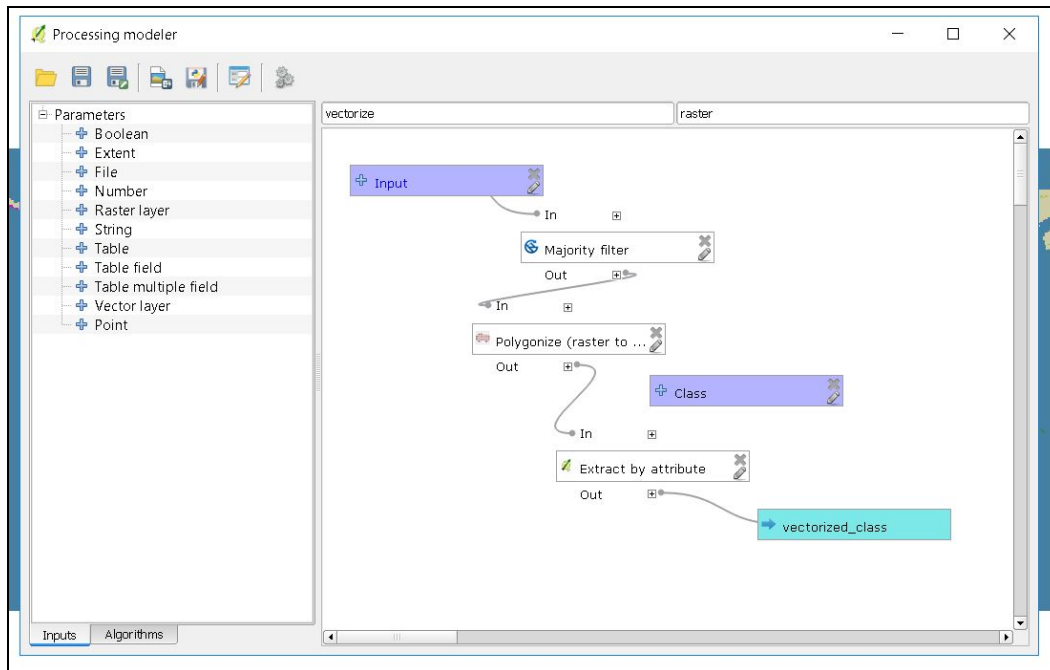
- Delete all layers
- New Project
- Set project CRS: 102674
- Add roads layer
- Add Indy tiff
- Create convex hull around roads ([Vector>>>Geoprocessing Tools](#))
- Edit polygon to fit in tiff (as done above)
- “Random points in layers bounds”
- Install “Point Sampling tool” Plugin
- [Plugins>>>Analyses>>>Point Sampling tool](#)
- [Vector>>>Analysis Tools>>>Basic Statistics for numeric fields](#)
- Digitize 3 points to **create new layer**
- [Vector>>>Analysis Tools>>>Distance Matrix](#)
- (Summary distance matrix, 1 nearest k target point)
- [Vector>>>Analysis Tools>>>Nearest Neighbor Analysis](#)
- [Vector>>>Analysis Tools>>>Mean coordinates](#)
- To compare point with polygon centroid: [Vector>>>Geometry Tools>>>Polygon Centroid](#)
- Go to tiff layer properties>>>[Histogram](#)>>>Compute Histogram(if not already there)
- You can save the histogram in a # of formats
- See more statistics in [Metadata](#)
- Much more analysis available in Processing>>>[Toolbox!!!](#)

## 10. Raster Data Demo

In this section, I rely heavily on [tutorials at this site](#).

### A. Vectorizing Land Cover Data with **Processing Modeler**

- ❑ [MODIS Land Cover 2001 to 2012](#) - Identify Change in Grasslands (ND = 10)
- ❑ Import both years (**Land Cover 2001 to 2012** folder)
- ❑ Create a model: **Input > Majority Filter > Polygonize > Extract by attribute > Output**



- ❑ Save the model
- ❑ Under **Processing Toolbox**, go to “Models” and select the model you want to run
- ❑ Select parameters (Input and Class Value)

## B. Terrain Data Work + Google Earth!

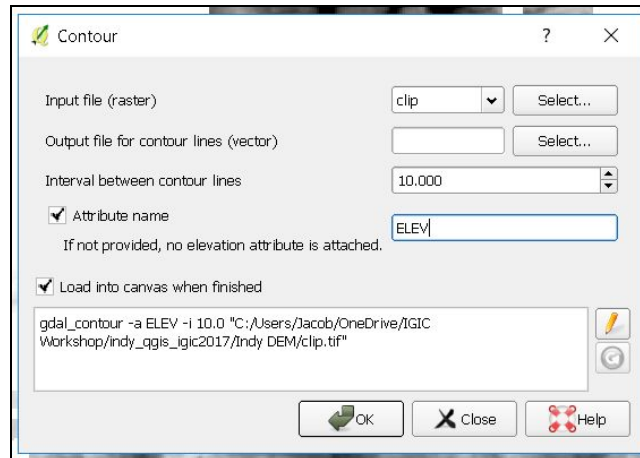
>>>Import city boundary layer (from “OSM Bloomington” folder)

>>>Import indy.tif from “Indy DEM” folder

>>>Raster>Extraction>Clipper (name output btowm\_clip; clipping mode = mask layer; mask layer = city boundary)

>>>Delete indy.tif from project

>>>Raster>Extraction>Contour:



>>>Open contour’s Attribute Table (each line has an elevation)

>>>Select highest elevation (280m = 918 ft!)

>>>Zoom to selection



>>>Raster>Analysis>DEM (mode= “hillshade”)

>>>Save contour layer as KML

>>>Double-click on it and view it in Google Earth!



## 11. BONUS

### A. Adding a WMS (Web Map Service) Layer

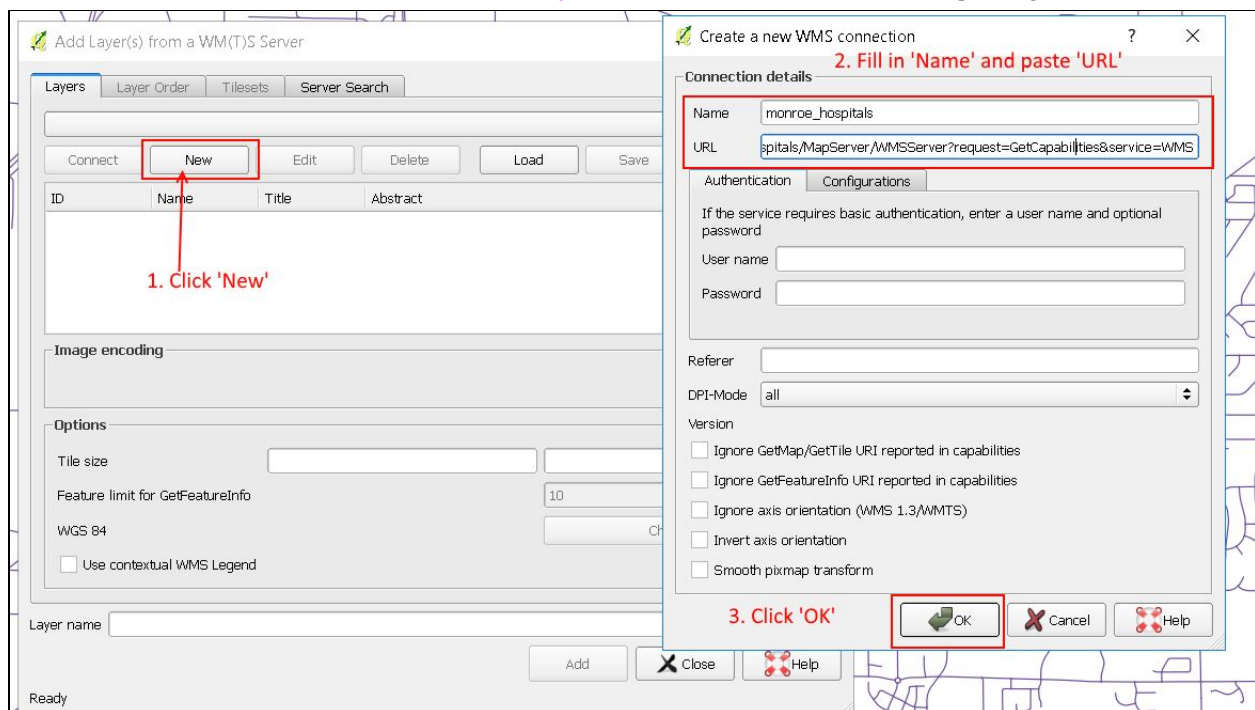
>>>Follow [this link](#) to the Indiana Map website.

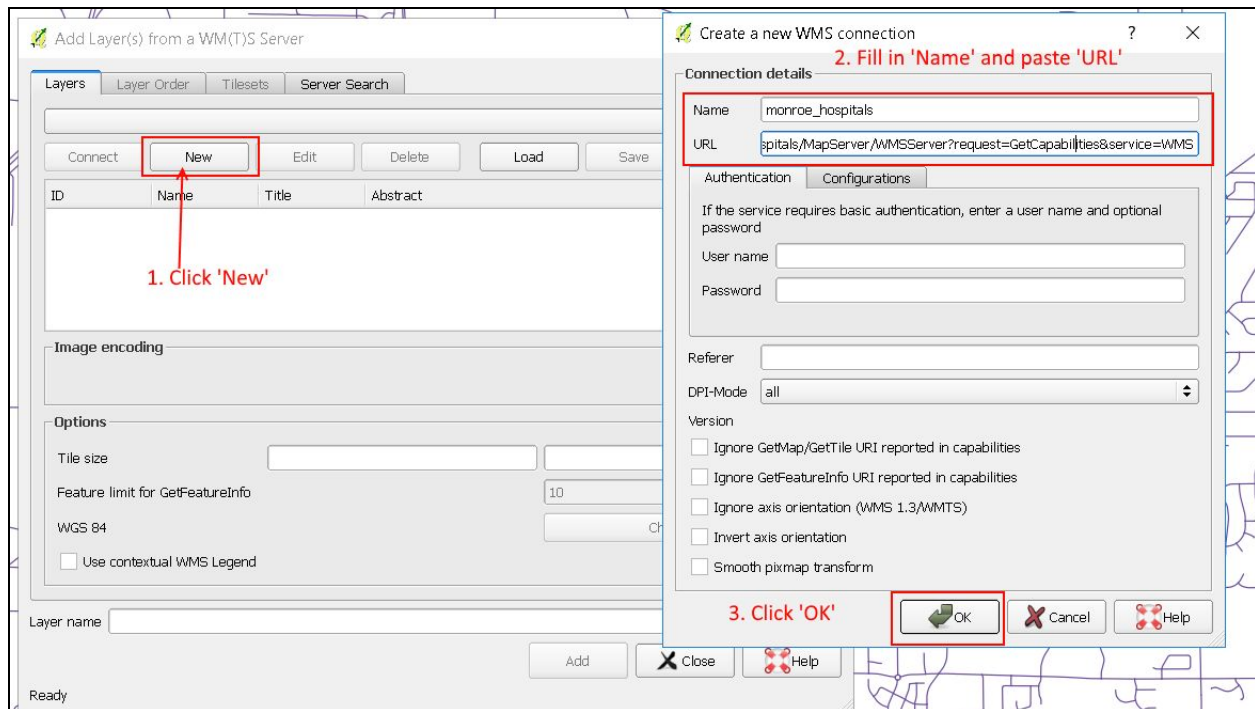
>>>Under [Hospitals](#), click on [Map Service](#)

>>>At the top of the page, click on [WMS](#)

>>>**Copy the URL**

In QGIS, Click on the [Add WMS/WMTS Layer](#) icon (  ) from the **Manage Layers Toolbar**



**Connect to layer:****B. OpenStreetMap****C. Actions****D. Python Console****E. More Plugins + Other Things**

Cloud, geocoding, [biological records tool](#), [semi-automatic classification plug-in](#), [qchainage](#) (linear referencin), [Topology Checker Plugin](#) -it could be better

[Virtual Layers](#)

**More to come! This is a working document, so more content will be added periodically.  
Check back in a couple of months!**

If you have any questions regarding QGIS (or any other Open Source GIS topic) please to do hesitate to contact **Jacob Mark**, the author of this document, at [jacobaamark@gmail.com](mailto:jacobaamark@gmail.com).