

Geocoding Cookbook V2:

A Guide to Creating a Point So You Can Make a Point



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Table of Contents

Chapter 1: Preparing Address Data for Geocoding

- 1.1 Background
- 1.2 Street Address Elements
- 1.3 Storing Address Data
- 1.4 Formatting Address Data
- 1.5 Special Cases

Chapter 2: Free online resources for Geocoding

- 2.1 Background
- 2.2 FreeGeocoder.com
- 2.3 FindLatitudeandLongitude.com
- 2.4 BatchGeo

Chapter 3: Creating Maps Using Epi Info 7.2

- 3.1 Download and Launch Epi Info 7
- 3.2 Create a Case Cluster Map Using the Epi Info 7 GeoCoder
- 3.3 Create a Case Cluster Map Using an External Data Source
- 3.4 Manipulating Map Features
- 3.5 Display >1 Case Cluster Layer or Apply >1 Filter
- 3.6 Saving Map Projects and Map Images
- 3.7 Create a Choropleth Map Using External Data Aggregated by Geographic Units
- 3.8 Tips and Other Features

Chapter 4: ArcGIS Explorer Desktop-GIS for Everyone

- 4.1 Overview, Download, & Training
- 4.2 Configuring your basemap and overlay maps
- 4.3 Adding a single point on a map
- 4.4 Adding multiple points to your map using text files
- 4.5 Adding shape files or other data
- 4.6 Adding other image files

Chapter 5: Geocoding with ArcGIS

- 5.1 The Basics
- 5.2 Geocoding Addresses
- 5.3 "Rematching" Geocoded Addresses
- 5.4 Labeling and Symbolizing the Map
- 5.5 Exporting the Map and Layout View
- 5.6 ArcMap is more than a map!

Chapter 6: ArcGIS Maps for Office

- 6.1 Installation and Signing On
- 6.2 Selecting Your Data, Location Type, and Style of Symbols
- 6.3 Editing Your Layers and Symbols





Chapter 7: Geocoding with ArcGIS Online

- 7.1 Loading the Files
- 7.2 Reviewing the Addresses and Field Types
- 7.3 Exporting Addresses

Appendix A: Additional Resources

Appendix B: Glossary





Introduction

Geocoding is the process of geo-referencing a street address to a location on an electronic map. It is an important step in spatial analysis and can be carried out with programs like EpiInfo, ArcGIS, ArcOnline, ArcGIS Maps for Office, and a number of free online tools.

Researchers within the public health field have increasingly found geocoding to be a valuable tool with many uses. Current uses include determining geographic distribution of diseases; analyzing spatial and temporal trends; mapping populations at risk; stratifying risk factors; assessing resource allocation; planning and targeting interventions; and monitoring diseases and interventions over time.

This geocoding cookbook is meant to serve as a guide for everyday use. This cookbook does not propose to address every available avenue for cartography, spatial statistics, or geographic information systems comprehensively. There are many great additional resources for this listed in Appendix A.





Chapter 1: Preparing Address Data for Geocoding

1.1 Background

The purpose of geocoding is to assign geographical coordinates to address data in order to display those data as points on a map. Geocoding matches address data of interest (e.g., hospital locations, patient residences, etc.) to a geographic information system (GIS) reference layer that contains address data for specific geographical features (e.g., street centerlines). This section provides basic tips on cleaning and formatting address data – also called “standardization” – to facilitate the geocoding process. Without proper formatting, your address data may be unmatchable or incorrectly matched to the reference layer, resulting in an inaccurate map. These tips will work for most standard geocoding tools, such as ArcGIS and EpiInfo 7.

1.2 Street Address Elements

Street addresses are comprised of several elements:

- **Number:** identifies the point along the street at which the address resides
 - Examples: **120 W MAIN ST** ; **345 AVENDIA C** ; **156 SCENIC PKW SE** ; **5870 HWY 200**
- **Directional:** the road direction or “bearing”
 - Examples: **120 W MAIN ST** ; **345 AVENIDA C** ; **156 SCENIC PKW SE** ; **5870 HWY 200**
- **Type:** a descriptor that identifies the type of street, which can come before or after the street name
 - Examples: **120 W MAIN ST** ; **345 AVENIDA C** ; **156 SCENIC PKW SE** ; **5870 HWY 200**
- **Name:** the primary name given to the street
 - Examples: **120 W MAIN ST** ; **345 AVENIDA C** ; **156 SCENIC PKW SE** ; **5870 HWY 200**
 - Note: commonly, “HWY 200” is thought of as the street name, but notice in the above examples that “HWY” is not a part of the street name.

1.3 Storing Address Data

- **Data storage:** Store your address data in a database-compatible format.
 - Examples: comma-separated values (.csv), tab-delimited text file (.tab), dBase (.dbf), Excel spreadsheet (.xls)
 - If storing data as an Excel spreadsheet, place field names in the first row and do not include formatting rows (e.g., spacer rows).





1.4 Formatting Address Data

- Fields (columns):
 - Place the street address in a single column containing the number, directional, type, and name.
 - Include all necessary address elements that are known (see “Street Address Elements” above). Omission of street types or directionals could result in mismatched records.
 - Example: 123 MAIN could include MAIN ST, MAIN DR, MAIN RD, etc.
 - Intersection names can be included; see “Special Cases” for more information.
 - Secondary address information (e.g., apartment, suite, building, floor) should not be included in the street address field; create a separate field if you need to maintain this information.
 - Place city, state, ZIP code, and attribute data (e.g., hospital bed sizes) in separate fields.
 - Include ZIP code at a minimum if possible.
 - ZIP code should be stored as a text (string) field to maintain any leading zeroes.
 - Follow dBase-compatible formats for field names (e.g., no spaces in field name, maximum of 10 characters).
- Spacing:
 - Include one space between address elements; run-on words can be confusing.
 - Examples: NORTHWEST ST is not the same as N WEST ST; HWY200 should be HWY 200
- Spelling:
 - Correct spelling of street names is critical, especially if the target area contains many streets with similar spellings.
- Punctuation:
 - To expedite the geocoding process, eliminate all punctuation except hyphens (-) in the address string.
 - If a street name contains initials, use an underscore (_) as a separator.
 - Example: S. P. MCCLANAHAN RD = S_P_MCCLANAHAN RD
- Abbreviation:
 - Abbreviations should be standardized to prevent confusion.
 - Acceptable street directional abbreviations: N, S, E, W, NW, NE, SW, SE
 - Acceptable street type abbreviations can be found in Appendix A of https://www.tn.gov/assets/entities/finance/oir/attachments/geocoding_standards.pdf.





- State, county, and local highway recommendations can be found on p. 5 of https://www.tn.gov/assets/entities/finance/oir/attachments/geocoding_standards.pdf.
- The street name should never be abbreviated.

1.5 Special Cases

- Intersections:
 - Intersections can be included as addresses as long as they are standardized.
 - Always use the same intersection “connector” (e.g., &).
 - Include all address elements that are necessary; example: BURNET RD & W 51ST ST, not BURNET & W 51ST
- Alphanumeric street numbers:
 - Alphanumeric street numbers should never be separated by a space; this type of street number is typically found in Wisconsin.
 - Example: S4W35020 BAKER ST
- Fractional street numbers:
 - The fraction should be separated from the whole number by one space, or the geocoder will interpret everything to the left of the “/” as a whole number.
 - Example: 12 1/2 MAIN ST, not 121/2 MAIN ST
- Hyphenated street numbers:
 - Hyphenated street numbers are typically found in New York, Hawaii, and parts of California. Be careful not to confuse these numbers with address ranges.
 - Example: 1210-4 is not the same as 1210-1214
- Spanish-language addresses:
 - A list of acceptable common abbreviations can be found on p. 15 of https://www.tn.gov/assets/entities/finance/oir/attachments/geocoding_standards.pdf.

References and Resources:

Much of the information in this section was adapted from:

“Geocoding Standards” developed by the Tennessee Office for Information Resources, GIS Services:

https://www.tn.gov/assets/entities/finance/oir/attachments/geocoding_standards.pdf

Tufts GIS Tip Sheet: <http://ocw.tufts.edu/data/54/626652.pdf>





Other resources include:

ArcGIS Desktop Help: <http://support.esri.com/>

United States Postal Service (USPS) Publication 28: <http://pe.usps.com/cpim/ftp/pubs/Pub28/pub28.pdf>

USPS Online Abbreviation Standards: http://pe.usps.gov/text/pub28/28apc_002.htm

Federal Geographic Data Committee (FGDC) Addressing Standards: <https://www.fgdc.gov/standards>





Chapter 2: Free online resources for Geocoding

2.1 Background

A number of websites provide free resources for geocoding street addresses. They have various advantages and disadvantages with regard to ease of use, exporting maps, and the ability to geocode addresses outside of the United States. In many cases, regardless of what the web interface looks like, you will be steered to a Google map of your geocoded points. This may be all you are interested in - if so, you can stop there. If not, you can plug the geocodes into EpiInfo's map-making tool (see Chapter 3: Creating Maps Using Epi Info 7.2) and make your own map.

***Note: geocoders are not always precise. Approximate latitudes and longitudes can be found for most addresses, especially in urban areas.** But the exact latitude and longitude can vary by a few decimal points depending on which geocoder you use.

The following list is by no means comprehensive. There are literally dozens of geocoding websites that can accommodate single postal addresses, batch addresses, or both. These are just a few sites that are easy to find and easy to use.

2.2 FreeGeocoder.com

<http://www.freegeocoder.com/> - Appropriately named, this is a straightforward site that only does forward geocoding. That is, it enables you to look up the latitude and longitude of a location using a traditional U.S. street address, but not vice-versa. Simply enter an address, hit "go," and the site delivers an interactive Google map along with your latitude and longitude coordinates.

Advantages:

- The site gives you a Google street view of your coordinates, if it is available.
- The map view can be changed from "map" to "satellite" to "terrain" as you desire
- The marker that indicates your geocoded point on the map can be dragged around to pin-point the address as you desire. The coordinates will adjust to wherever you place the marker
- The geocoder is fairly forgiving with regard to how you enter the address information.

Example: The following two formats will be geocoded identically:

- 425 5th Avenue N, Nashville, TN, 37243
- Nashville, 425 5th Avenue North, 37243, TN

Disadvantages:

- The site doesn't provide a way to export your Google map
- You will have to copy and paste the latitude and longitude if you want to do anything more than see your point on a map, and this can be cumbersome
- You can only geocode one address at a time
- The street view application only approximates your address - if you're not familiar with the address, don't assume you're looking at the precise building to which the address corresponds





Relevant screen shots from www.freegeocoder.com:

Home page:

Geocoder

Latitude and Longitude coordinates for an address

Enter an address below. With this free geocoder service, you can drag the marker around to pin-point the address to your liking. The latitude and longitude will show in the marker after you have searched or dragged the marker. Street view will display each time you search, if it is available.

Enter the: Street address, City, State



This street address geocoding service uses Google Maps API to perform searches on a supplied address to give us latitude and longitude information. This information is useful for store locators, and other features where you may require a latitude and longitude for an address.

Geocoders are not always precise, though approximate latitudes and longitudes can be found for most addresses. The database can make a best-guess based on a range of address details. Because of this, the website will let you adjust your marker accordingly and return the closest coordinate values for you.

© FreeGeocoder.com

Entering a street address, as shown in the image above, will take you to a map like this:

Geocoder

Latitude and Longitude coordinates for an address

Enter an address below. With this free geocoder service, you can drag the marker around to pin-point the address to your liking. The latitude and longitude will show in the marker after you have searched or dragged the marker. Street view will display each time you search, if it is available.

425 5th ave n., nashville, tn, 37219, usa



This street address geocoding service uses Google Maps API to perform searches on a supplied address to give us latitude and longitude information. This information is useful for store locators, and other features where you may require a latitude and longitude for an address.

Geocoders are not always precise, though approximate latitudes and longitudes can be found for most addresses. The database can make a best-guess based on a range of address details. Because of this, the website will let you adjust your marker accordingly and return the closest coordinate values for you.

© FreeGeocoder.com





2.3 FindLatitudeandLongitude.com

Homepage

<http://www.findlatitudeandlongitude.com> - The “finding latitude and longitude” website provides many tools, some of which are outside the scope of this chapter. However, the home page allows the user to select a point on a Google map, and will give approximate coordinates for that point (you don’t need an address).

The screenshot shows the homepage of 'Find Latitude and Longitude'. At the top, there's a map of North America with a blue circle over the United States. Below the map is a control panel with several sections:

- onlinemapfinder**: A blue button labeled 'CLICK HERE' with a list of steps: 1. Click Click Here, 2. Free Access - No Sign up!, 3. Get Free Directions & Maps.
- Load Location**: Input fields for Latitude, Longitude, Location, and Post Code, with a 'loaded from cache' checkbox.
- Map Coordinates of Selected Location**: A box displaying coordinates: Latitude: N 38° 41' 7.5351", Longitude: W 96° 30' 14.0625", Latitude: N 38° 41' 13.2598", Longitude: W 96° 30' 23.3737", Latitude: 38.68851°, Longitude: -96.503996°.
- Map Coordinates of Mouse**: Input fields for Latitude and Longitude, with a note 'loaded from cache'.
- Map Parameters**: A section with 'map type: ROADMAP', 'Dims: 1075 x 600 pixels', and a 'current link' field.
- Selected Location (Approximate)**: A box showing an address: '1400-1410 River Road West Rd, Council Grove, KS 66846, USA', Latitude: 38.680632°, Longitude: -96.5001°, Accuracy: street_address, Status: 200.
- Menu**: A list of links including 'SHIRE', 'Home', 'Lat/Long to Address', 'Address to Lat/Long', 'Batch Geocode', 'Batch Reverse Geocode', 'Location Searches', 'Reverse Geocodes', 'Antipodes Map (Tunneling Map)', 'GPS Coordinates Converter', 'Feedback', 'Record Lat/Longs', and 'How You Found Us... Searches'.

On the right side of the page, there is a yellow advertisement for 'WHICH WICH' with the text 'GET \$2 OFF YOUR ONLINE ORDER' and a 'COKE' promo code. Below the ad is a Coca-Cola logo and a red cup.

Batch geocoding

The site also geocodes batch address information. The tool for that can be hard to find from the home page - instead go to the batch geocoding page: <http://www.findlatitudeandlongitude.com/batch-geocode/#.T7VfalYERA>

This geocoder allows you to paste address information, one address per line in an input box:





Batch Geocoding
MapQuest API
 Get Started With MapQuest Developer Sign Up Now & Get Your Free API Key

Input

Batch Geocode Settings
 include failed geocodes in output
 include header row in output
 delimiter: tab
 format: " dac " geocode

Batch Geocode Output Fields

Batch Geocode Results
 Processed: 0
 Time: 0
 Address: 0
 Street: 0
 Locality: 0
 General: 0
 FAIL: 0

Output

Instructions
 To convert addresses or locations into latitude-longitude coordinate pairs:
 1. enter your addresses/locations in the input field, one address per line, up to a few hundred addresses.
 2. select the desired outputs via the checkboxes in the "Batch geocode output fields" box.
 3. Choose whether or not to include failed geocodes in your output via the checkbox in the "Batch Geocode Settings" box.
 4. Likewise, choose whether or not you want a header row of field labels at the top of your output in the same box.
 5. Select a field delimiter (separates the output fields) for your output in the same box.

Notes
 *Selecting comma as the delimiter will cause the address fields to be double quote

Menu
 Home
 Lat/Long to Address - Address to Lat/Long
 Batch Geocode - Batch Reverse Geocode
 Location Searches - Reverse Geocodes
 Antipodes Map (Turning Map)
 GPS Coordinates Converter
 Feedback - Record Lat/Longs
 How You Found Us - Searches

Contact Information
 Developer: David B. Ziefel/hofer
 Email: webmaster
 Support Us: Please Donate

Sign Up Recommend this on Google+
 Like Sign Up to see what your friends like

The geocoder also provides instructions for how to enter the address data. If you're doing batch geocoding, most likely you have your address information stored in a spreadsheet. Simply copy and paste directly from the spreadsheet into the "input window." There are a few options for how to display the output. A sensible choice is the tab-delimited format. If you choose the comma -delimited format, your street addresses will be flanked by quotation marks. After you have specified the output format, (this is achieved by selecting from the "batch geocode settings" window to the right of the input window), press the "geocode" button. Here is an example of the output from a batch geocoding operation:

Output

original address	latitude	longitude
street zip state	city	country
5195 East Weaver Drive USA 39.6001199	80121 CO -104.927151	Centennial
3203 Woodstock Boulevard Portland USA	97202 OR 45.4793039	-122.6293406
6207 SE Windsor Court USA 45.5046924	97206 OR -122.5991868	Portland,
6205 25th Avenue NE USA 47.67399	98115 WA -122.300975	Seattle,
1008 Ozark Street USA 36.163561	37206 TN -86.752857	Nashville,
425 5th Avenue NE USA 36.167186	37243 TN -86.7828914	Nashville,
1005 10th Avenue South USA 36.167186	37243 TN -86.7828914	Nashville,





It looks disorganized but if you select all the information in the window, you can copy and paste it into an Excel spreadsheet and it will come out as you would expect. The final two columns on the right represent the latitude and longitude, respectively:

	A	B	C	D	E	F	G	H	I	J	K	L
1	original address	latitude	longitude									
2	street	zip	state	city	country							
3	5195 East Weaver Drive	80121	CO	Centennia	USA	39.6001	-104.927					
4	3203 Woodstock Boulevard	97202	OR	Portland	USA	45.4793	-122.629					
5	6207 SE Windsor Court	97206	OR	Portland,	USA	45.5047	-122.599					
6	6205 25th Avenue NE	98115	WA	Seattle,	USA	47.674	-122.301					
7	1008 Ozark Street	37206	TN	Nashville,	USA	36.1636	-86.7529					
8	425 5th Avenue NE	37243	TN	Nashville,	USA	36.1672	-86.7829					
9	1005 13th Avenue South	37212	TN	Nashville,	USA	36.1459	-86.7877					
10	121 Fairview St	30030	GA	Atlanta	USA	33.7812	-84.2847					
11												

Advantages:

- The geocoder accommodates batch entries, and can extract appropriate street, city, state, and country parameters even if they were all together in the same spreadsheet cell (some sites require that the different address components come from separate cells)
- The geocoder can also reverse geocode (find addresses from latitude and longitude information). To do this, paste your latitude and longitude information for each location on the same line, separated by commas as in this example: 39.6001199, -104.927151
- This site provides accuracy measures along with your coordinates, estimating how much confidence the geocoder has in the accuracy of the information
- The home page of the site (<http://www.findlatitudeandlongitude.com>) does allow you to map coordinates on a Google map

Disadvantages:

- The map this site produces is not exportable





2.4 BatchGeo

<https://batchgeo.com> - This is another great website that provides many tools, including single and batch geocoding. Simply paste your address information into the input window. Hit “map now” or, if you are less confident about your address information, there is a button for validating your column headings.

pro sign-in ▾

make maps features pro pricing mobile support blog

Paste your location data below to map it:

Example Address	City	State	Zip	Name	Phone Number	Group	URL
1 Crossgates Mall Road	Albany	NY	12203	Apple Store Cross Gates	(518) 869-3192	Example Group 1	http://www.apple.com/retail/c...
Duke Rd & Walden Ave	Buffalo	NY	14225	Apple Store Walden Galleria	(716) 685-2762	Example Group 2	http://www.apple.com/retail/w...
630 Old Country Rd.	Garden City	NY	11530	Apple Store Roosevelt Field	(516) 248-3347	Example Group 3	http://www.apple.com/retail/r...
160 Walt Whitman Rd.	Huntington Station	NY	11745	Apple Store Walt Whitman	(631) 425-1563	Example Group 3	http://www.apple.com/retail/w...

(Don't forget to include some header columns - You can also try our [Spreadsheet Template](#), or hit "Map Now" and try it out with our example data.)

Validate & Set Options or Map Now

***Note:** This site is noteworthy for allowing you to produce an exportable map as a KML file, which can be opened in Google Earth. It is possible to view the latitude and longitude coordinates for your map points by hovering the cursor over the point while in Google Earth. It is also possible to open the KML file in Excel. The spreadsheet will look like a minor disaster, but your coordinates will be there, on the same line as their corresponding addresses.

Advantages:

- BatchGeo can geocode batch entries
- BatchGeo Produces an Google map along with coordinates
- The site produces an exportable Google map, which can be opened in Google Earth

Disadvantages:

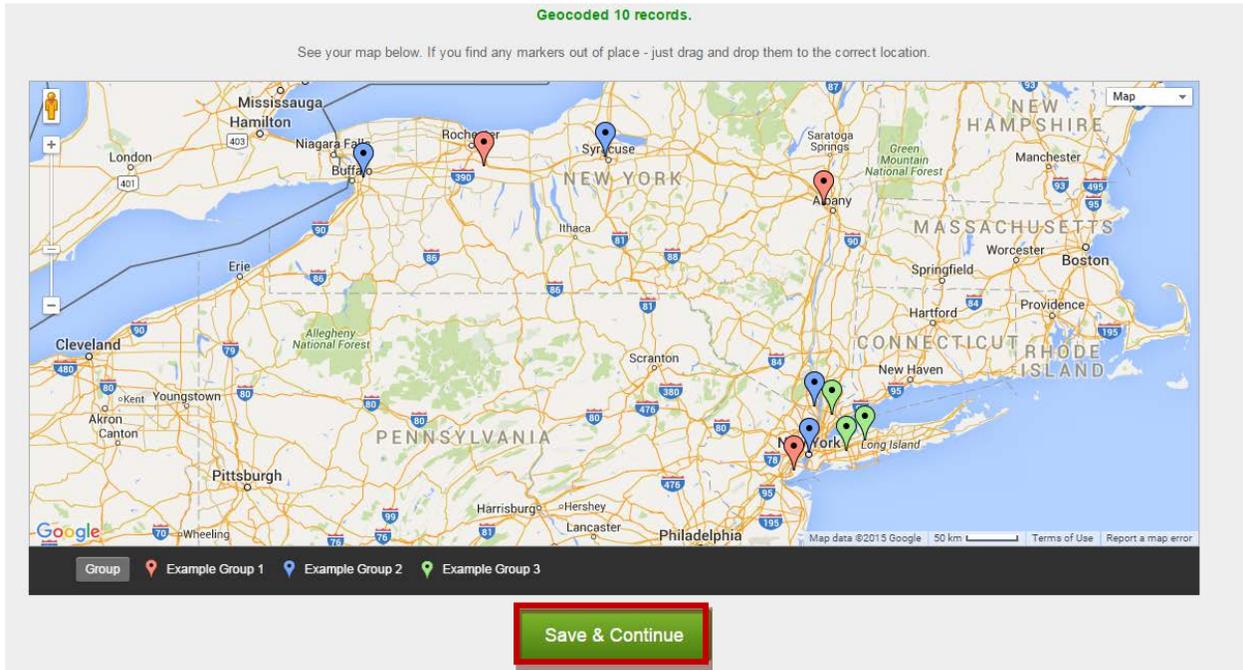
- If you cannot handle KML files, you will have challenges opening the map this geocoder produces. This would most likely be because your IT department has helpfully blocked you from installing software by yourself (for example, if you work for the CDC)
- If you open your KML file in an Excel spreadsheet, you may be exposed to intimidating spreadsheet gibberish as well as you longitude and latitude coordinates
- If you want to save your map and extract your coordinates, you must agree to give your email address to Google so that they can begin advertising GIS products to you subliminally as you





conduct your routine email commerce. This is not a big deal unless you are prone to impulsive software purchases

Enter addresses by cutting and pasting into the input window as for the other geocoding sites discussed. Hit the green “Map Now” button, or the pale “Validate & Set Options” button if you wish to validate your column headings (not a bad idea). Your map will appear, as in the example pictured here:



If you press the “save and continue” button, you will be taken to another window that forces you to name your map and enter your email address, so you can be sent instructions for editing your map.

Title

Description

Email

Share Public Unlisted Password Protect (Pro Only)

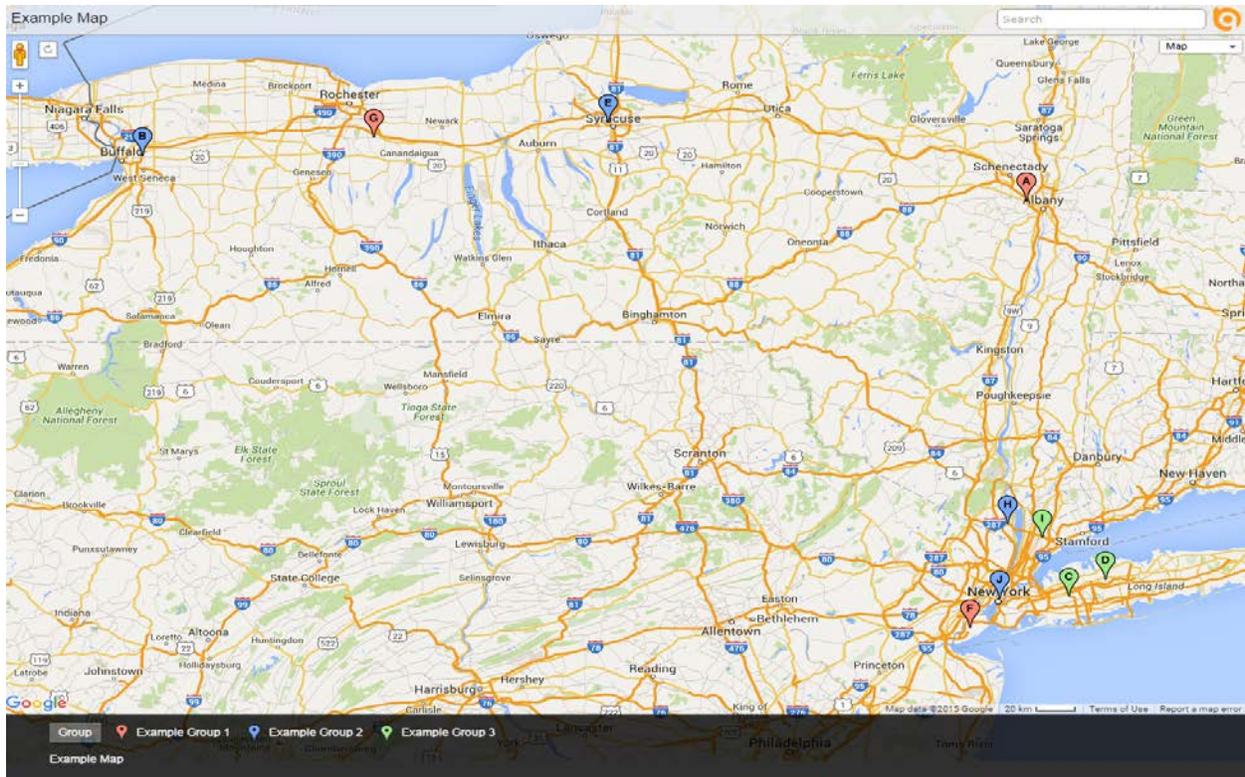
I have read and agree to the BatchGeo [Terms of Service](#).





If you are uncomfortable providing your email address, just remember that Google already knows who you are and everything about you that would be relevant for advertisers/Homeland Security, so don't fret about it and move on to your KML file. Name your map something sensible, and be sure to tick the "please contact me with special offers" box so that BatchGeo can harass you about buying the "Pro" version of this software. 😊

At this point, the site will email you a link to your map, and instructions for editing it. It will also open the map in what looks like just another browser window, but *at the very bottom of the page is a link that says "Download Sample Map Google Earth."* Depending on your default settings, this will save the KML file to somewhere on your computer, most likely the temporary internet files on your computer. You can open the downloads window from your browser in order to find the file (the file path to your temporary internet files folder can be tricky to locate).





Scroll to the bottom of the page to find the download link



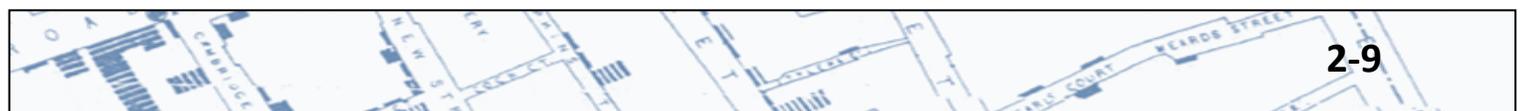
2000 Richmond Ave Staten Island, NY 10314 Phone Number: (718) 477-4180 Group: Example Group 1	E
Apple Store Eastview 7979 Victor Road Victor, NY 14564 Phone Number: (585) 421-3030 Group: Example Group 1	F
Apple Store Palisades 1591 Palisades Center Drive West Nyack, NY 10994 Phone Number: (845) 353-6756 Group: Example Group 2	G
Apple Store The Westchester 125 Westchester Ave. White Plains, NY 10601 Phone Number: (914) 428-1877 Group: Example Group 3	H
Apple Store SoHo 103 Prince Street New York, NY 10012 Phone Number: (212) 226-3126 Group: Example Group 2	I
Download Example Map Google Earth (KML)	

If you are more interested in the Map, the best way to view it and manipulate it is with Google Earth. Downloading and installing Google Earth is easy. Simply go <http://www.google.com/earth/index.html>. Follow the download instructions, and Google will walk you through the rest. You can then open your KML file in Google Earth.

If you are more interested in the coordinates themselves, and less interested in a map, you can still get those through BatchGeo. When you download your KML file, simply open it with Excel. You might get something that looks like this:

	E	F	G	H
1	ns1:description2	ns1:coordinates	ns1:address	ns1:styleUrl
2	<div>country: USA</div>	-104.92715038243,39.600122675678,	6195 East Weaver Drive Centennial, CO 80121	#0
3	<div>country: USA</div>	-122.63191889567,45.481259601225,	8203 Woodstock Boulevard Portland, OR 97202	#0
4	<div>country: USA</div>	-122.59918678057,45.504693110449,	6207 SE Windsor Court Portland,, OR 97206	#0
5	<div>country: USA</div>	-122.30097204462,47.673993193423,	6205 25th Avenue NE Seattle,, WA 98115	#0
6	<div>country: USA</div>	-86.752853906101,36.163563438639,	1008 Ozark Street Nashville,, TN 37206	#0
7	<div>country: USA</div>	-86.782890712039,36.167187661364,	425 5th Avenue NE Nashville,, TN 37243	#0
8	<div>country: USA</div>	-86.787698168408,36.145950991188,	1005 13th Avenue South Nashville,, TN 37212	#0
9	<div>country: USA</div>	-84.284702024058,33.781243952952,	121 Fairview St Atlanta, GA 30030	#0
10				

Remain calm. There is some extraneous information in your spreadsheet, but the coordinates are readily visible, and obviously correspond to addresses appropriately placed in the adjacent column.





Chapter 3: Creating Maps Using Epi Info 7.2

3.1 Download and Launch Epi Info 7

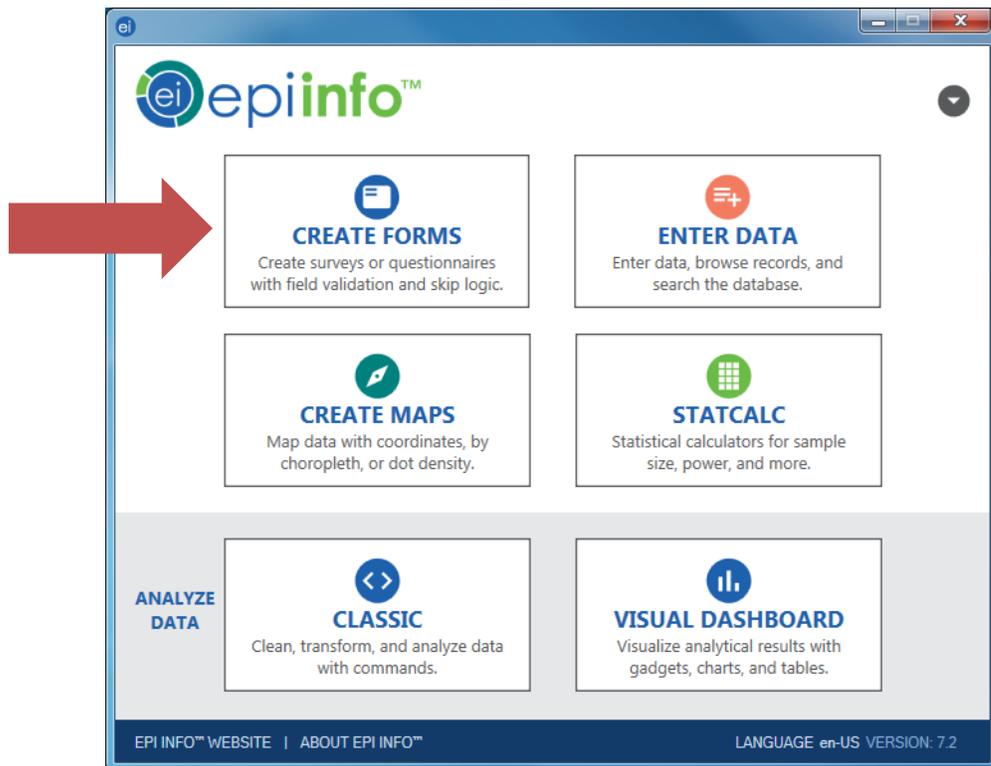
Instructions for downloading and installing Epi Info 7 are available at <http://www.cdc.gov/epiinfo/7/index.htm>. After the download has been completed, follow these instructions for producing a case cluster map using the Epi Info 7 GeoCoder.

3.2 Create a Case Cluster Map Using the Epi Info 7 GeoCoder

Launch the Epi Info 7 application by double clicking the Epi Info 7 Icon on your desktop.

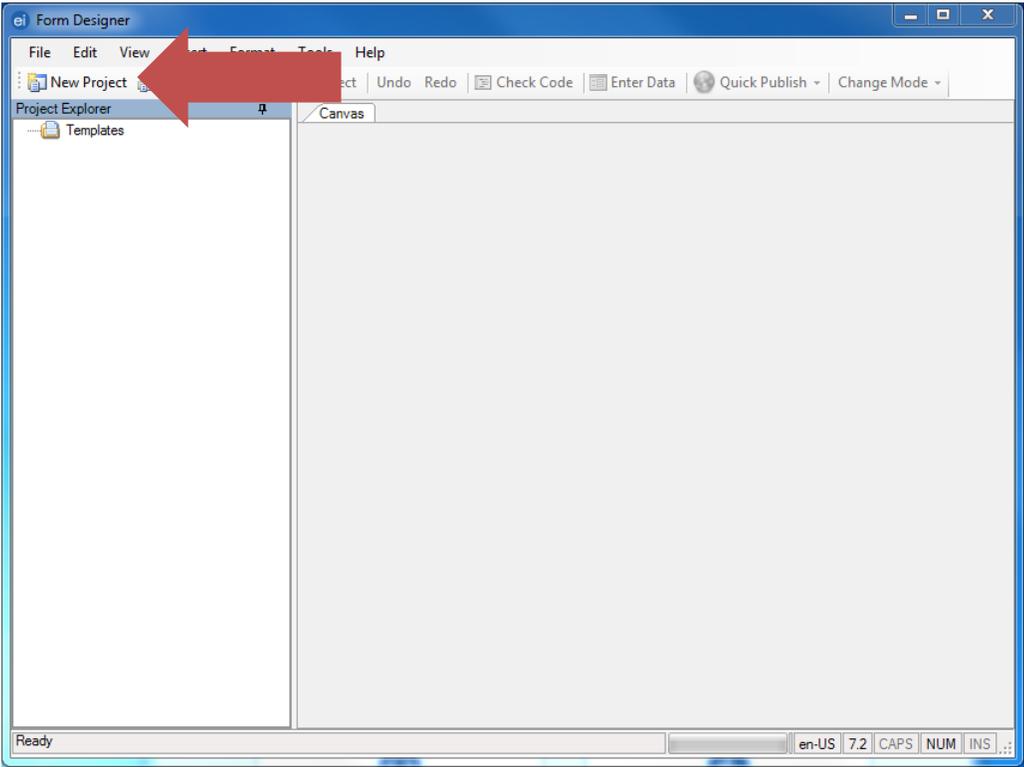


Click the Create Forms tab on the Epi Info 7 Menu.



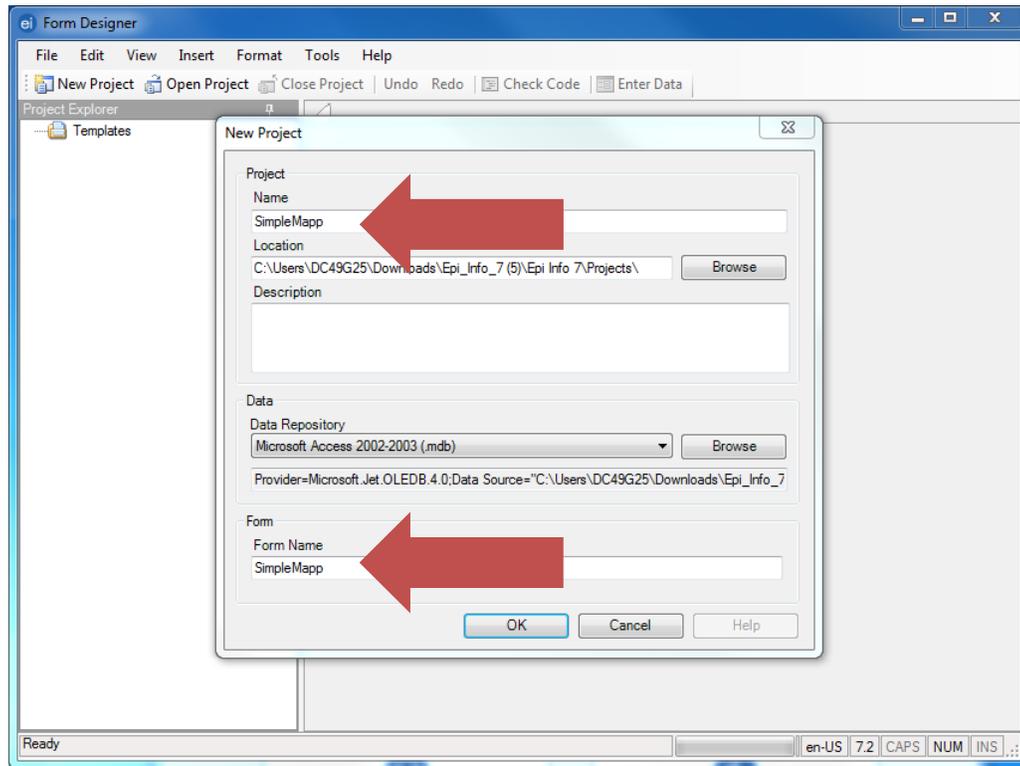


Click New Project



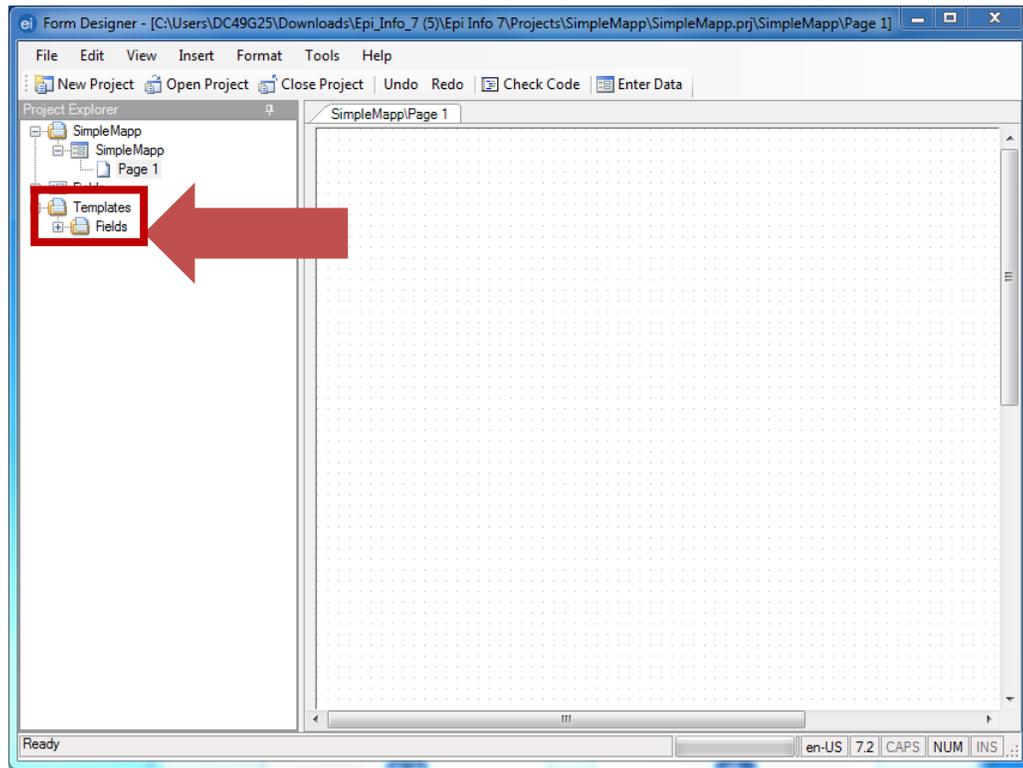


Name the Project and Form. In this example, the project name and form name is “SimpleMapp”. You can assign any names you choose, but spaces and special characters are not allowed.



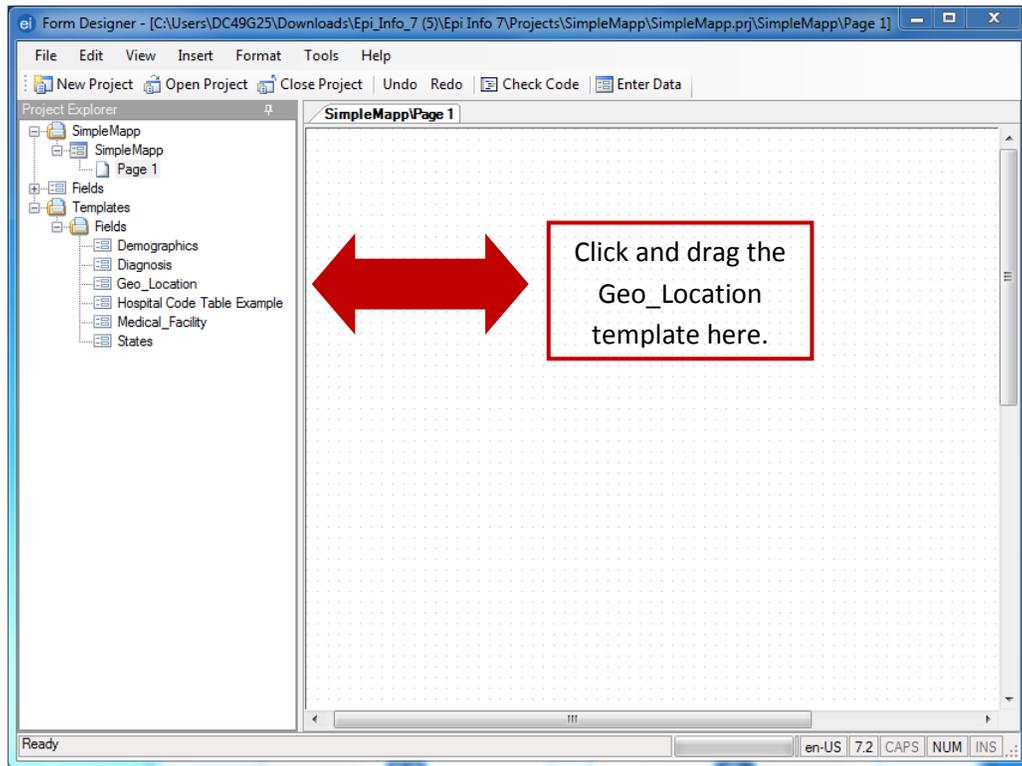


Expand the Templates: Fields menu by clicking the small + to the left of the Fields folder.



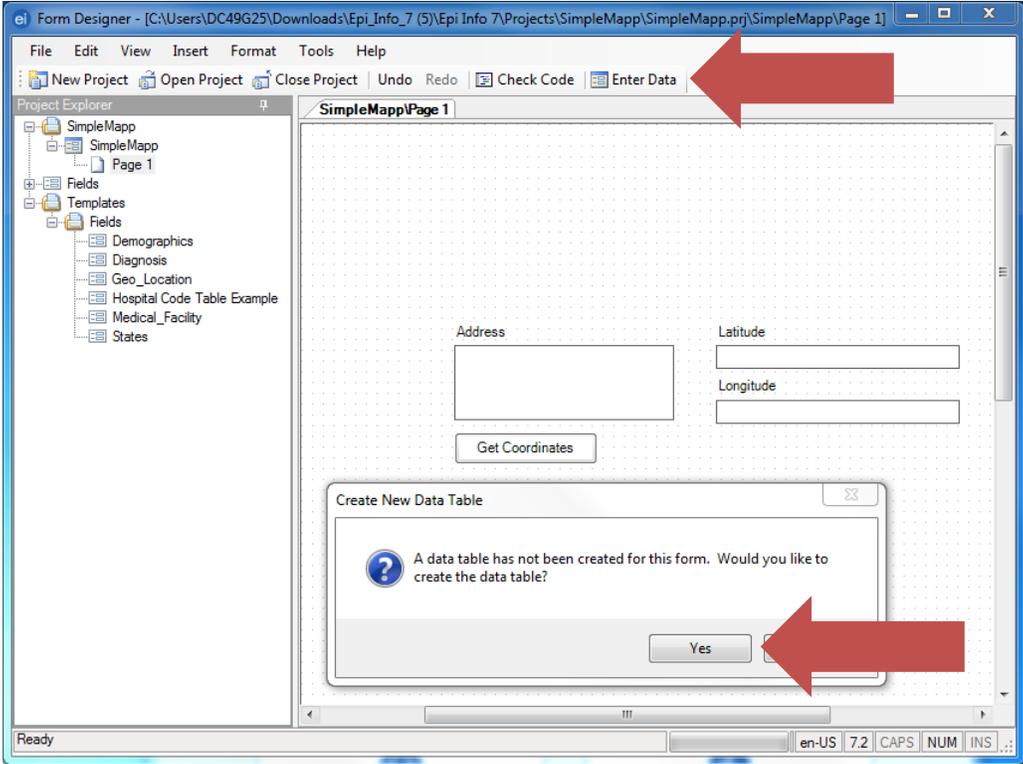


Click and drag the Geo_Location template to the Page 1 canvas.



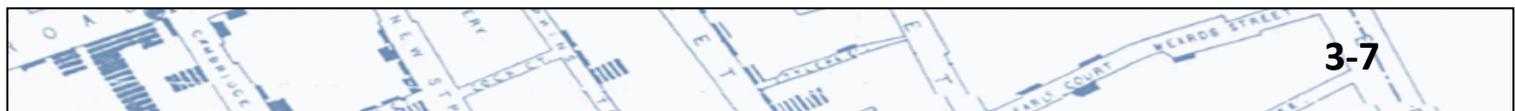
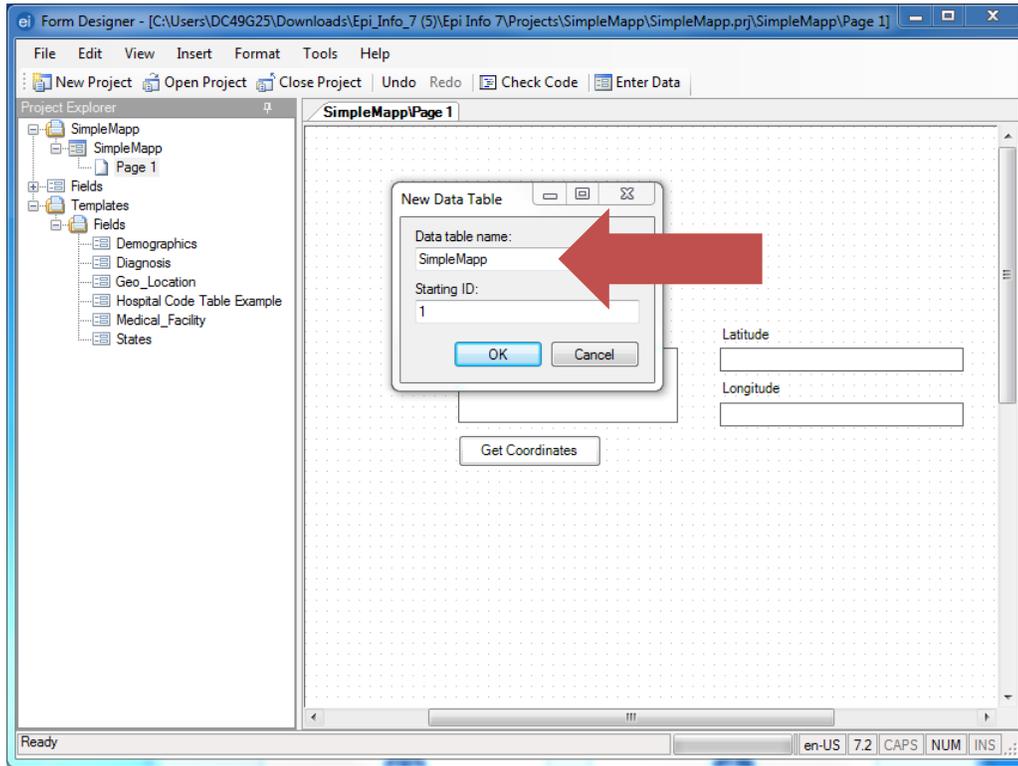


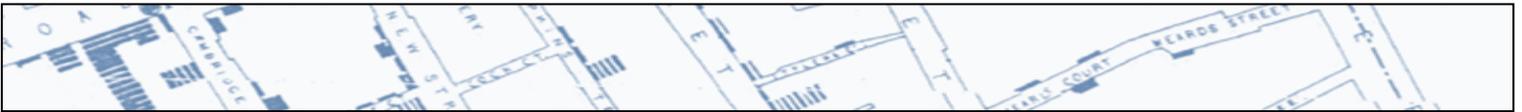
Once your canvas contains the Geo_Location fields as shown below, click Enter Data to switch to the data entry module of Epi Info 7. Then click Yes to Create New Data Table.



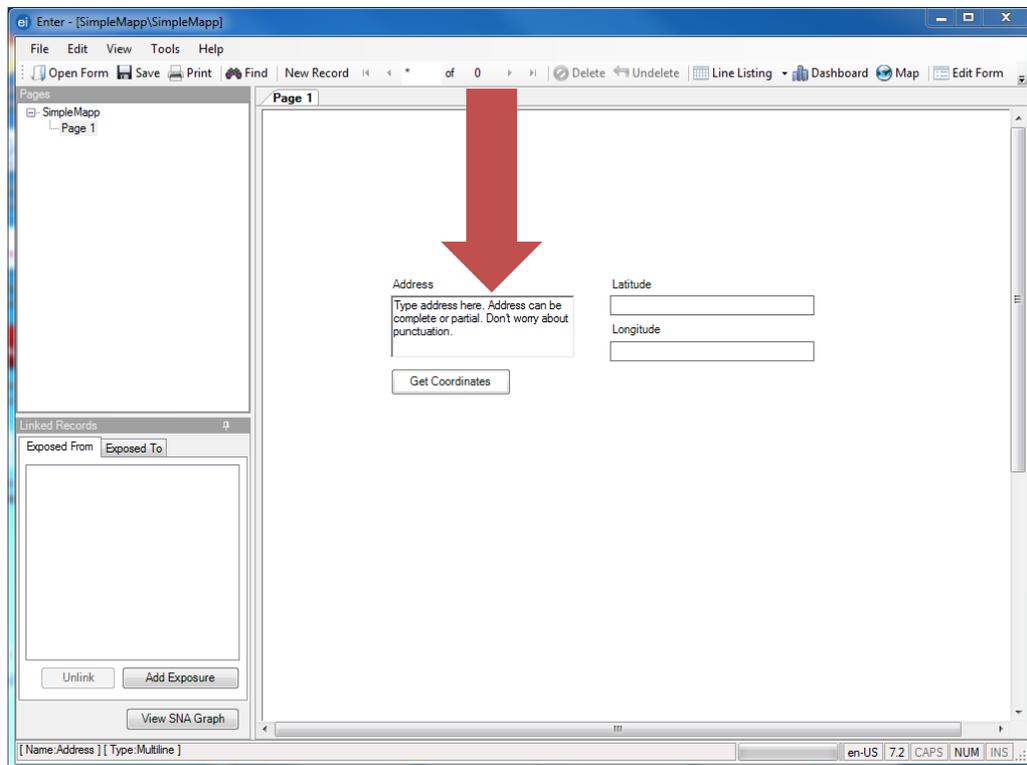


Enter a name for your Data Table.



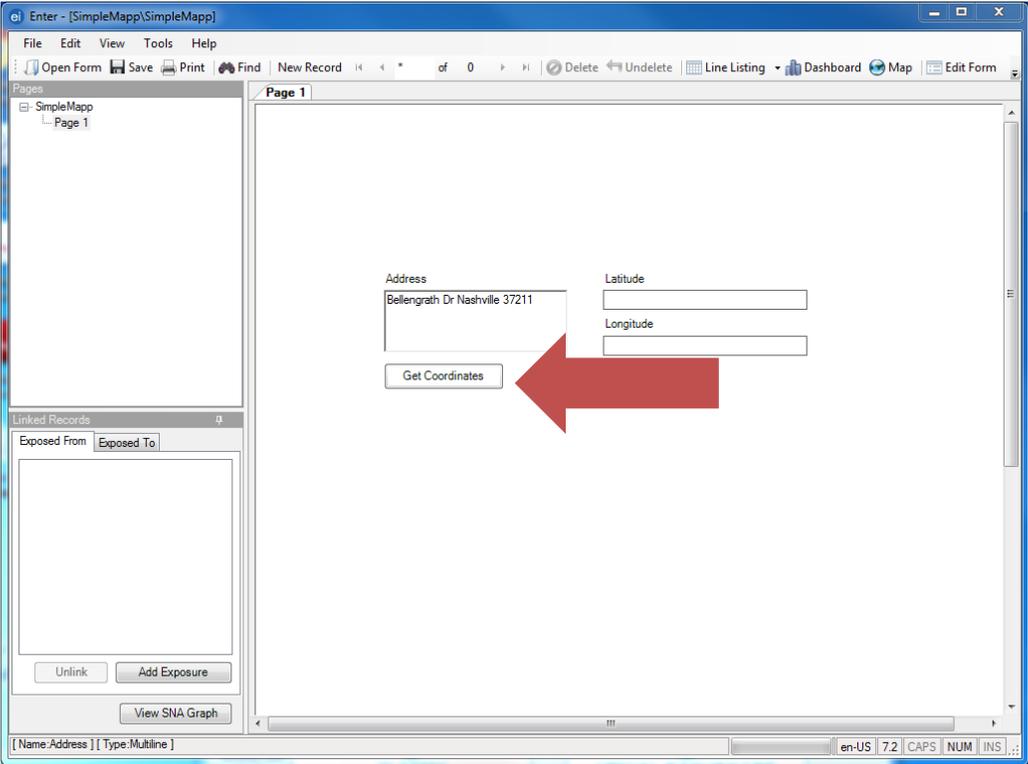


Now, you can begin using the Epi Info 7 GeoCoder. Enter one address per record in the address field. Addresses can be complete or partial. Careful attention to punctuation is not necessary. The field is not case sensitive.





After you type an address, click the Get Coordinates button. You must be connected to the internet.





Geocode Results will appear. If the address looks like a good match, click Accept. If the address does not look like a good match, click Cancel, modify your address data, and try again.

Address: Bellengrath Dr Nashville 37211

Latitude:

Longitude:

Get Coordinates

Geocode Results

The geocoding service returned the following coordinates:

Address: **Bellengrath Dr, Nashville, TN 37211**

Confidence: **High**

Quality: **Good**

Latitude: **36.081407**

Longitude: **-86.734121**

Accept

Cancel

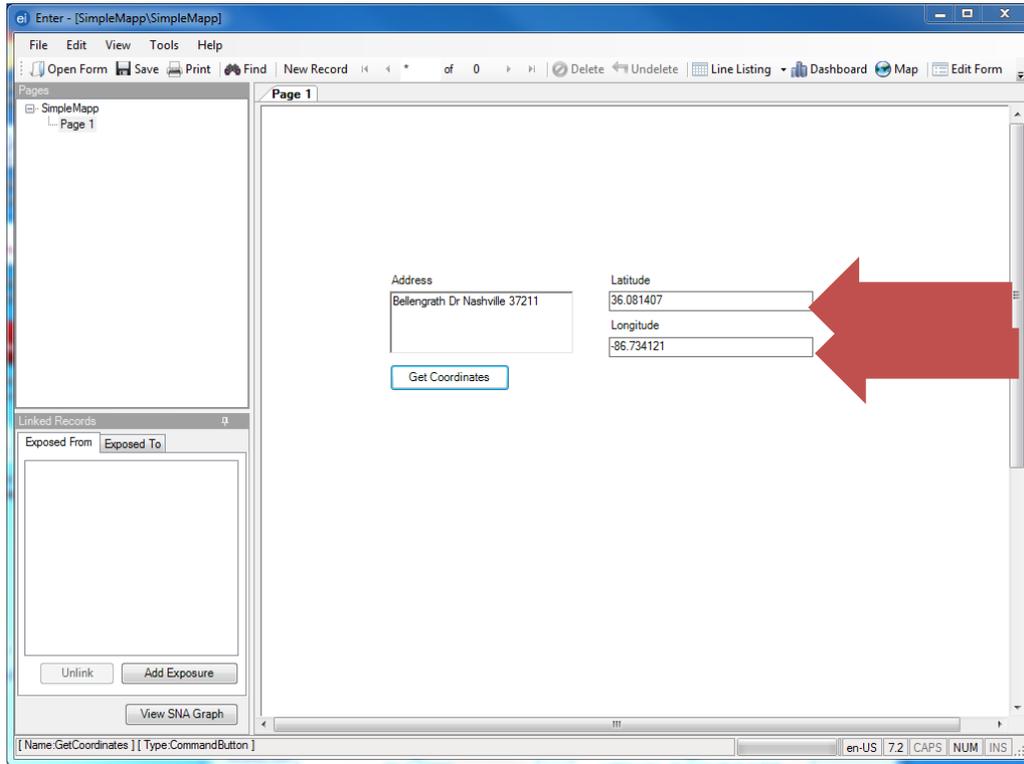
Source: <http://www.microsoft.com/maps/>

[Name.GetCoordinates] [Type.CommandButton] en-US | 7.2 | CAPS | NUM | INS |



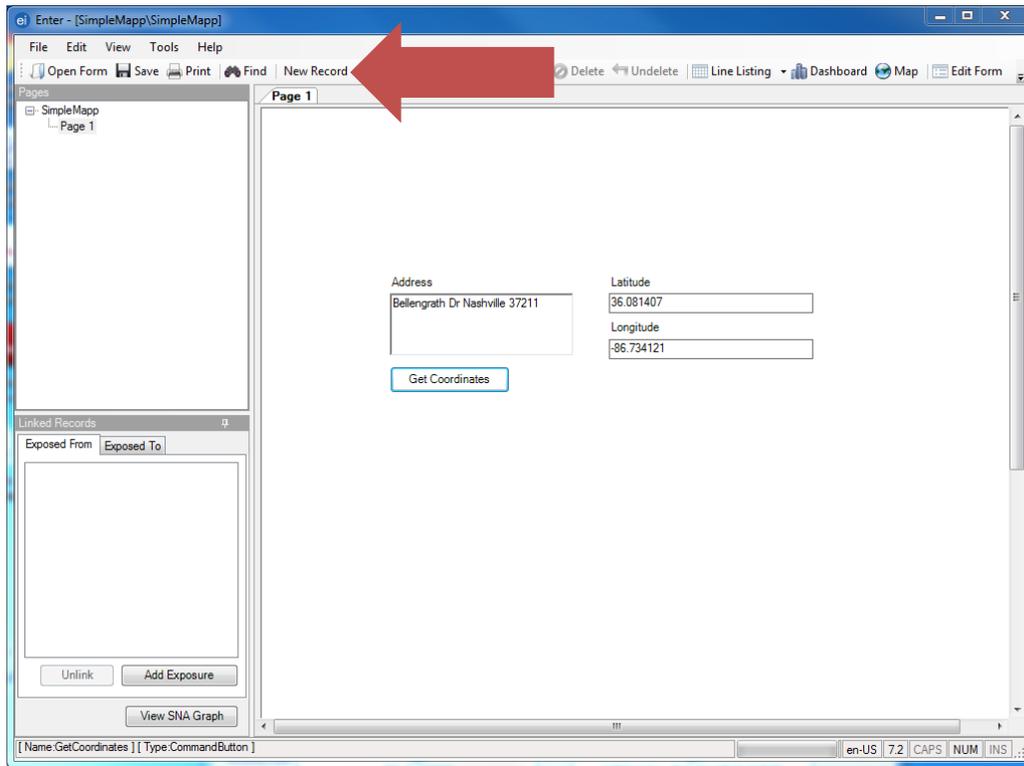


If you Accepted the results this step, Epi Info 7 automatically populates the Latitude and Longitude fields.



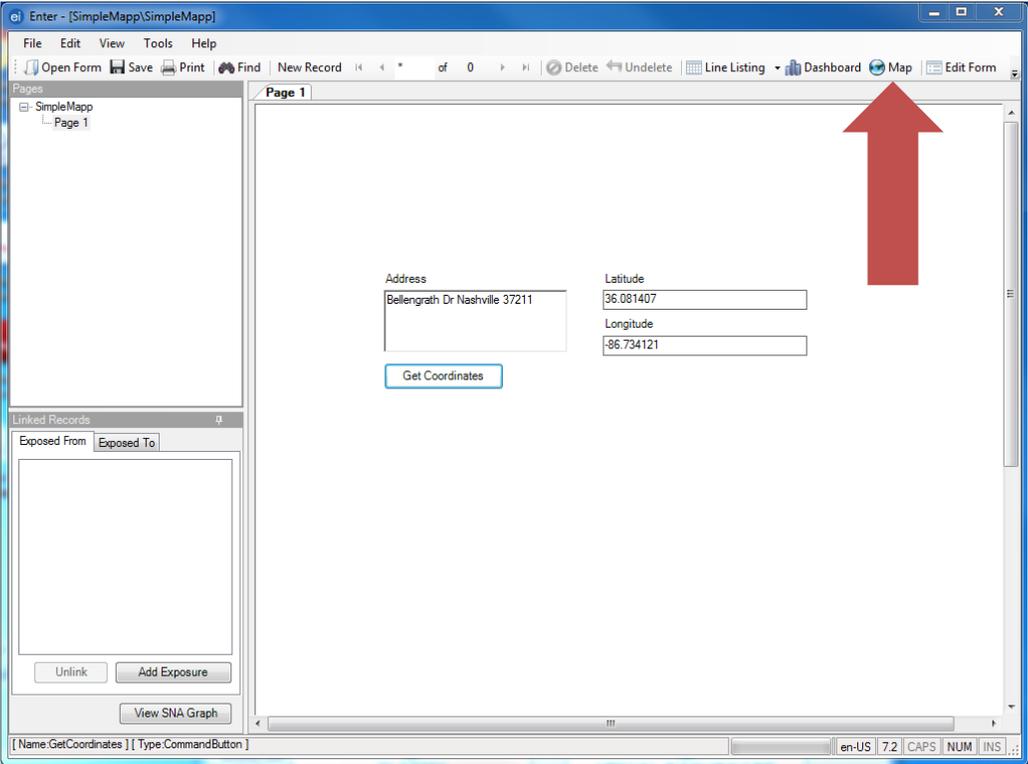


Click New Record to enter another address. Repeat these steps until all addresses are entered and Geocoded.



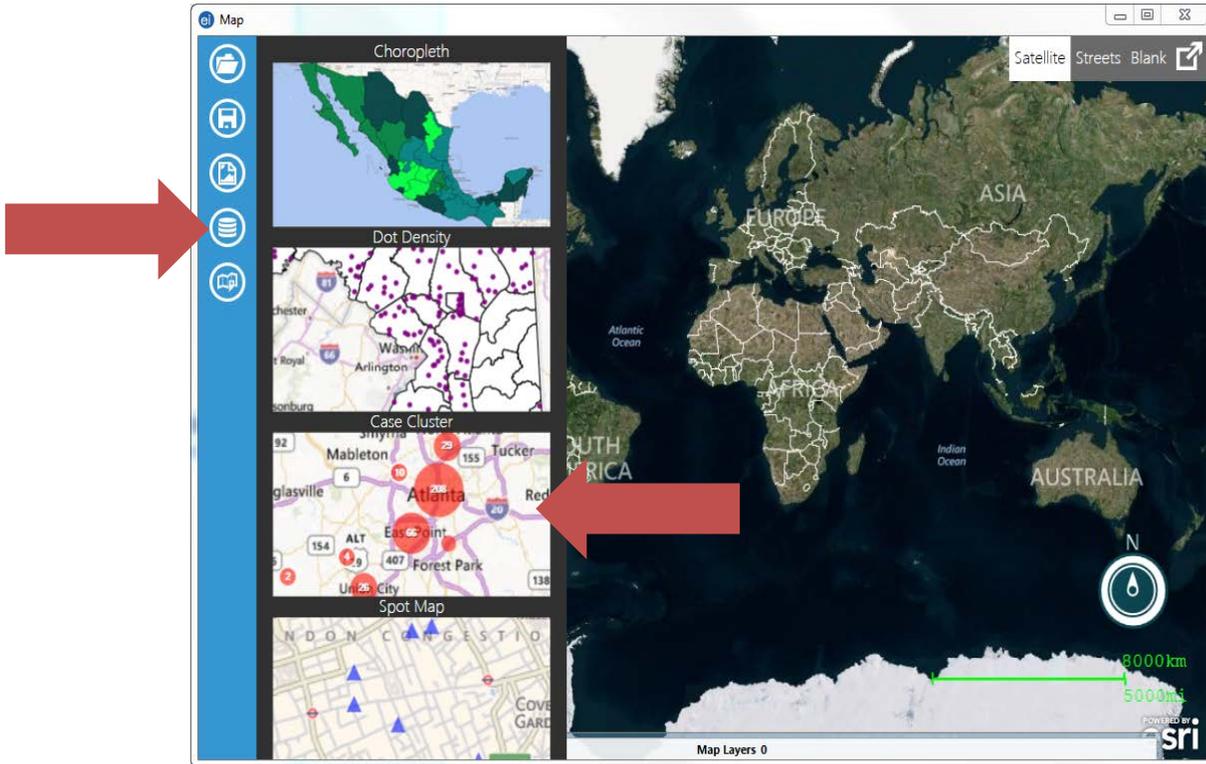


Launch the Epi Info Map module by clicking Map on the toolbar.

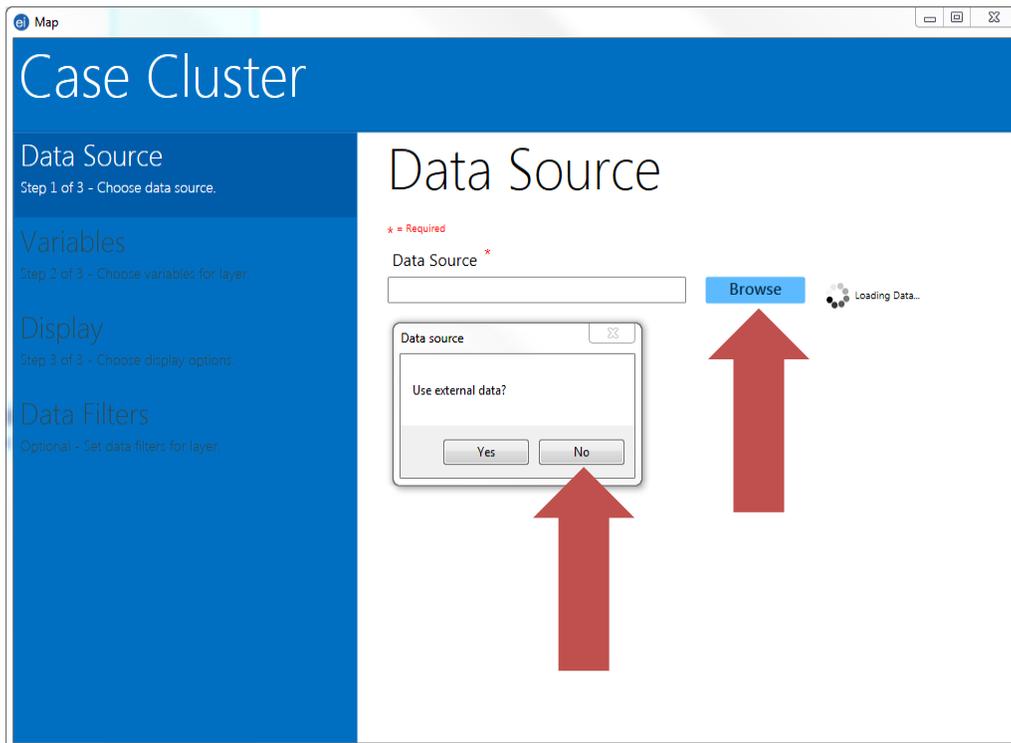




After the Map module opens, click Add Data Layer on the toolbar and then select case cluster.

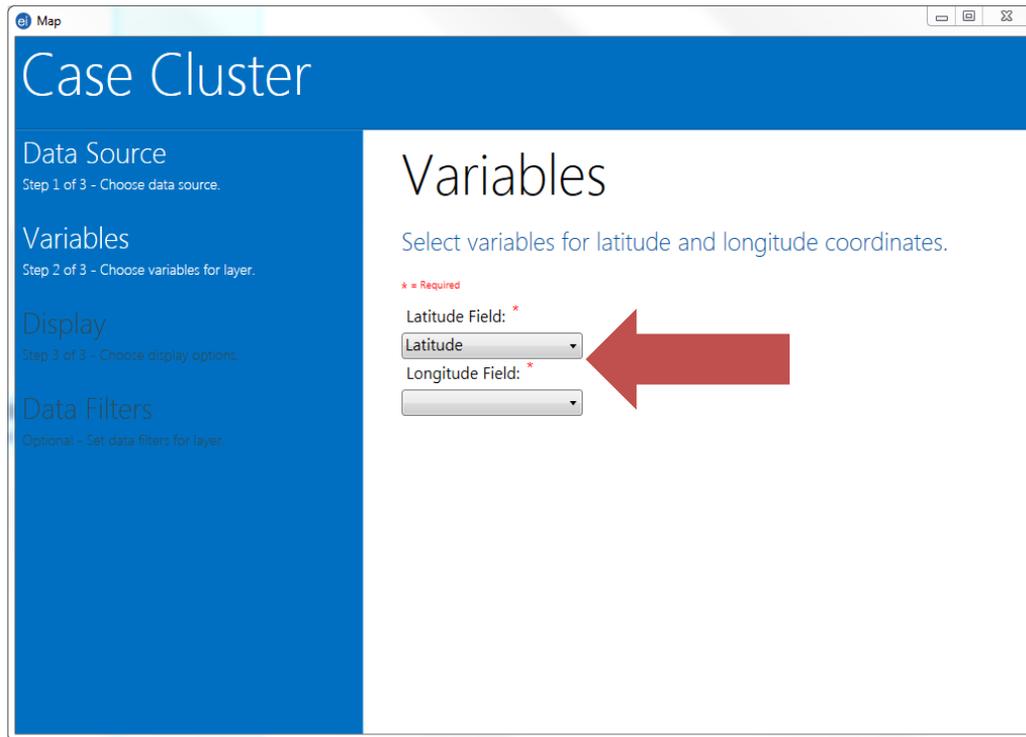


Select browse for the Date Source and when asked if External Data will be used as your Data Source, click No.

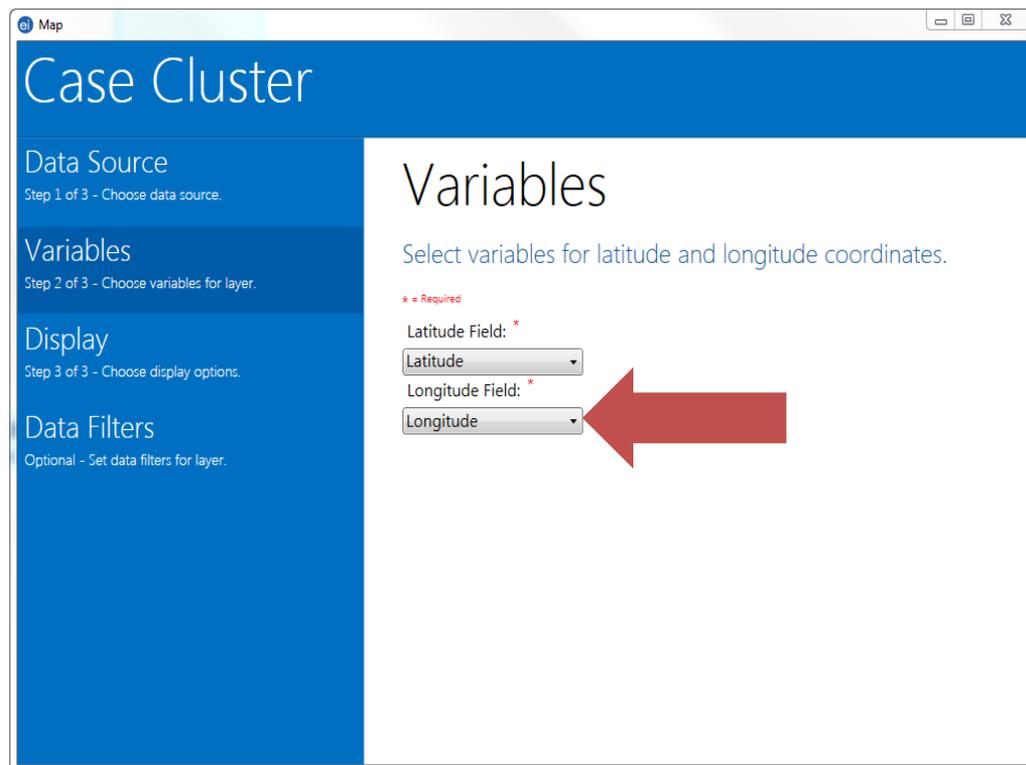




The next toolbar item, Variables, will automatically appear. Click the drop down arrow next to Latitude Field and select the field name latitude.

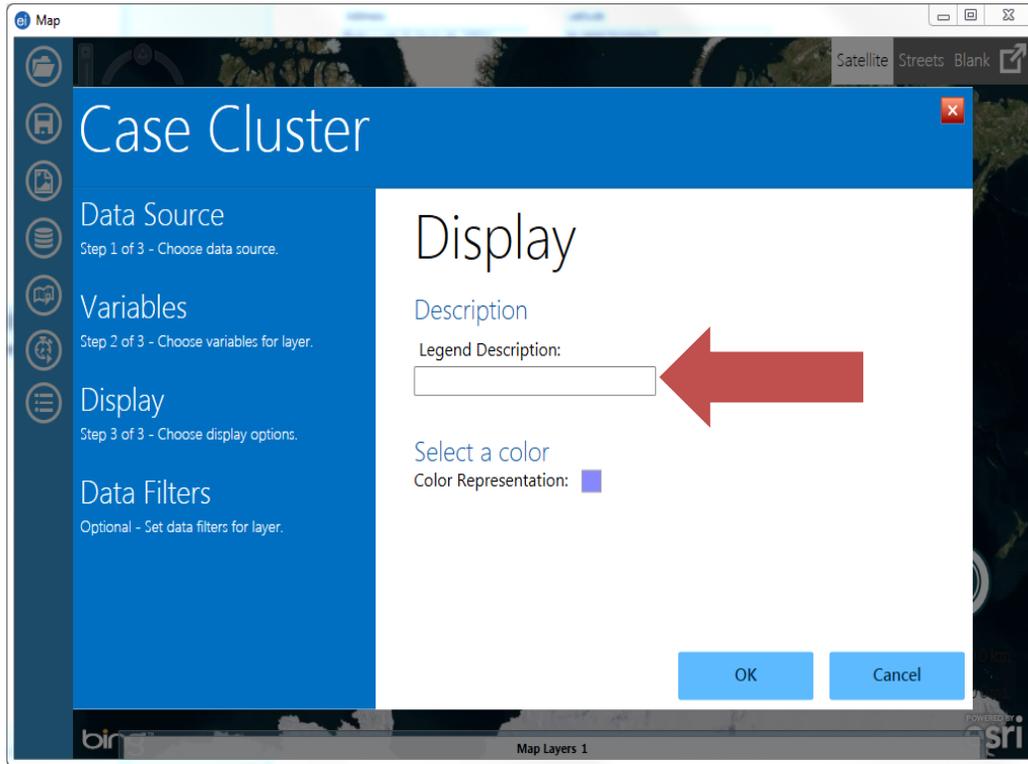


Click the drop down arrow next the Longitude Field and select the field name longitude.

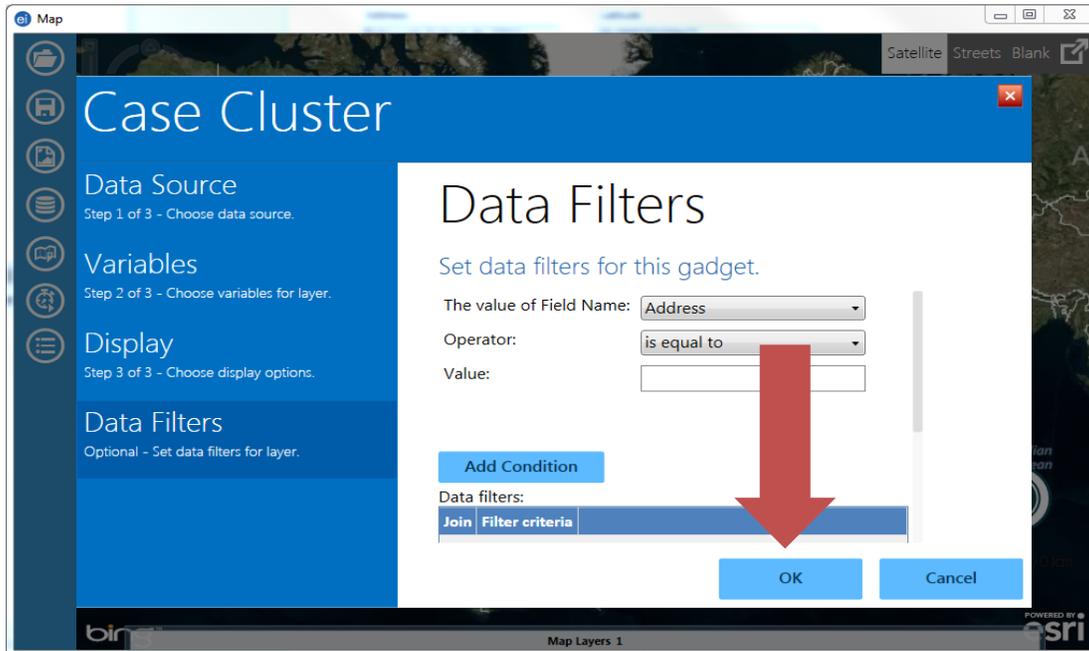




For the display step, you have the option to enter in a legend description and select a color of your choice.

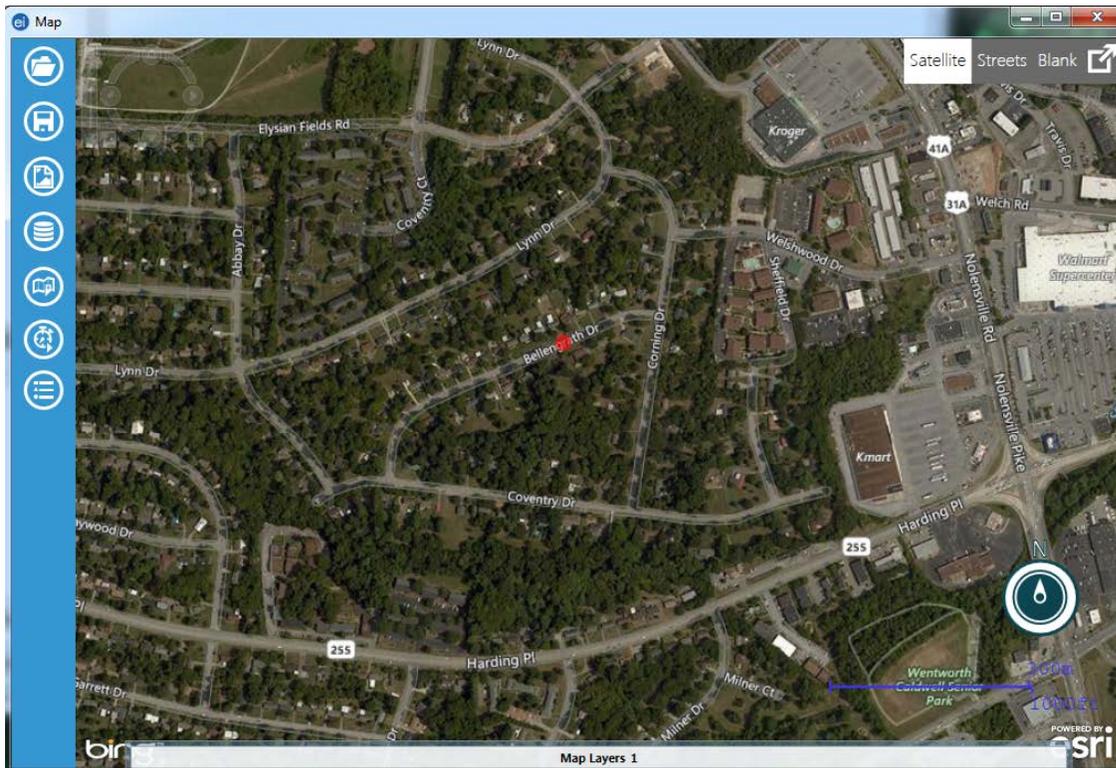


If you choose, you can add data filters to your map at this time. Once you're done, click ok.





A map will appear with the addresses plotted. Here is an example with just one address.





3.3 Create a Case Cluster Map Using an External Data Source

Launch the Epi Info 7 application by double clicking the Epi Info 7 Icon on your desktop.

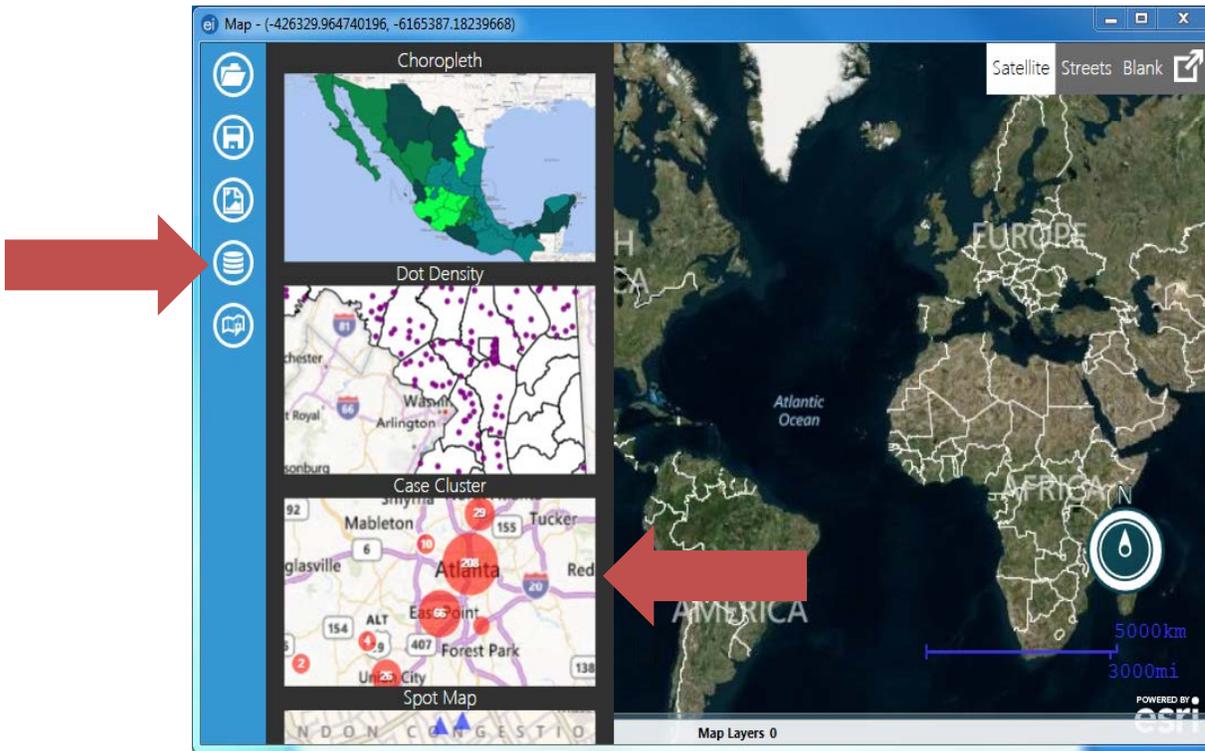


Click the Create Maps tab on the Epi Info 7 Menu.

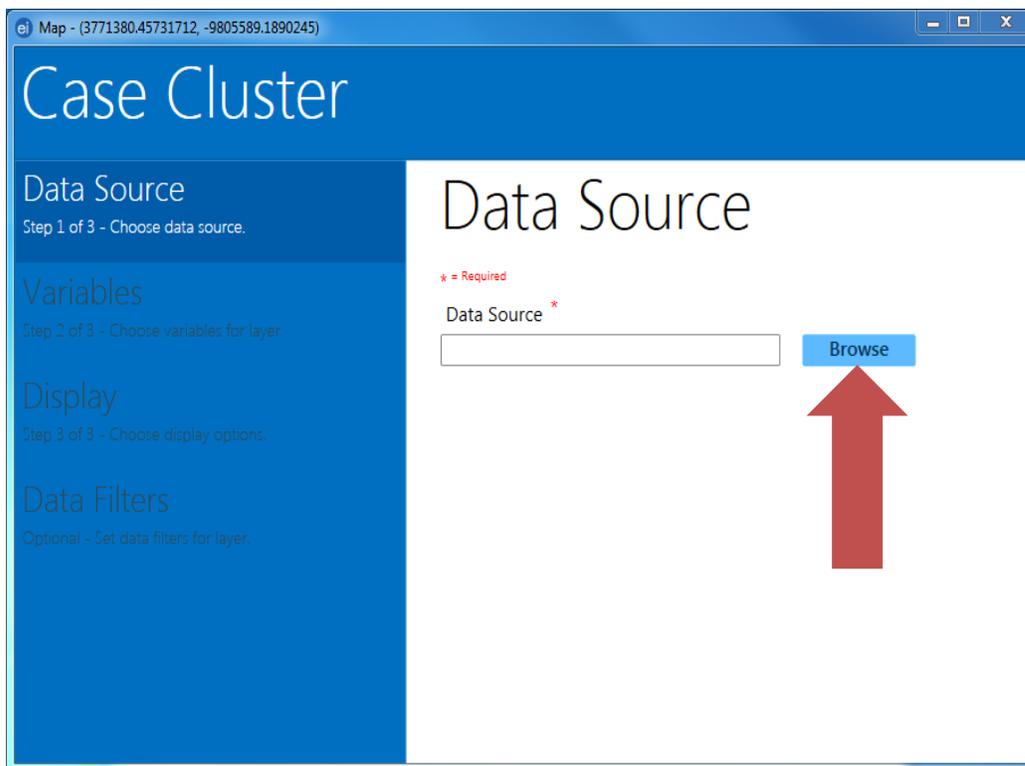




After the Map module opens, select Case Cluster from the Add Data Layer drop down menu.

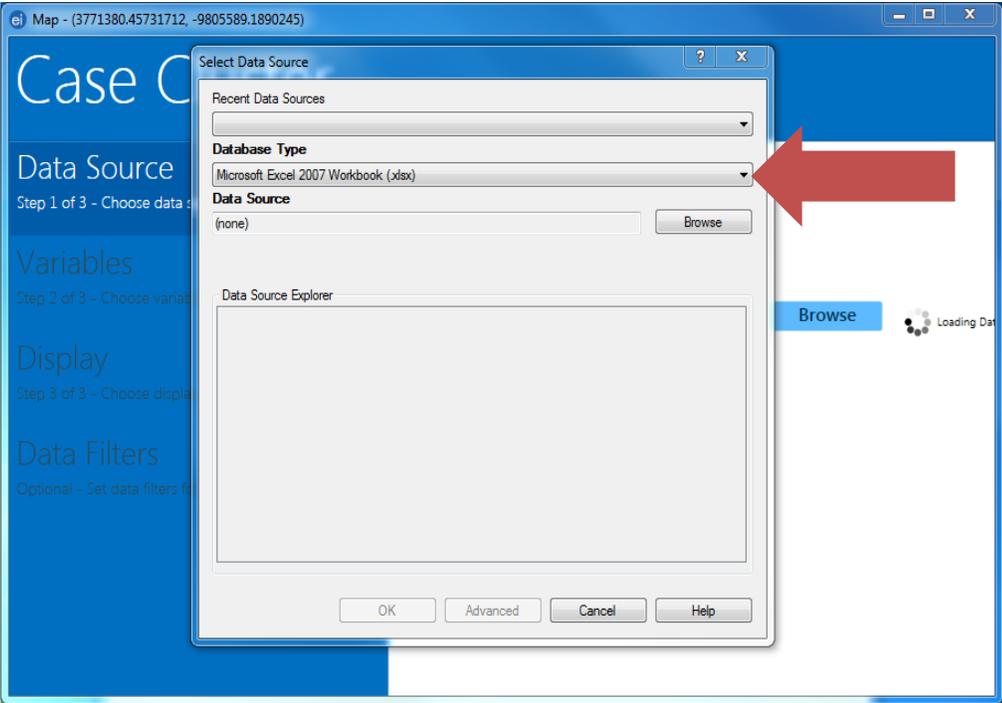


To select your external data file, select browse for the Data Source.



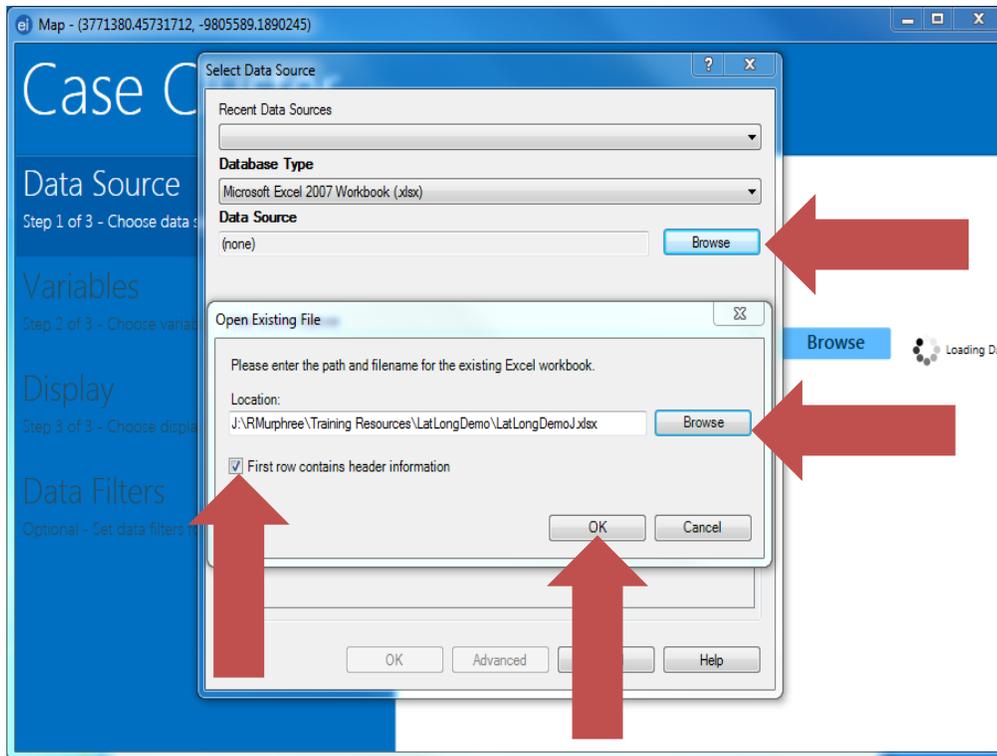


Specify the external data file type from the Database type drop down menu. Your external data file must contain one field containing latitude and one field containing longitude. Free tools for converting addresses into latitude and longitude coordinates are described in Section 3.



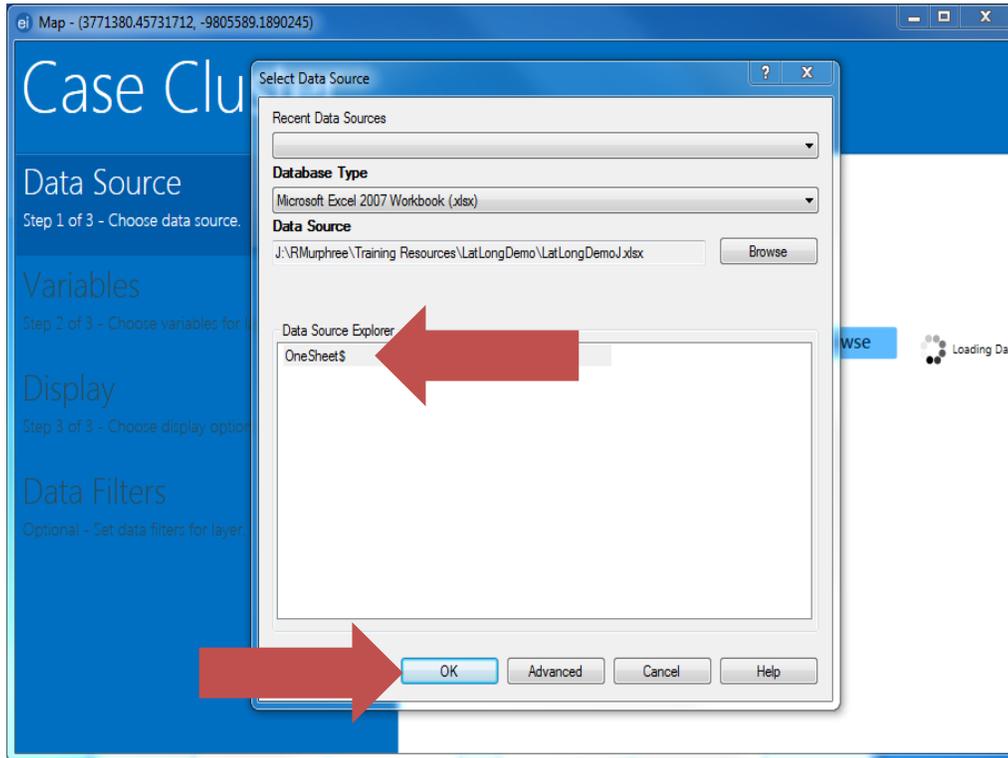


Beside Data Source, click browse to open an existing file. A small screen will appear that says Open Existing File. Click on the small box to the under the location field and point to your existing file. If your existing file does not contain header information in the first row, uncheck the appropriate box. Select browse to select your file. Once you have selected your file, select ok.

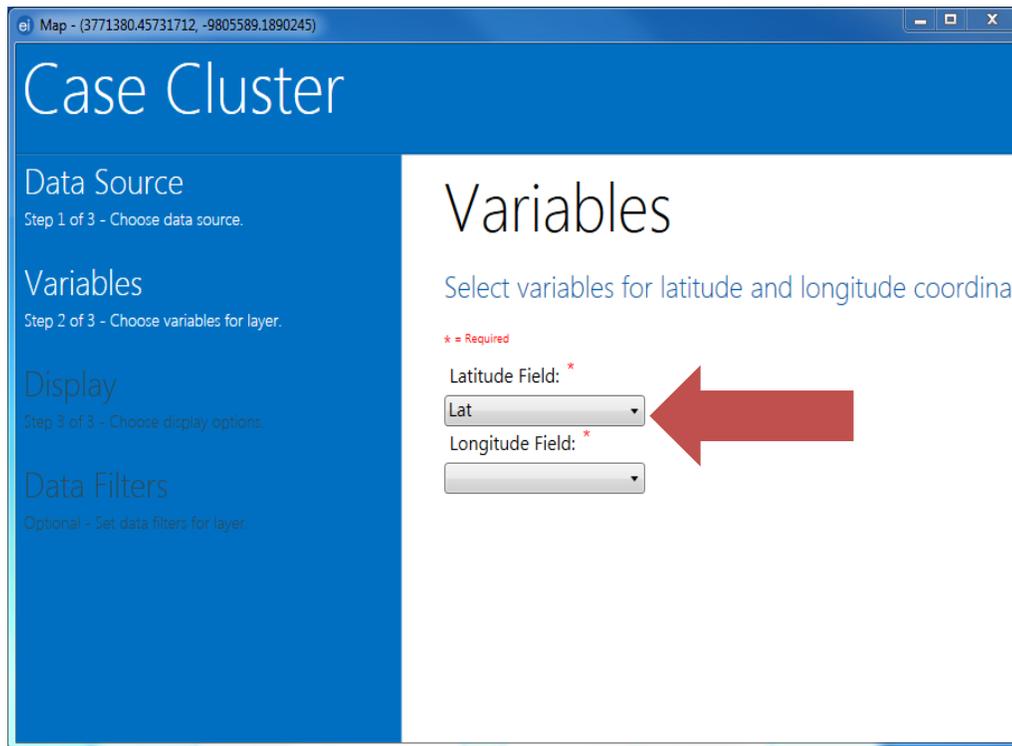




Highlight the worksheet containing your data then click ok.



Click the drop down arrow next to Latitude Field and select the field that contains latitude.





Click the drop down arrow next to Longitude Field and select the field that contains longitude.

Map - (3771380.45731712, -9805589.1890245)

Case Cluster

Data Source
Step 1 of 3 - Choose data source.

Variables
Step 2 of 3 - Choose variables for layer.

Display
Step 3 of 3 - Choose display options.

Data Filters
Optional - Set data filters for layer.

Variables

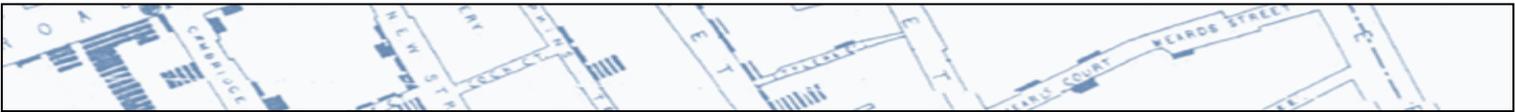
Select variables for latitude and longitude coordinates

* = Required

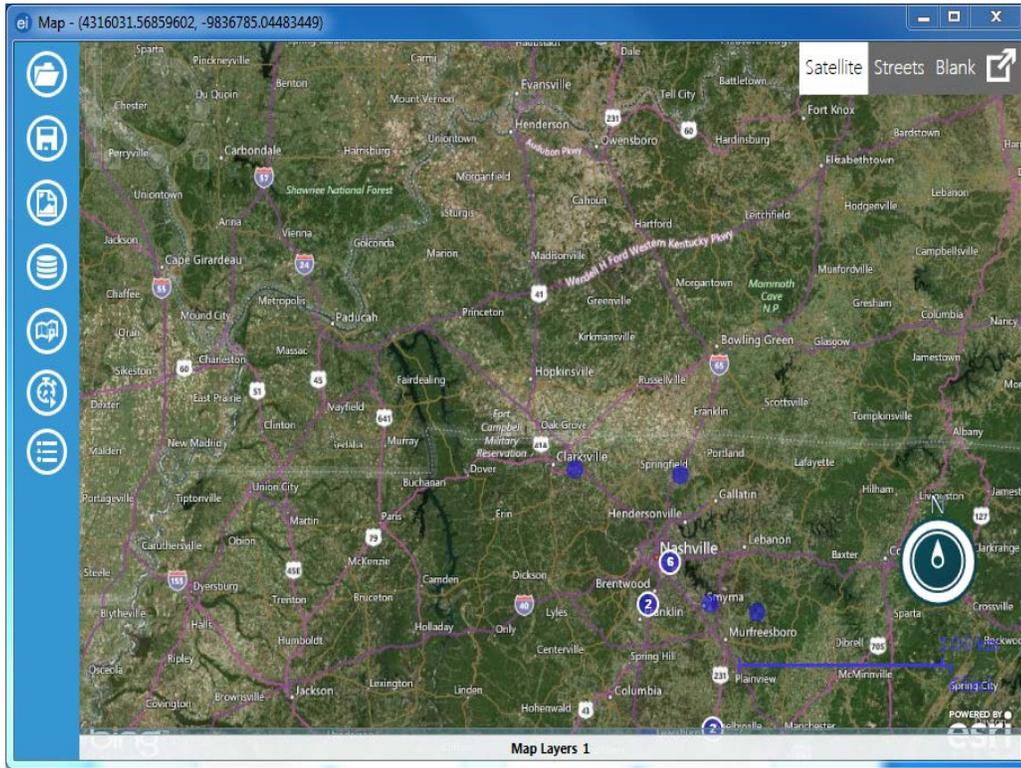
Latitude Field: *
Lat

Longitude Field: *
Long





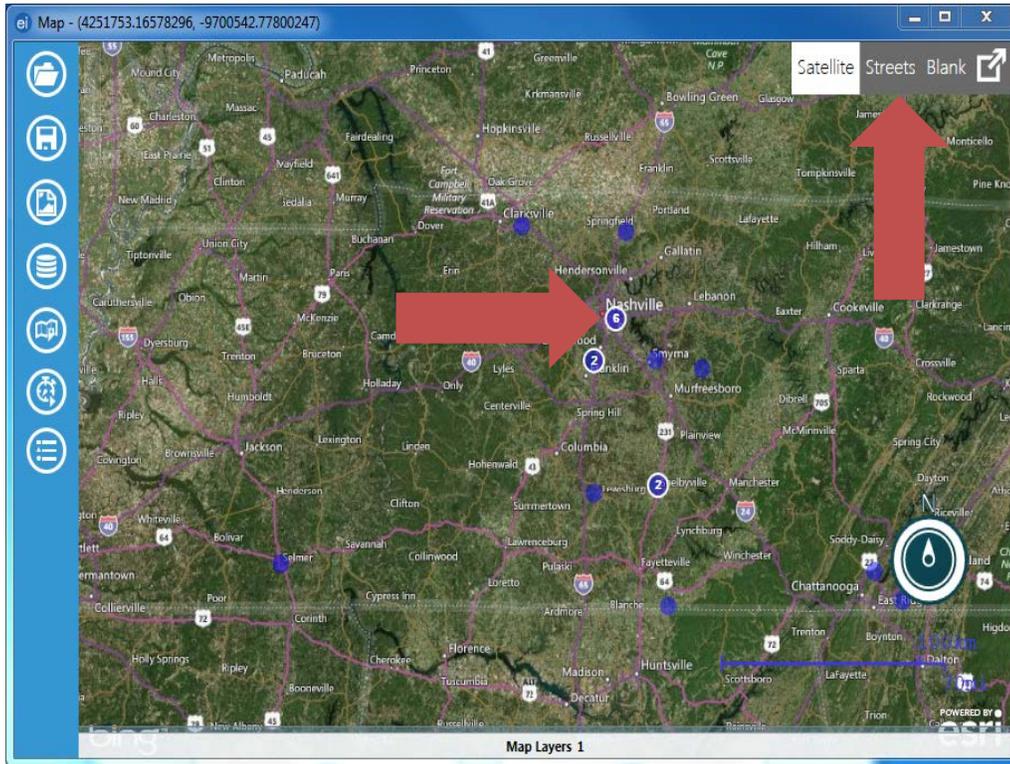
Select ok at the bottom of the screen and a map will appear.





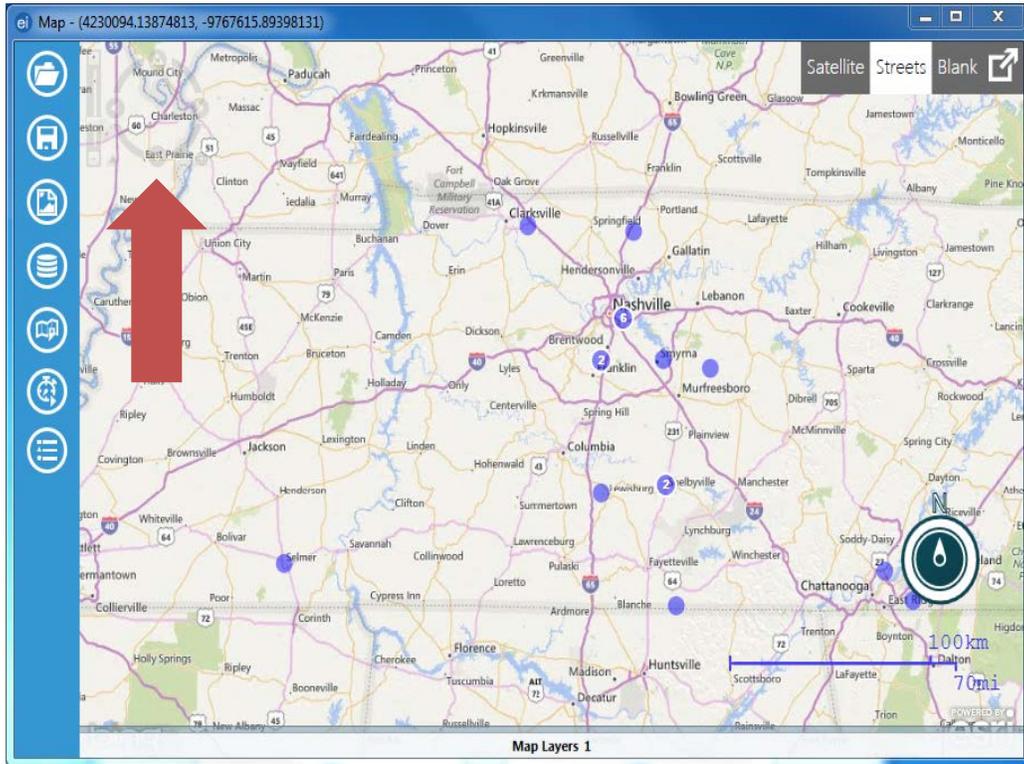
3.4 Manipulating Map Features

The default background is Satellite. You can change the background by selecting streets or blank. Blue dots mark a single geocoded address. Larger blue dots represent clusters. The number of records included in a geographic cluster is printed on the blue dot. For example, the largest cluster below represents 8 records.

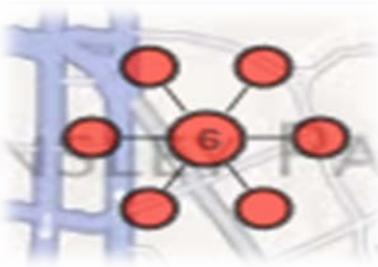




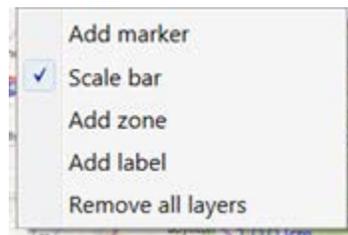
Zoom in and out using the navigation tools in the upper left hand corner of the map. As you zoom, the diameter of dots will change in relation to the number of records they represent.



If you click on a cluster, a graphic showing the number of records represented will appear.

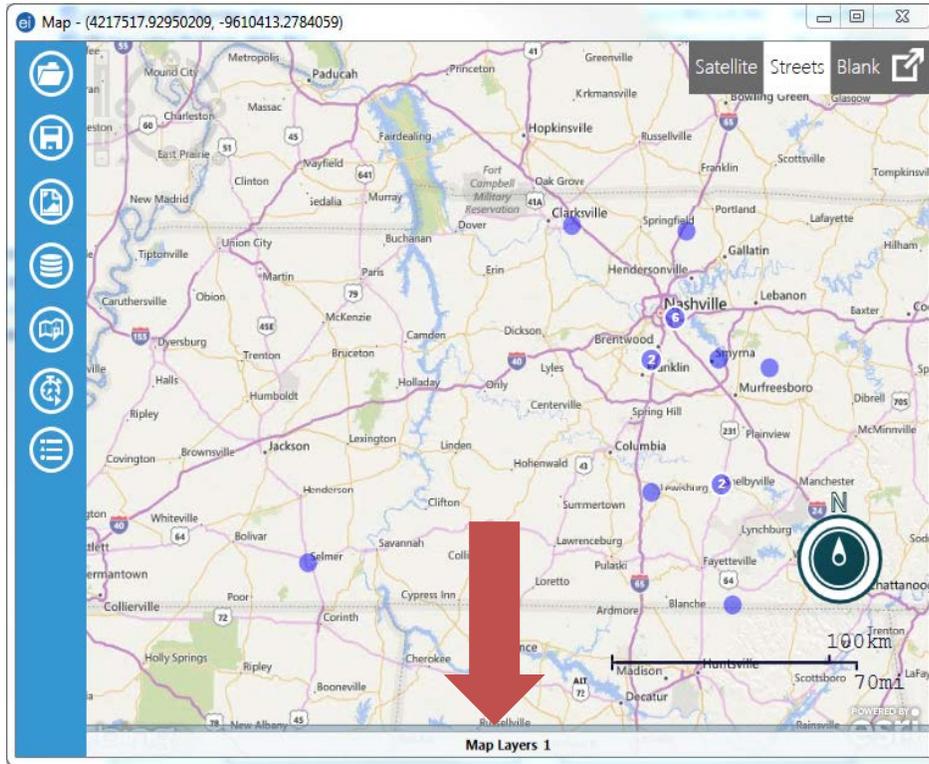


Right click on the map to add a marker, scale bar, zone, or label





If you wish to apply (or remove) a filter to your data, hover over the Map Layers tab at the bottom of the map.





To add a filter to your data, click the tiny wheel to edit data layers.

The screenshot shows a web map application with a map of Tennessee. The map is titled "Map - (4099441.29824767, -9493035.32544293)". The map shows various cities and roads. At the bottom, there is a "Map Layers 1" panel. The panel has a table with the following columns: "Case Cluster", "Description", "Latitude Field", and "Longitude Field". The "Case Cluster" column has a value of "Case Cluster". The "Description" column is empty. The "Latitude Field" column has a dropdown menu with "Lat" selected. The "Longitude Field" column has a dropdown menu with "Long" selected. To the right of the table is a blue square icon and a gear icon labeled "Edit data layer". A red arrow points to the gear icon.

Case Cluster	Description	Latitude Field:	Longitude Field:
Case Cluster		Lat	Long





Select data filters on the toolbar to set data filters for your layer.

In this example, data will be restricted to children. Use the drop down arrows to set the filter condition. Then click Add Condition.

Map - (4099441.29824767, -9610413.2784059)

Case Cluster

Data Source
Step 1 of 3 - Choose data source.

Variables
Step 2 of 3 - Choose variables for layer.

Display
Step 3 of 3 - Choose display options.

Data Filters
Optional - Set data filters for layer.

Data Filters

Set data filters for this gadget.

The value of Field Name:

Operator:

Value:

Data filters:

Join	Filter criteria
------	-----------------





This Filter Criteria is then shown in the Data filters box and immediately applied to the map. Click ok to close the Data Filters box and return to the map.

Case Cluster

Data Filters

Set data filters for this gadget.

The value of Field Name:

Operator:

Value:

Data filters:

Join	Filter criteria
	The value of [Age] is less than 18





To remove the Filter, click on the filter you wish to remove, and click Remove Selected from the Data Filter box. Click ok to close the Data Filters box and return to the map. The map will immediately return to the original, unfiltered data.

Case Cluster

Data Source
Step 1 of 3 - Choose data source.

Variables
Step 2 of 3 - Choose variables for layer.

Display
Step 3 of 3 - Choose display options.

Data Filters
Optional - Set data filters for layer.

Data Filters
Set data filters for this gadget.

The value of Field Name:

Operator:

Value:

Add Condition

Data filters:

Join	Filter criteria
	The value of [Age] is less than 18

Remove selected **Clear all conditions** **Advanced mode**

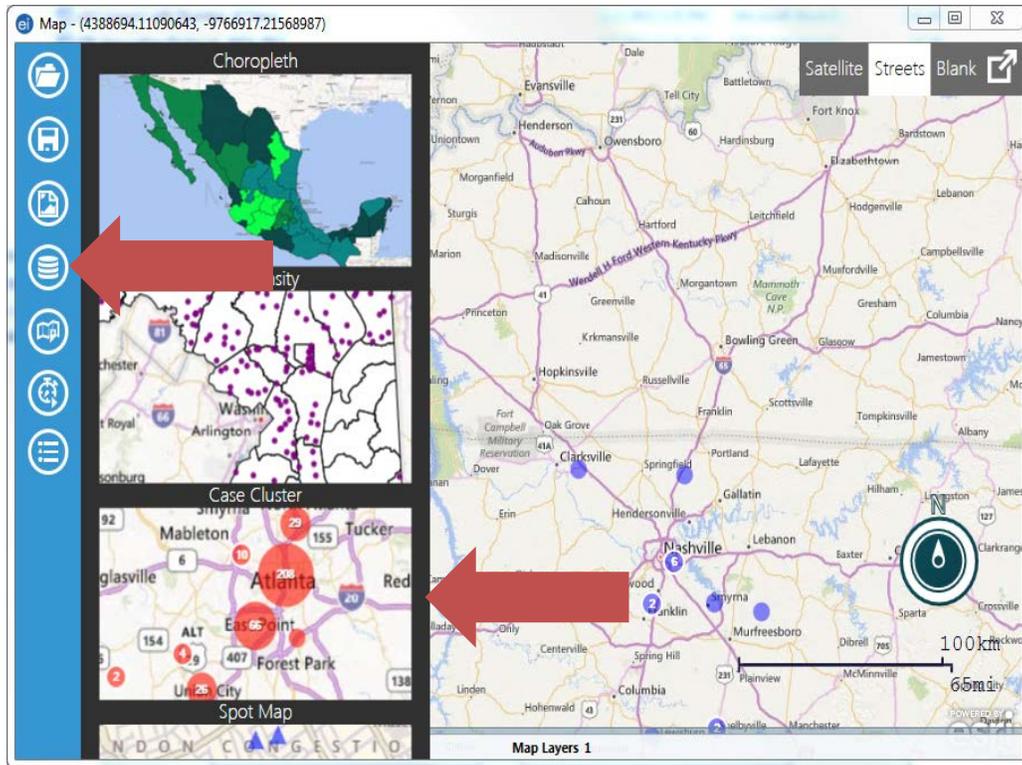




3.5 Display >1 Case Cluster Layer or Apply >1 Filter

In Section 3.4, you learned how to apply a filter to your case cluster map. In our example, we restricted the data display to case patients who were less than 18 years old (i.e., children). Suppose you want to view case patients 18 years or older (i.e., adults) on the same map, but using a different color marker.

First you'll need to Add Data Layer: Case Cluster to bring another copy of your data onto the map. You can review step-by-step instructions in sections 3.2 and 3.3.

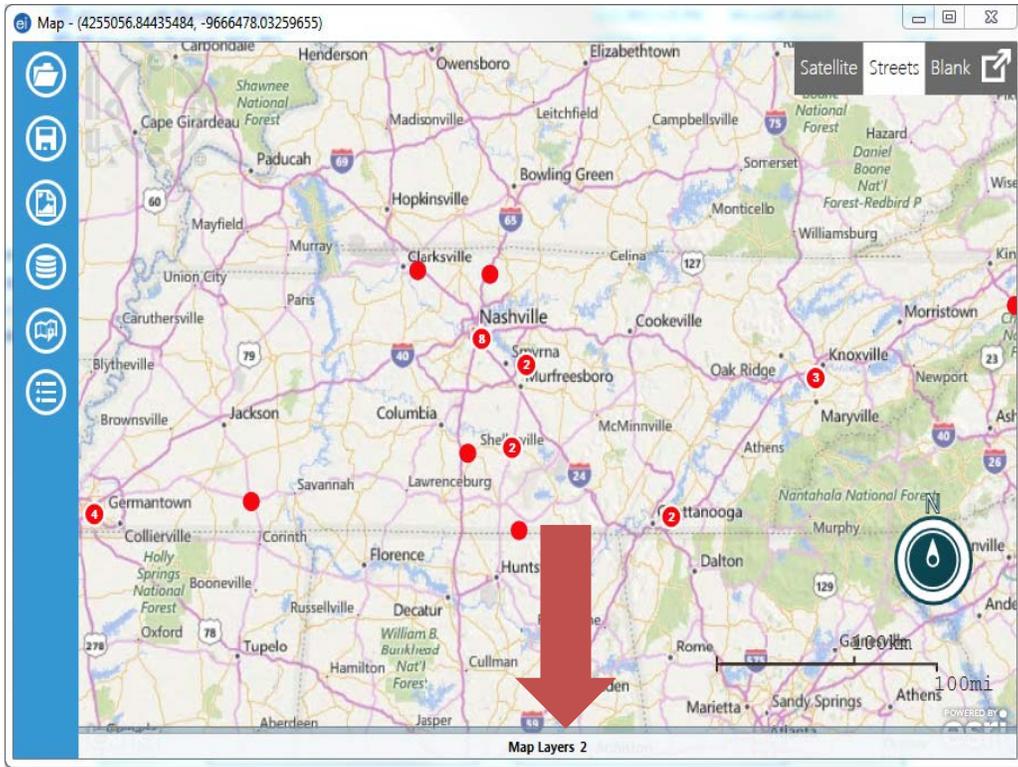


Note: The map layers tab indicates 1 layer is active.





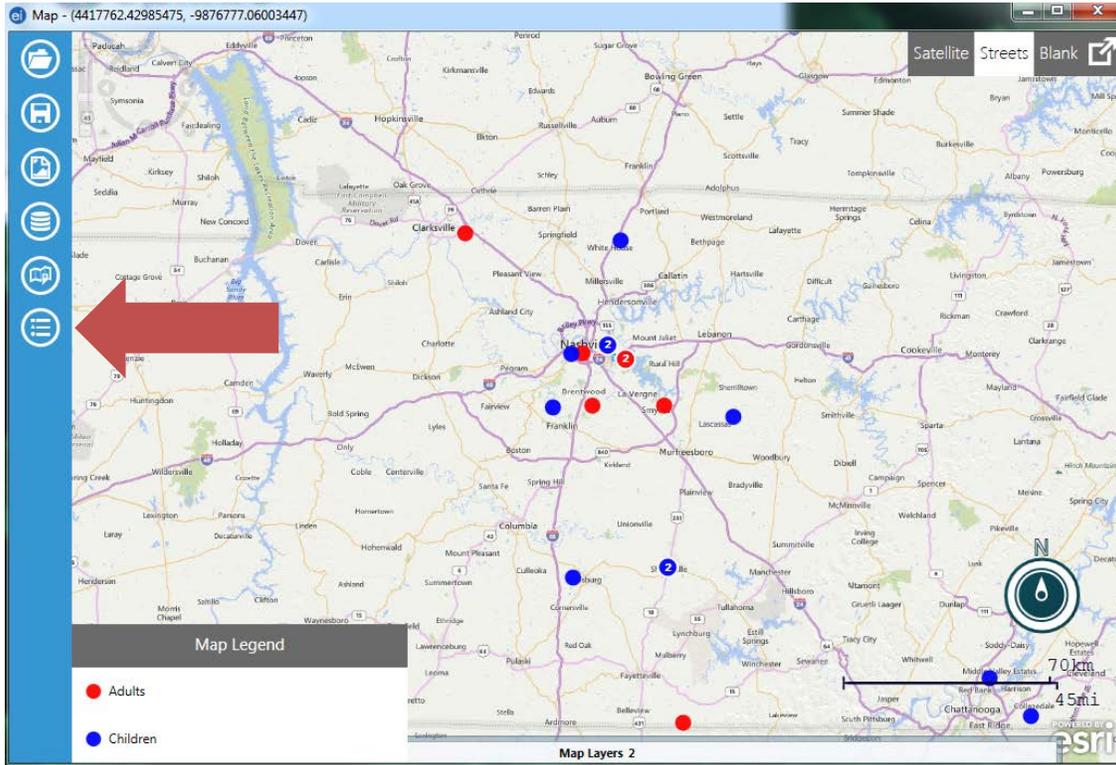
Once you have successfully brought in another copy of your data, you have two Map Layers to work with.





Now you can add a filter to the second copy of your case cluster data. In the example below, children are mapped in blue, and I added a new filter for adults mapped in red. You can repeat these steps to add as many data layers and filters as you like. Review step-by-step filter instructions in section 3.4.

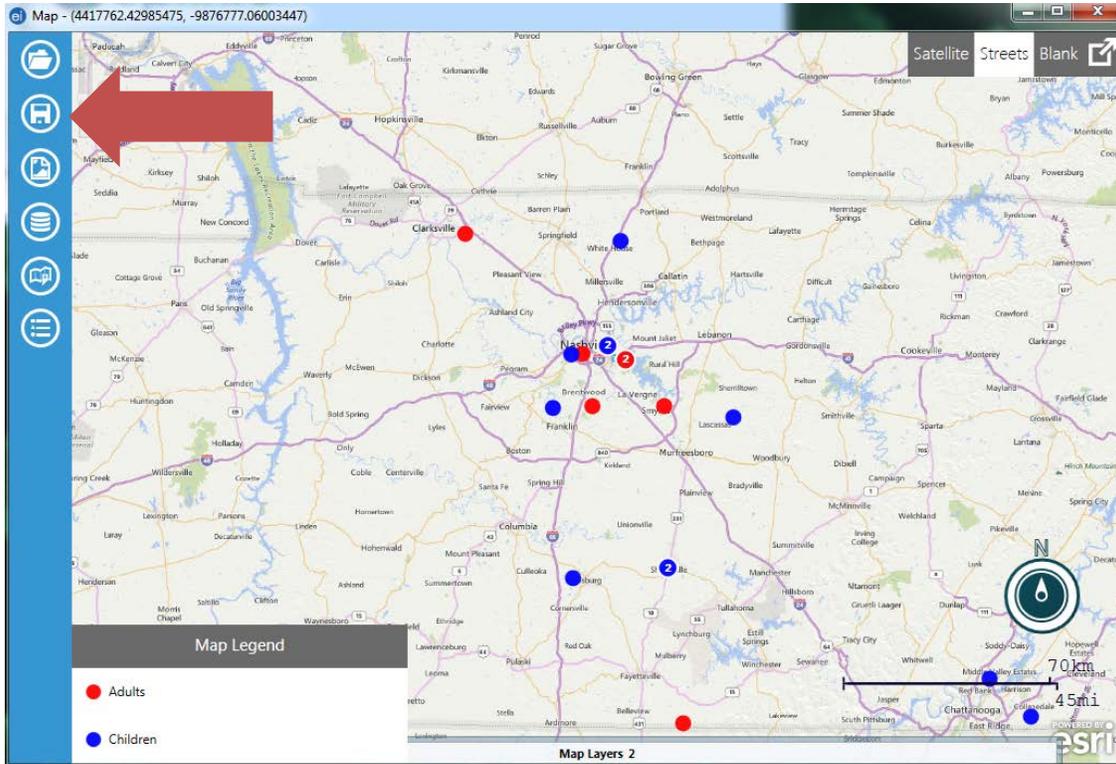
Add or remove a legend by clicking the legend icon to the left of the red arrow below.





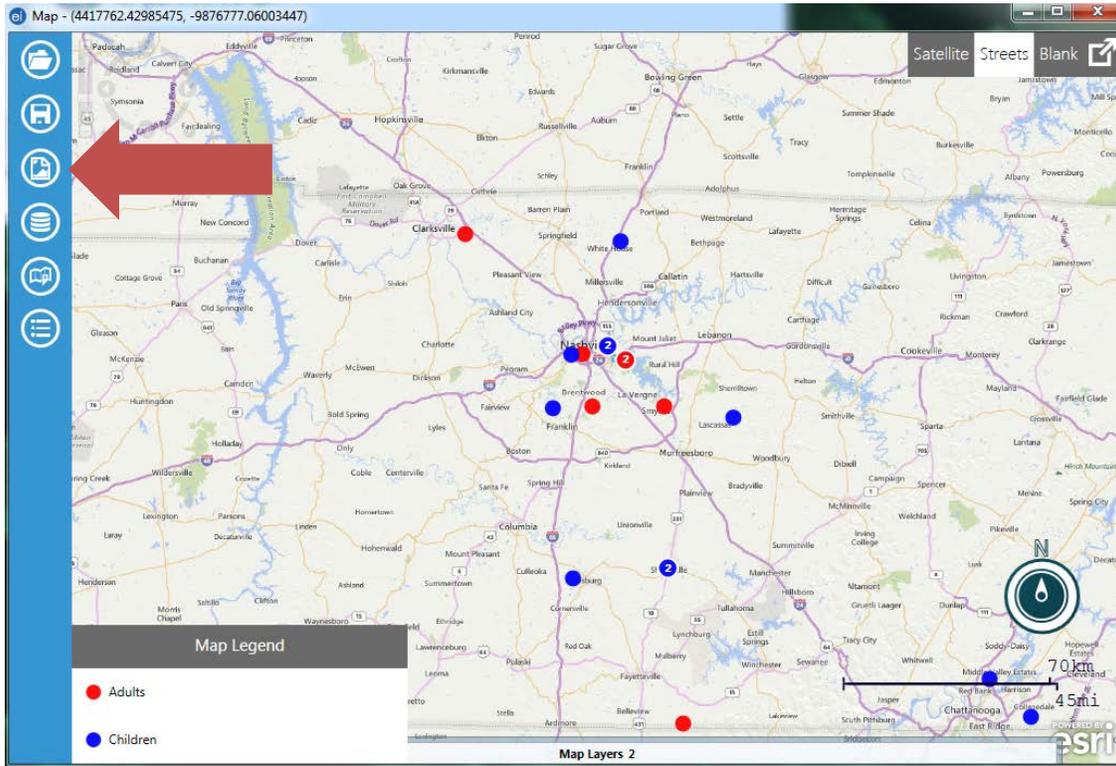
3.6 Saving Map Projects and Map Images

To save the entire map project, click the small disc on the toolbar.





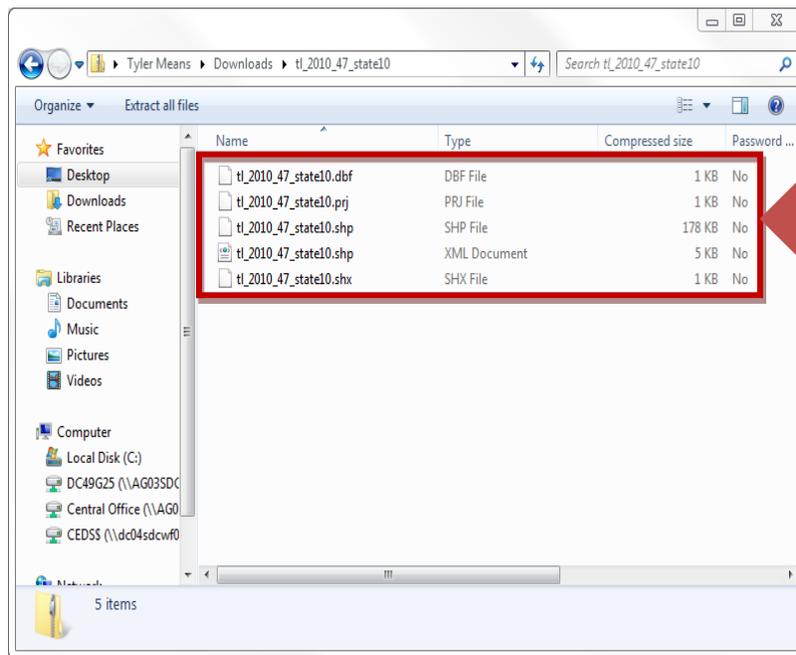
To save the map as an image, click the small photo on the toolbar. Maps are stored as PNG image files.





3.7 Create a Choropleth Map Using External Data Aggregated by Geographic Units

Prior to producing a choropleth map in Epi Info 7, you must have your data file containing the aggregate data you wish to represent on a map (TN Absentee Rates by County for this example) and the Shape for the geographic region of interest (TN Counties). Note that a Shape file is usually a collection of 5 individual files. In this example, the shape file for all Tennessee counties was downloaded at <http://www.census.gov/cgi-bin/geo/shapefiles2010/main>. Select “Counties (and equivalent)” under the Select a layer type dropdown > click Submit > select “Tennessee” under the County and Equivalent (2010) dropdown > click Download. For more information on downloading shape files refer to Sections 3 or 5.

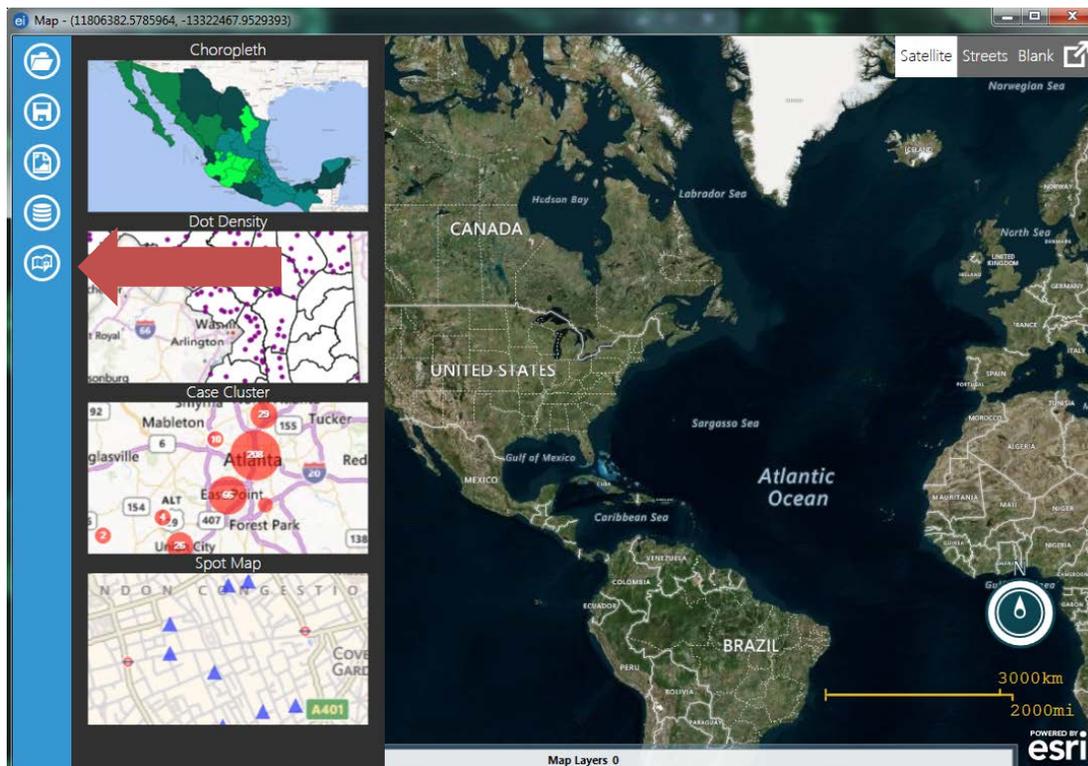




Now that you have the necessary data and shape files stored, click Create Maps on the Epi Info 7 menu.

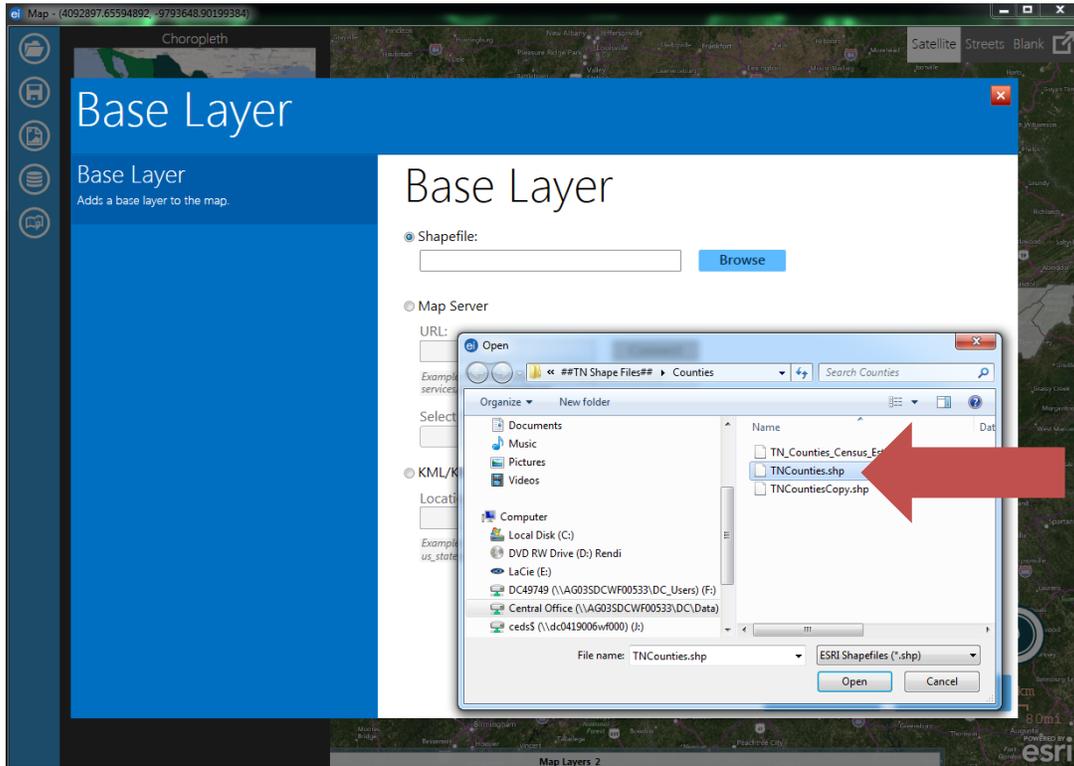


Click on the small map icon on the toolbar to Add a Base Layer

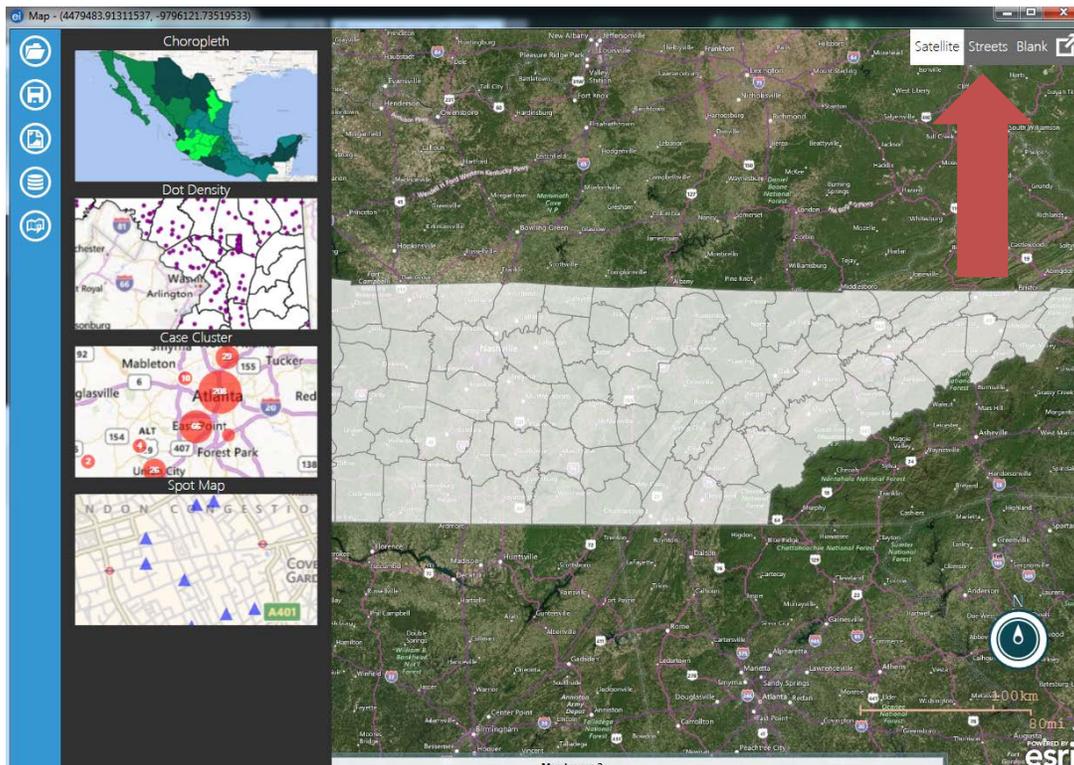




Point to your shape file. Note that only the *.shp file will appear (not the other files associate with a Shape file).

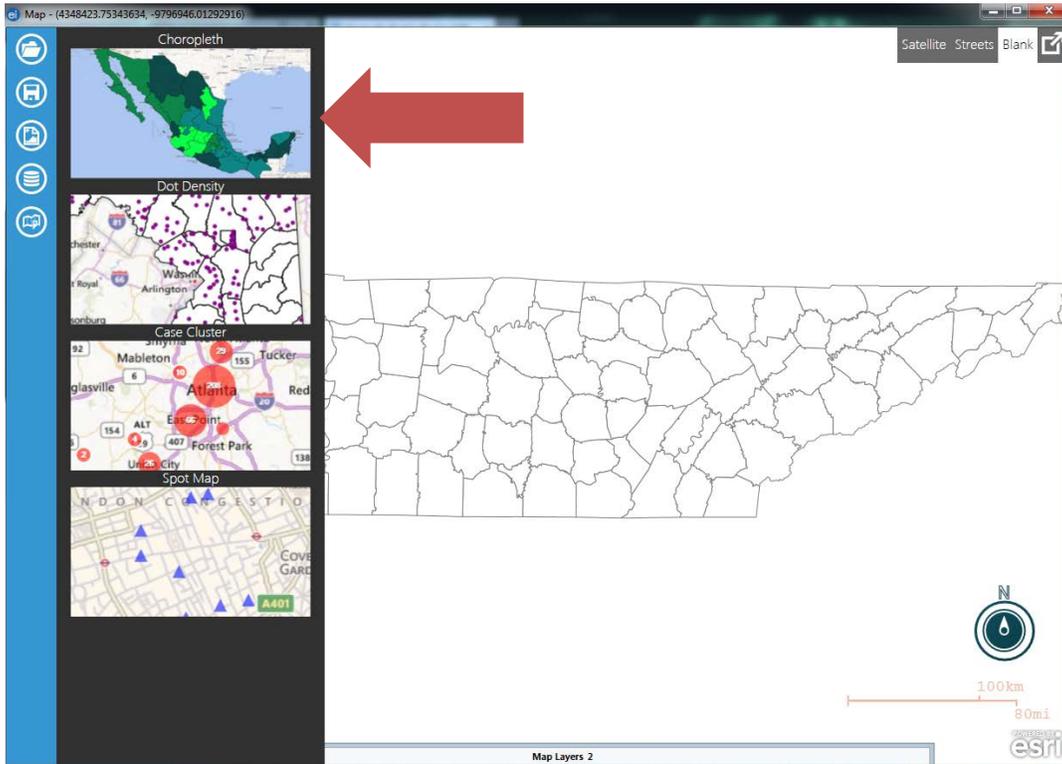


An outline of Tennessee counties will appear. Change the background to Street or Blank if you wish.

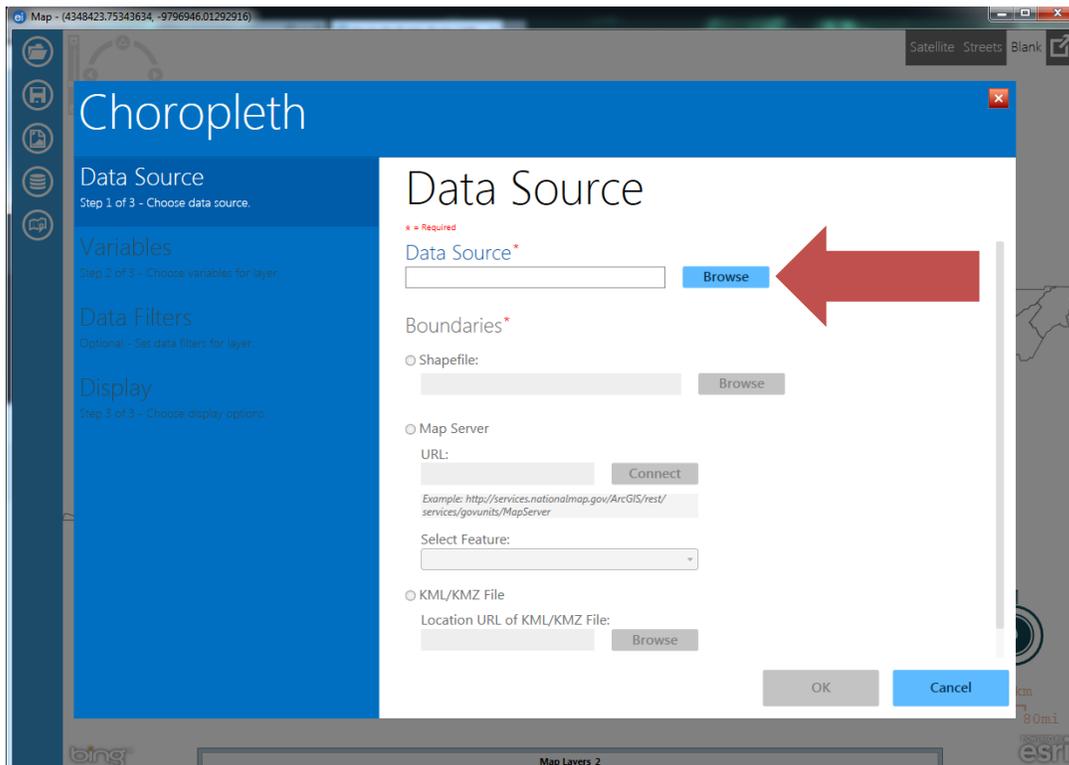




A blank background will be used for this example. To continue, hover over Add Data Layer on the toolbar and select Choropleth (Shape File).

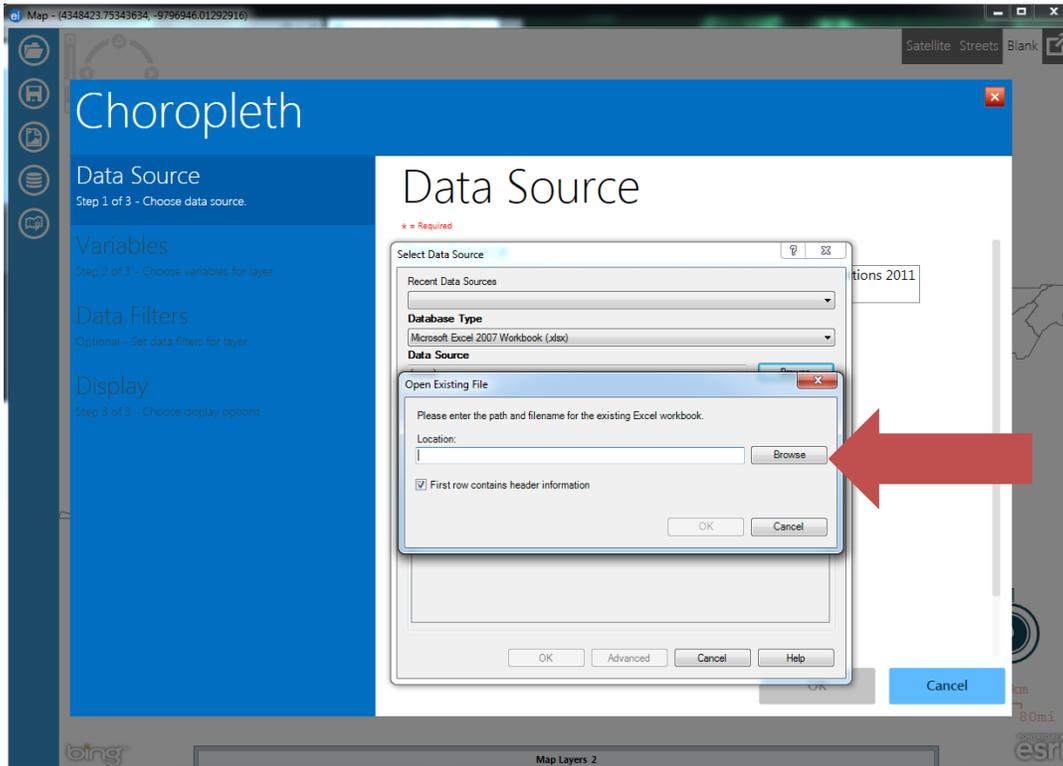


Point to the database file containing your aggregate data. This example uses *.xls data.

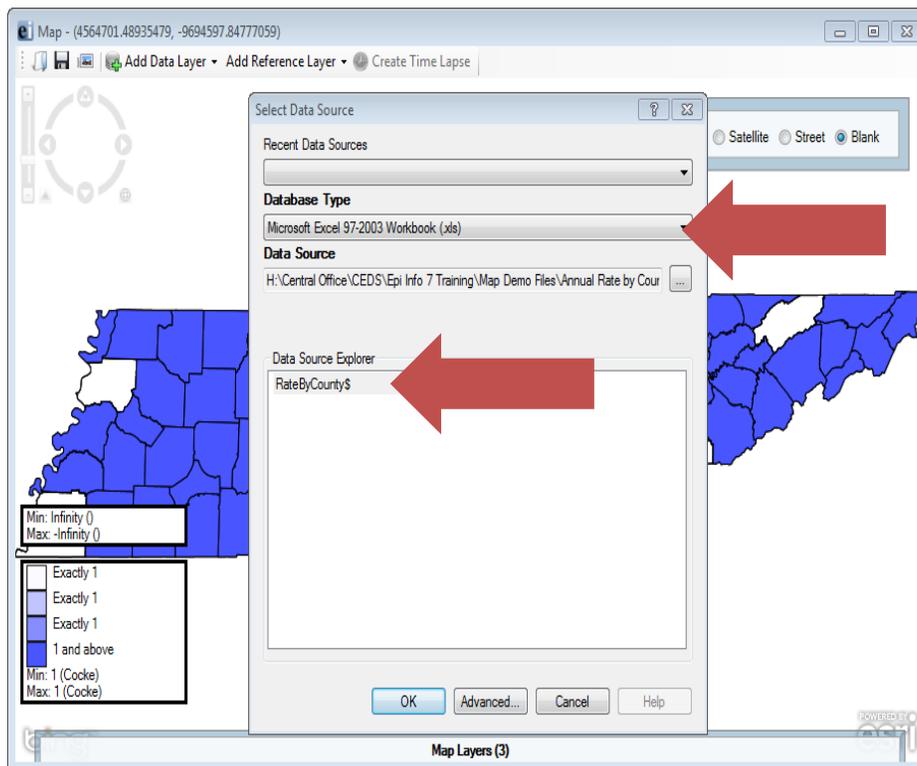




Navigate to the database file location.

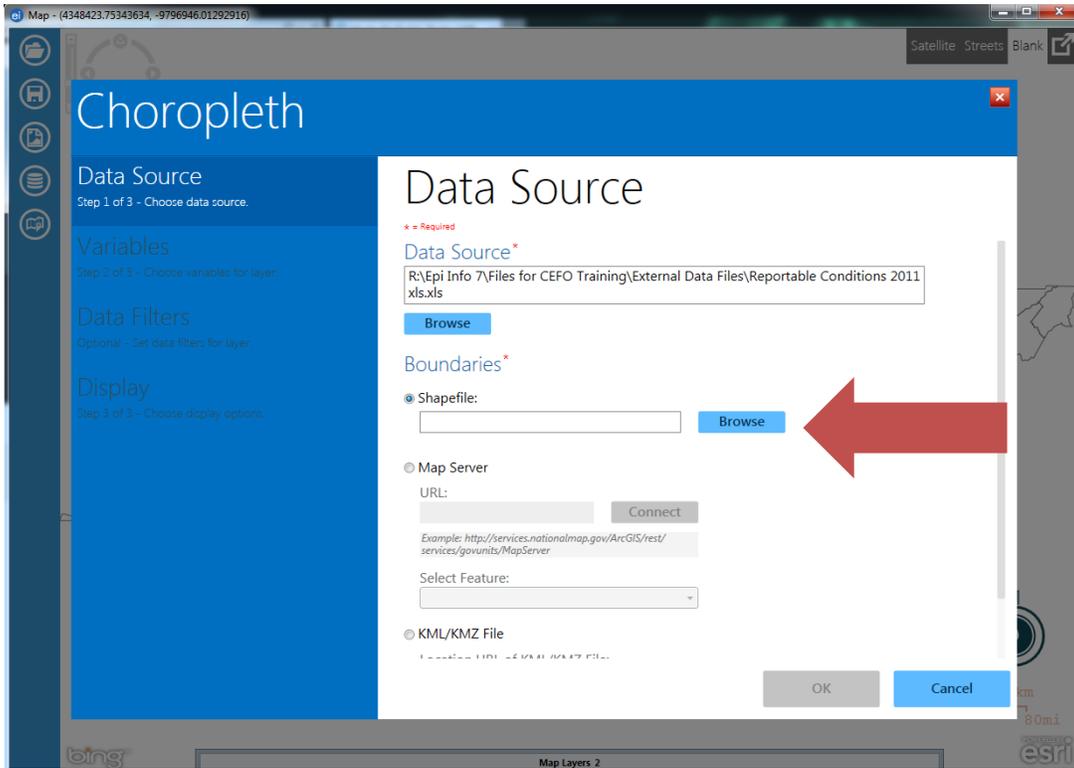


Select the worksheet/table containing the aggregate data.



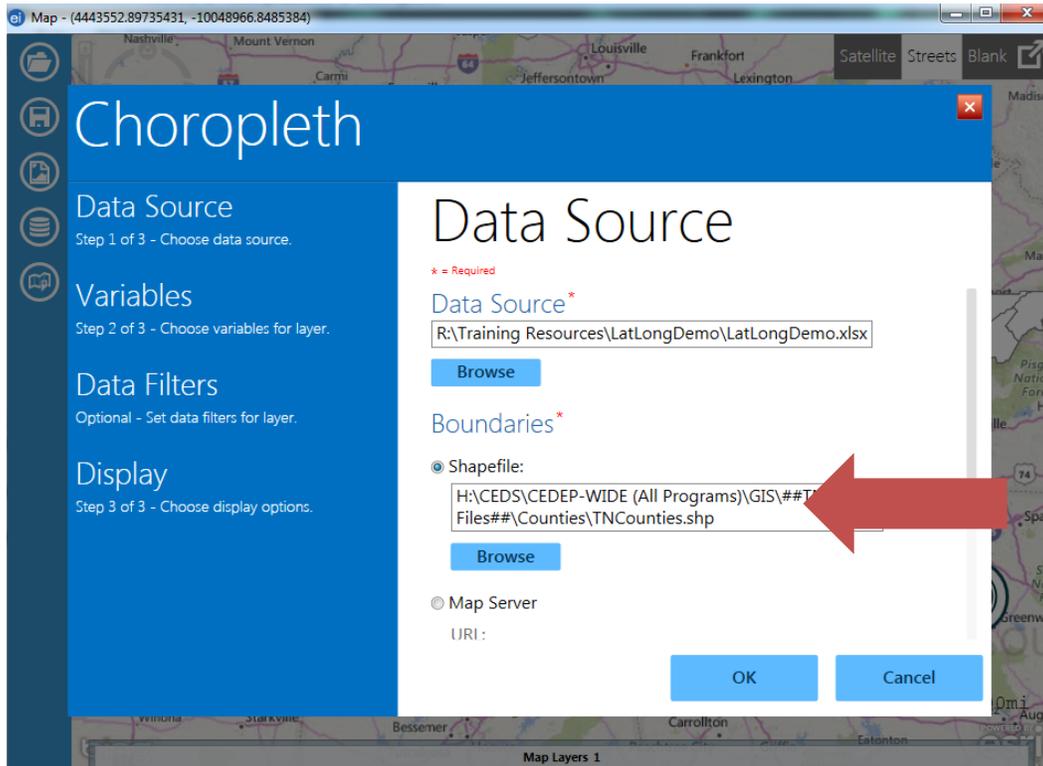


Click Browse Shape File.





Navigate to the *.shp file then click OK.



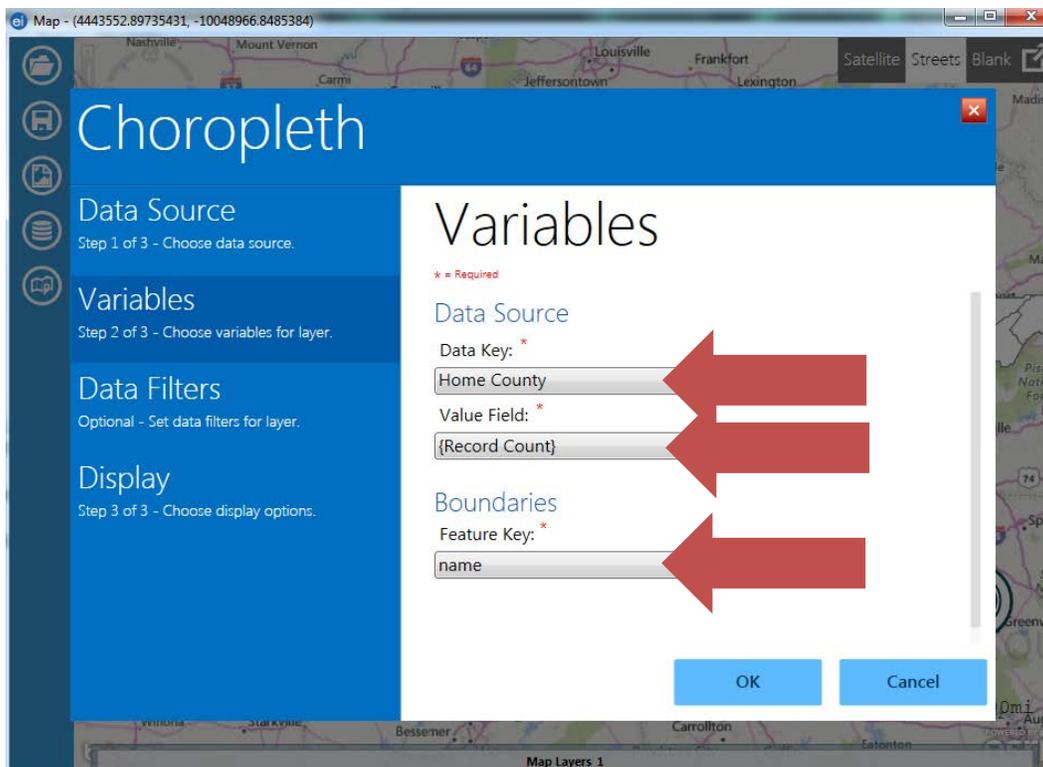


Under Data Source;

- Select the Data Key in the drop down menu. This is the column containing the name/number of your geographic unit of interest (Home County in this example). Note: this unit must match the Feature Key in the Boundaries file.
- Select the Value Field from the drop down menu. This is the column containing data values you wish to map (Record Count in this example).

Under Boundaries;

- Select the Feature Key in the drop down menu. This is the column containing the name/number of your geographic unit (county in this example). Note: this unit must match the Data Key in the Data Source.

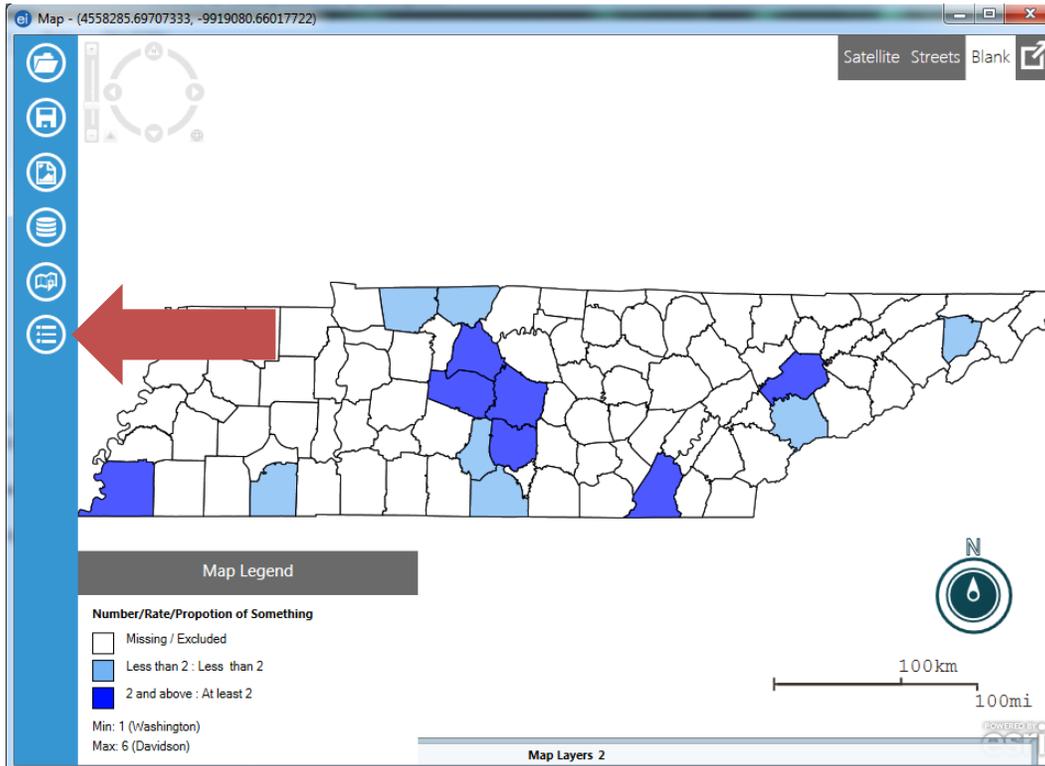


Click Ok and a map will appear (see next page).

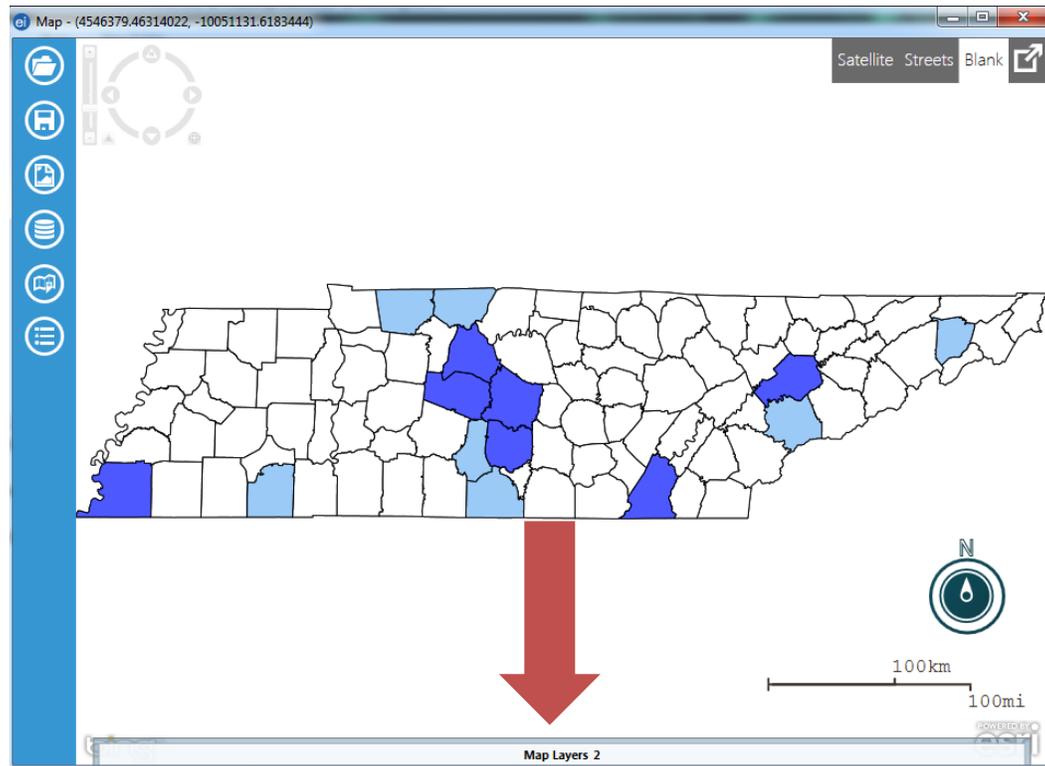




Click here to turn the legend on and off.



Hover over the Map Layers tab at the bottom of the screen to expand this menu.





Click on the purple gear to open the Choropleth options box.

The screenshot shows a GIS application interface. At the top right, there are map style options: "Satellite", "Streets", and "Blank". The main map area displays a choropleth map of Tennessee counties, with several counties shaded in blue and others in light blue. A vertical toolbar on the left contains various map navigation icons. Below the map, the "Map Layers 1" panel is visible, containing a table of layer properties:

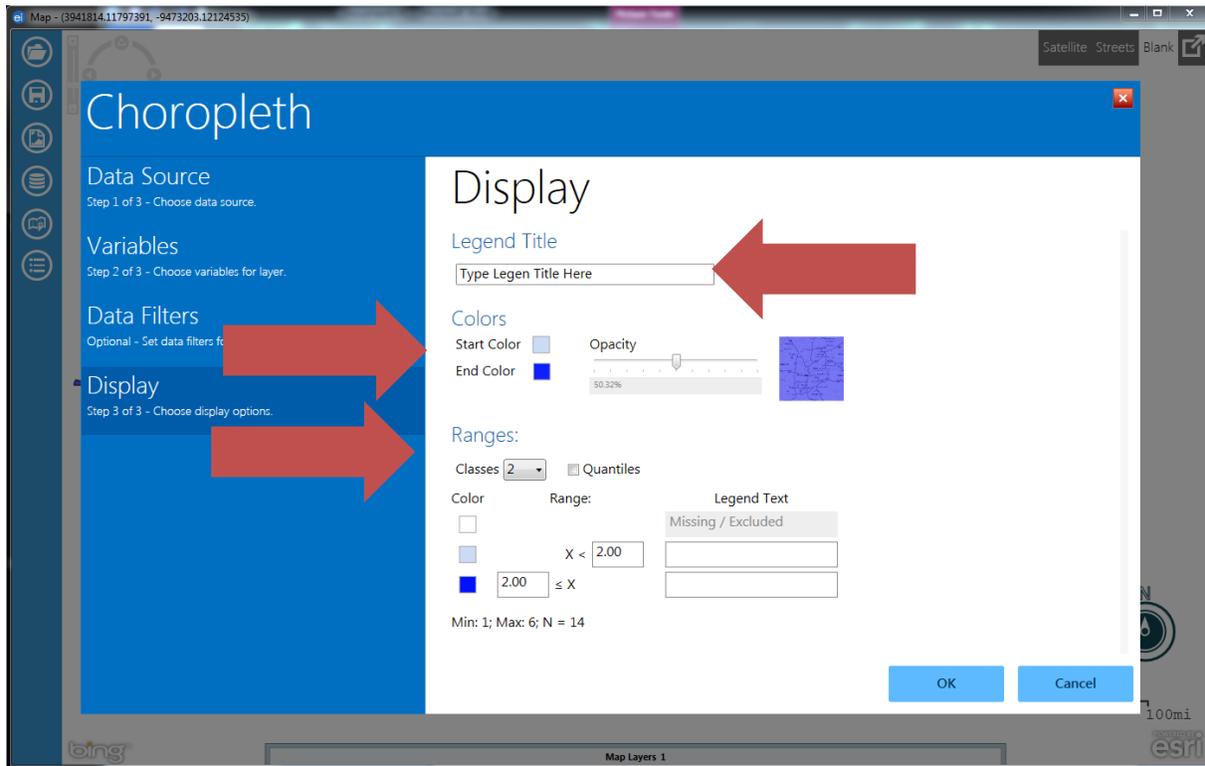
	Classes:	Feature Key:	Data Key:	Value Field:
Choropleth	2	name10	Home County	{Record Count}

To the right of the table, there is a purple gear icon (labeled "Edit data layer" below it) and a close button (X). A large red arrow points from the map area down to the gear icon.





Here, you can apply Data Filters (as shown on page 4-29) and customize Display options including adding a Legend Title, changing the color scheme, changing the number of Ranges, or set your own Ranges.

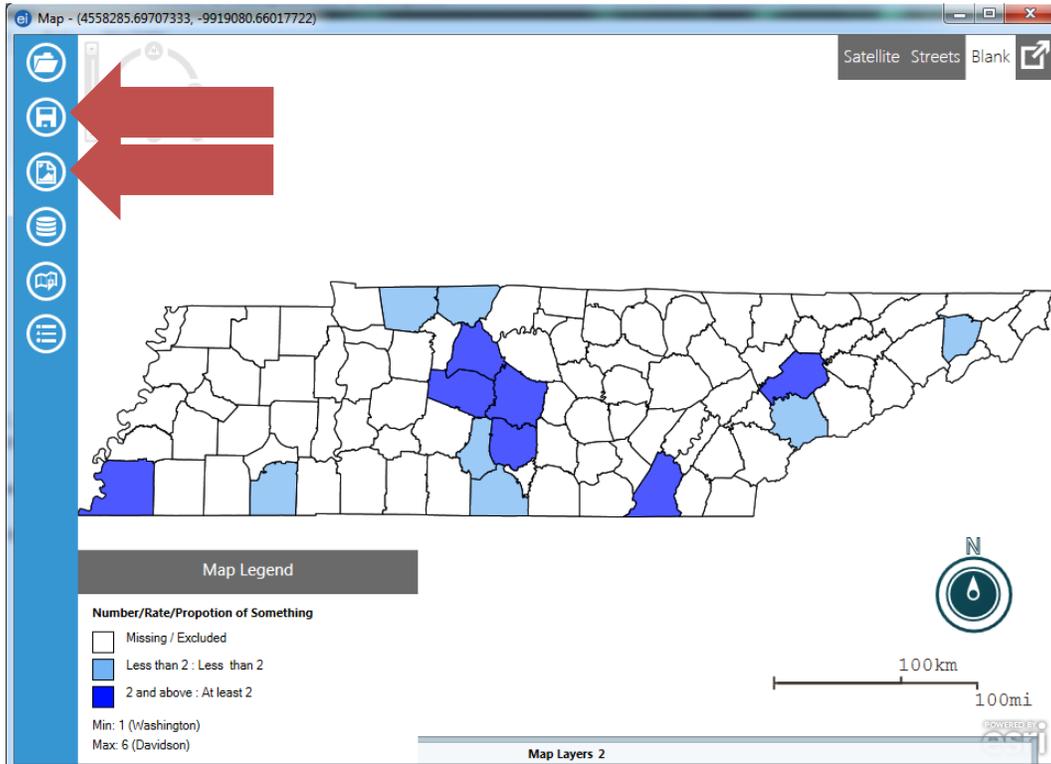


When you're done with Choropleth options, click ok to return to the map.





Click these icons to save the map project (tiny disk) and image (tiny picture) for inclusion in reports and presentations.





3.8 Tips and Other Features

- It is possible to map more than one data layer at a time, though it gets a little tricky. Seek assistance from Rendi.Murphree@tn.gov or another Epi Info user.
- Check the CDC Epi Info Websites frequently for updates, new releases, support and resources <http://www.cdc.gov/epiinfo/>



CDC A-Z INDEX ▾

Epi Info™



Epi Info™

Epi Info™ is a public domain suite of interoperable software tools designed for the global community of public health practitioners and researchers. It provides for easy data entry form and database construction, a customized data entry experience, and data analyses with epidemiologic statistics, maps, and graphs for public health professionals who may lack an information technology background. Epi Info™ is used for outbreak investigations; for developing small to mid-sized disease surveillance systems; as analysis, visualization, and reporting (AVR) components of larger systems; and in the continuing education in the science of epidemiology and public health analytic methods at schools of public health around the world.

EPI INFO™ FOR WINDOWS	EPI INFO™ FOR MOBILE	EPI INFO™ FOR WEB & CLOUD
<p>Create forms, collect data, and perform epidemiologic data analysis and visualization. Appropriate for small to medium size surveillance and response activities and special epidemiologic studies.</p> <p>More ></p>	<p>Load your Epi Info™ forms on tablets or smart phones and conduct epidemiologic studies in the field. Appropriate for distributed data collection in locations lacking IT infrastructure.</p> <p>More ></p>	<p>Web based and cloud-optimized components for data collection, analysis and visualization. Appropriate for large scale surveillance and response activities in locations with reliable network connectivity.</p> <p>More ></p>

Support and Resources

<p>DOWNLOADS Epi Info Tools are in the public domain and free to download and use</p>	<p>USER COMMUNITY Q&A Search posted answers or post your own question to the community of users</p>	<p>HELP DESK Have a tough question? Get custom support directly from the makers of the Epi Info Suite.</p>
<p>FAQS Answers to some frequent questions about the Epi Info tools.</p>	<p>USER GUIDE Epi Info for PC explained with examples and sample templates and programs</p>	<p>TUTORIALS Self-paced training to learn the basics: examples, sample data, & how-to videos.</p>





Chapter 4: ArcGIS Explorer Desktop-GIS for Everyone (*AKA: Free GIS for regular people*)

4.1 Overview, Download, & Training

ArcGIS Explorer Desktop Overview

ArcGIS Explorer Desktop is a free GIS viewer from Esri® that gives you an easy way to explore, visualize, share, and present your geographic information. With ArcGIS Explorer Desktop, you can:

- Access ready-to-use ArcGIS Online basemaps and layers
- Fuse your local data with map services to create custom maps
- Add photos, reports, videos, live web cams, websites, and other information to your maps
- Perform spatial analysis (e.g., visibility, modeling, proximity search)

Download ArcGIS Explorer at: <http://www.esri.com/software/arcgis/explorer/download.html>

Free Online Training

There are several good online tutorials to get started. Since this information is easily available for free, we will not discuss those basics in detail in this document. Here are some of the highly recommended online tutorials:

Getting Started: The Ribbon, Navigation, and More - 8:41 minutes

Learn how to navigate your way around ArcGIS Explorer Desktop.

<http://www.esriuk.com/software/arcgis/explorer-desktop/demos>

There are several other short, yet informative, online training tutorials located at the Esri® Resource Center: <http://www.esri.com/videos>

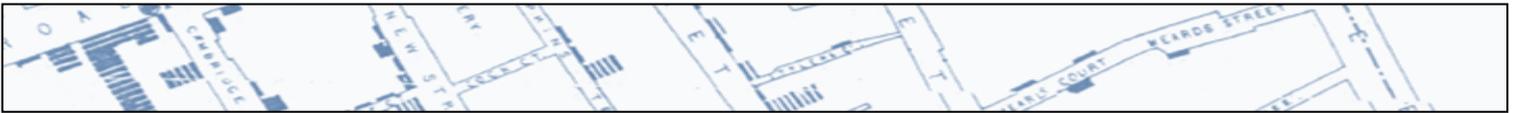
These three are highly recommended and provide you with all the basics for getting started:

- ArcGIS Explorer Basics – 3:50 minutes
- DS2011: Implementing ArcGIS Explorer – 1:11:27 minutes
- Add points to your map using text files – 5:15 minutes

The benefit to ArcGIS Explorer Desktop is that you can download it and learn all the main functionality in under an hour. Plus, it is FREE – GIS for everyone.

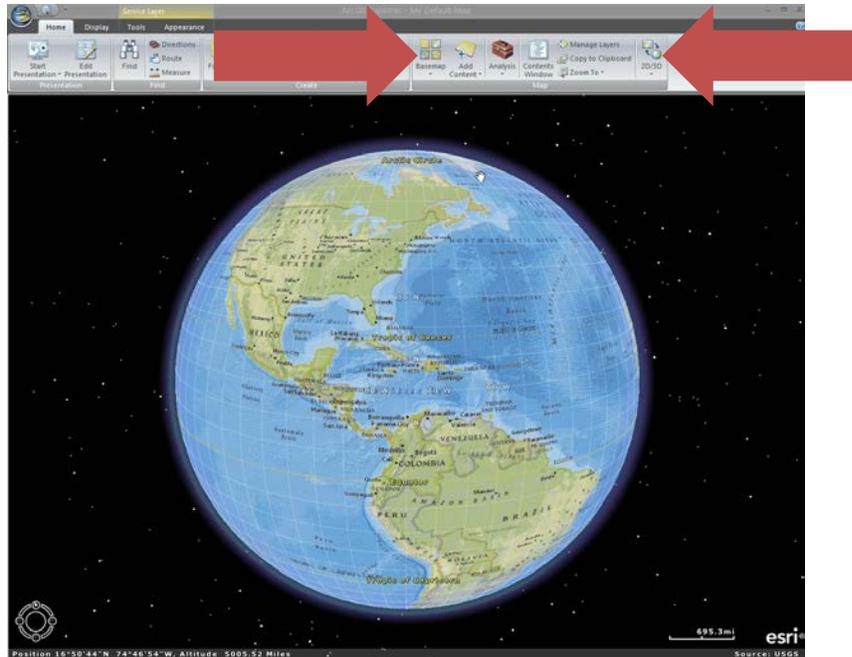
(NOTE: An online version of ArcGIS Explorer is also available for free but is not discussed here. If you would like to learn about capabilities of the ArcGIS Explorer Online, view this free video:

http://video.arcgis.com/watch/496/whats-new-in-arcgis-explorer-online_question_)



4.2 Configuring your basemap and overlay maps

Once you have downloaded the software, it is time to start setting up your map. You can toggle between 2D & 3D and set your basemap to a variety of different choices.

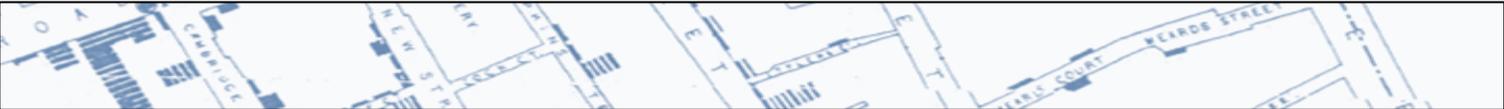


Roadmaps, imagery maps, aerial maps, topography maps, terrain maps, physical maps, etc., are all part of the basemaps that come with the basic download. Here are some examples:



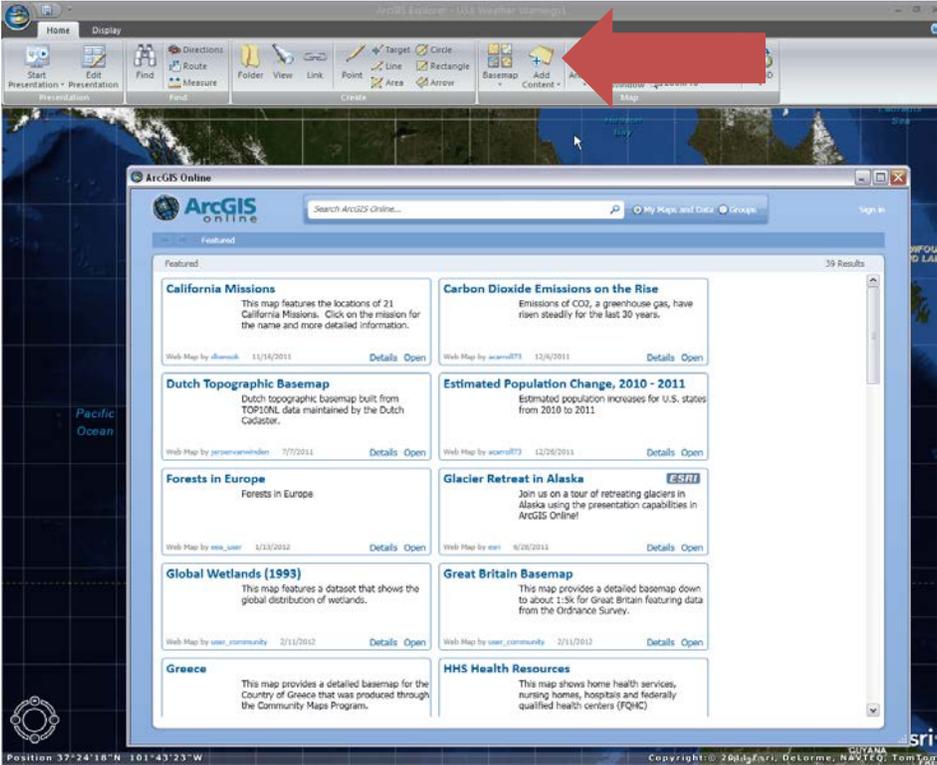
You could also select maps from a variety of other sources.





ArcGIS Online

Under “Add Content” click “ArcGIS Online”. There will be a variety of other map choices, plus you can search their online catalog of maps. You can view the details of the map before opening it to ensure it will be useful. Click “Open” to load the content.

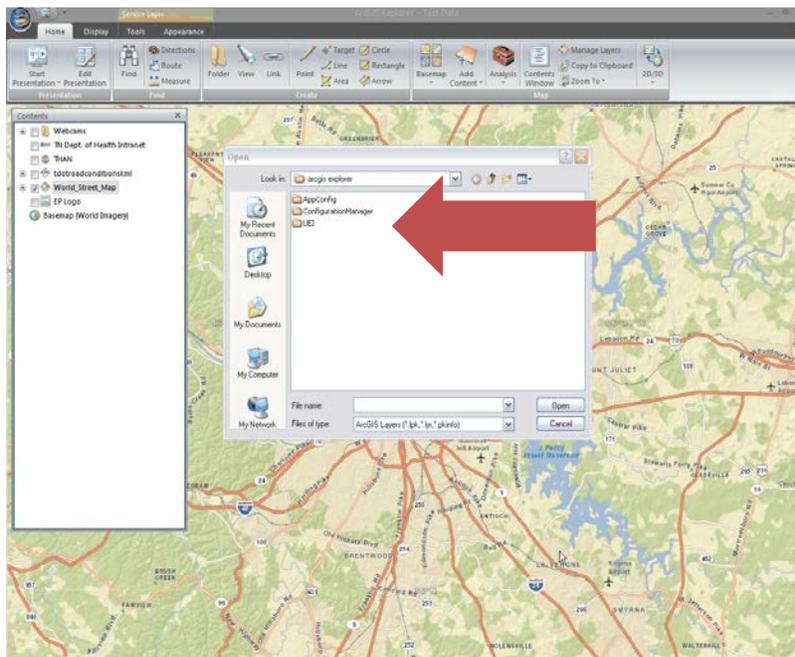




Maps as Layers

You can import maps as layers over your basemap, and you will have the ability to turn the map layers off and on with a click. These are available from an external source or from online services.

To import a layer from an external source (such as a GIS user who created one), save the data to a place where you can find it, click “Add Content”, then click “Arc GIS Layers”, and navigate to the place it is saved. (For those in the Central Office, H:/CEDS/GIS/ is a great source of these kinds of files specific to Health.) Map layers have these file extensions: *.lpx *.lyr *.pkinfo

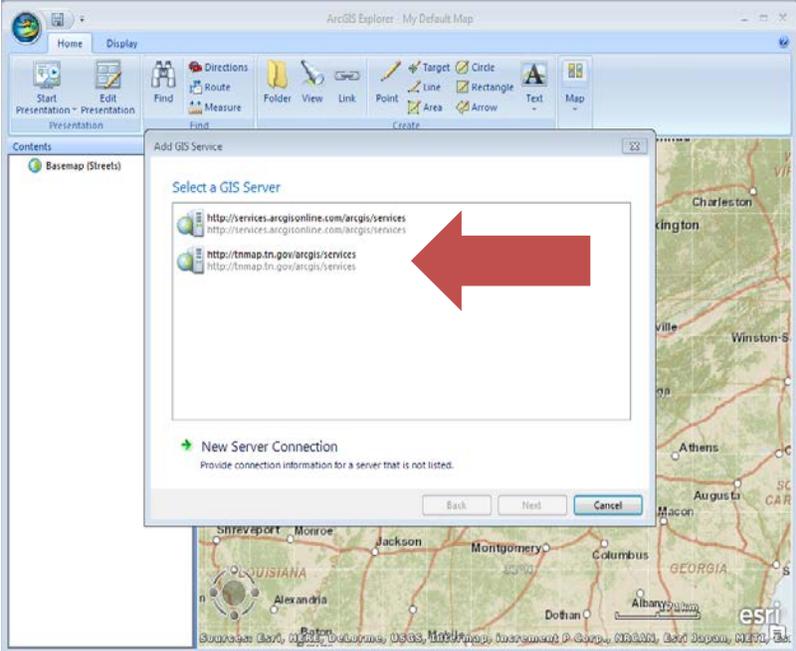




Another way to add layers is through GIS Services. Click “Add Content”, then “GIS Services”, then “New Server Connection”. Enter one of the links below to connect to a GIS server.

To find more data from ArcGIS Services: <http://services.arcgisonline.com/arcgis/rest/services/>

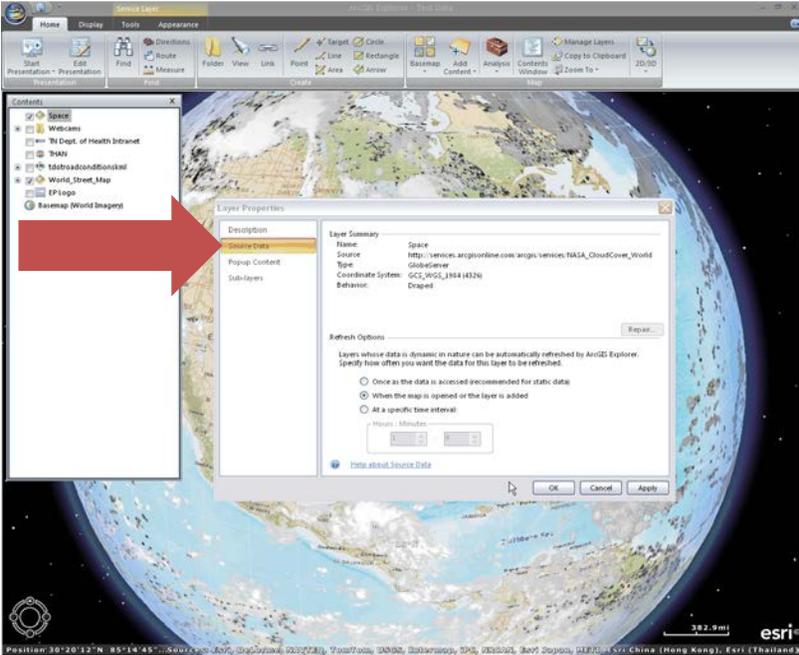
To find more data from the State of Tennessee GIS Services: <https://tnmap.tn.gov/arcgis/rest/services>





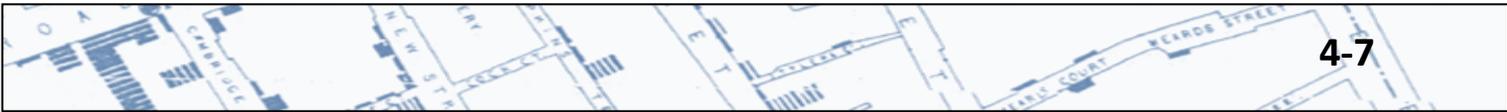
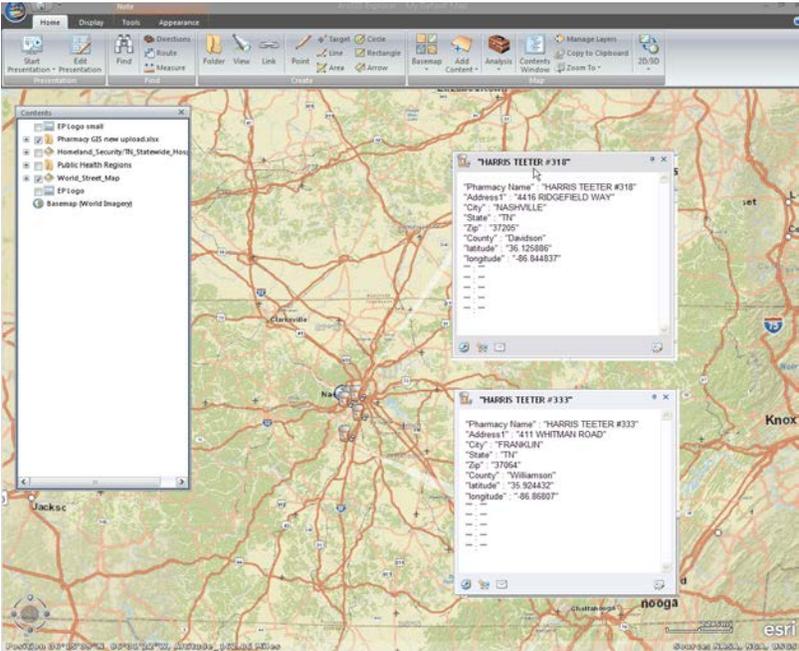
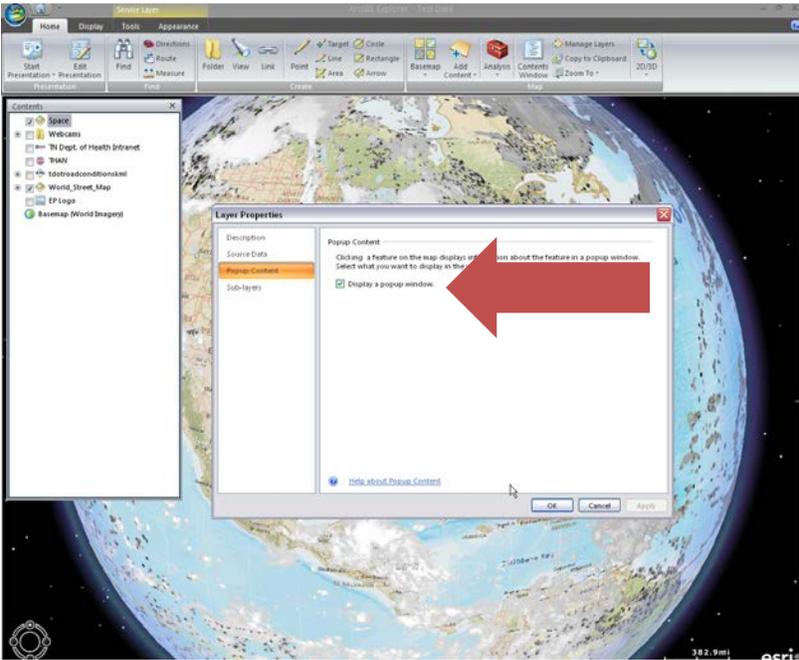
It is HIGHLY recommended that you preview these various services on the agency’s website before importing. Some of these layers are very large and may take a long time to load, so you want to be sure that the map will be useful before you spend time loading it. These maps will import as a service layer and can be turned off and on with a click in the Contents window.

These links to external GIS services are live data sources and can be set to refresh at certain intervals or every time you open your map. Configure this functionality by right clicking the item in the Content Window and selecting “Properties”. Go to the “Source Data” tab to change the “Refresh Options”.





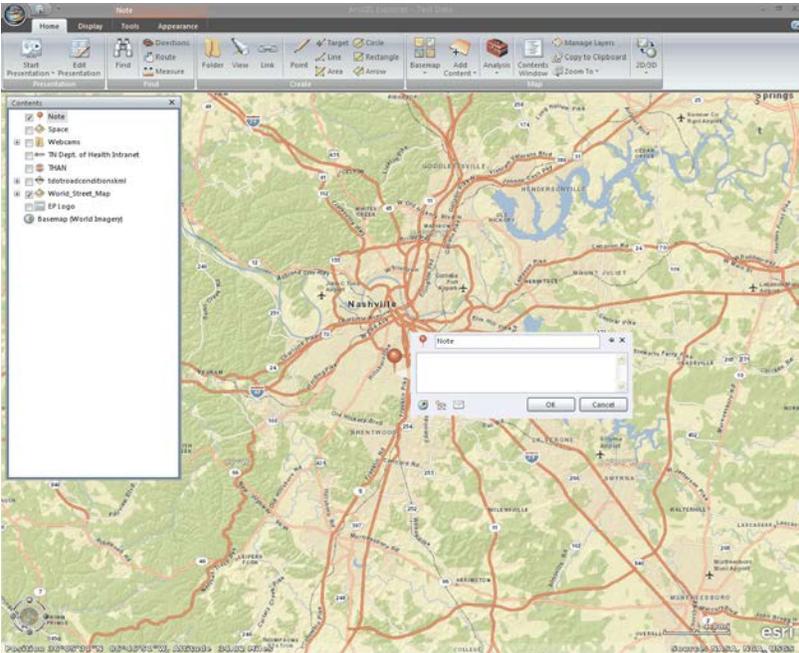
If the map you are importing from a service has points with data about each point, right click the item in the Content Window and select "Properties". Go to the "Popup Content" tab and check "Display a popup window." This will allow the point to display all the characteristics in a popup window. This is helpful because it displays embedded data only when you click a particular point.





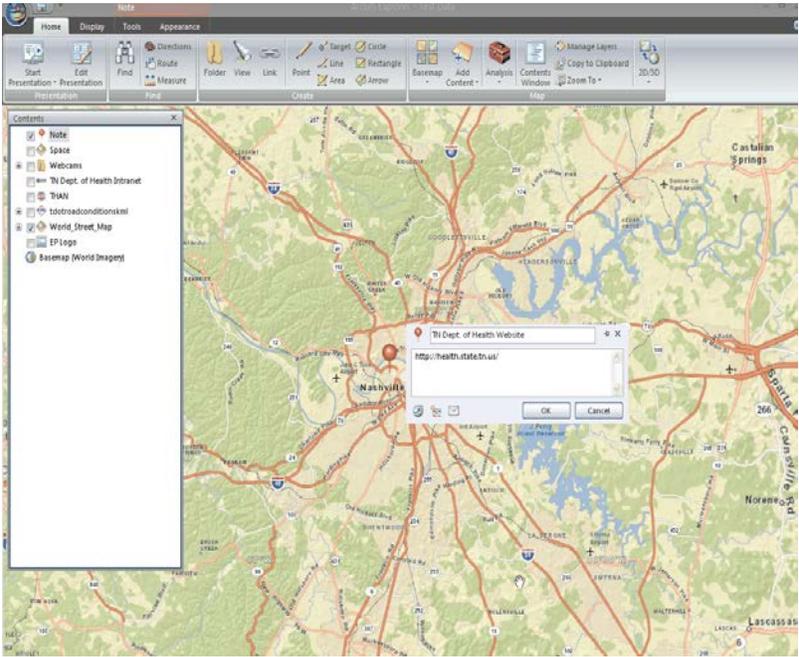
4.3 Adding a single point on a map

After you select a suitable basemap or starting layer for your project, then it is time to put points on your map and fill it with content. Click “Point” and then select a location on your map to put that point. Using this method, you will need to locate where you want the point to be placed on the map by zooming in to find the location. This method is recommended if you don’t know the address and only have a few individual points to plot.

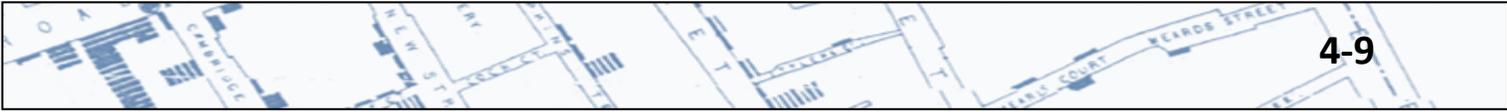
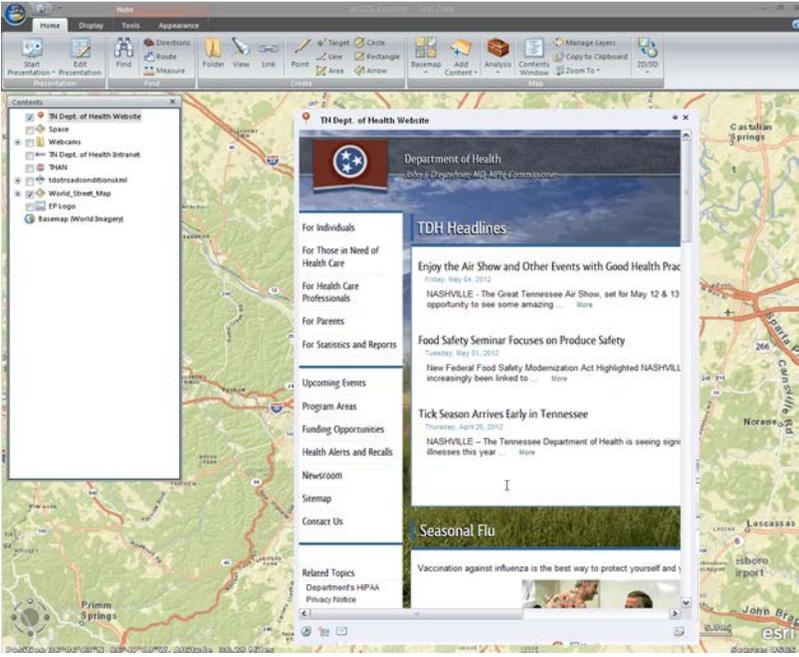


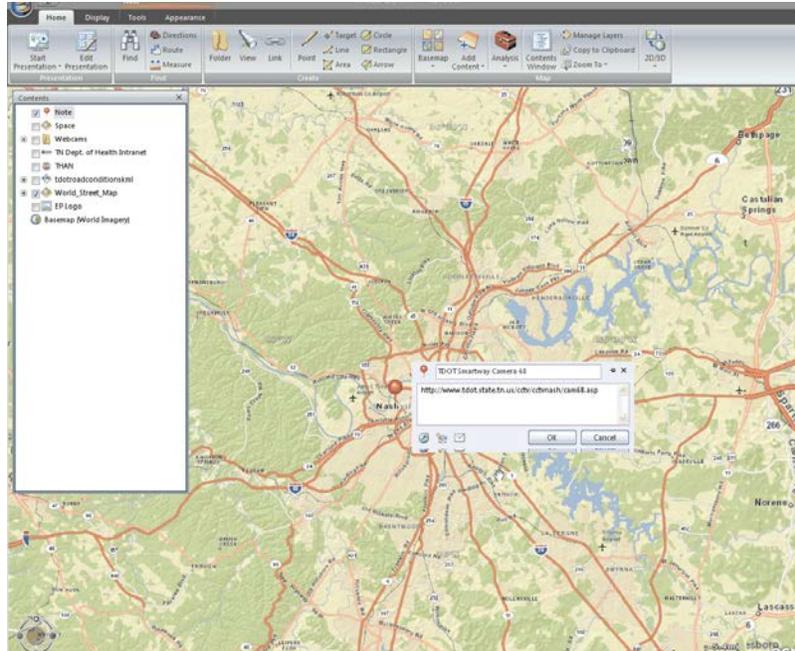
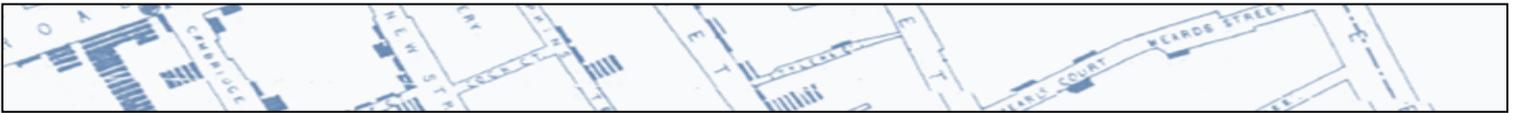


This comes in as a note. Simply copy and paste your own content into the box and rename the note. Here is an example to insert a website page. This also works for online web cameras.

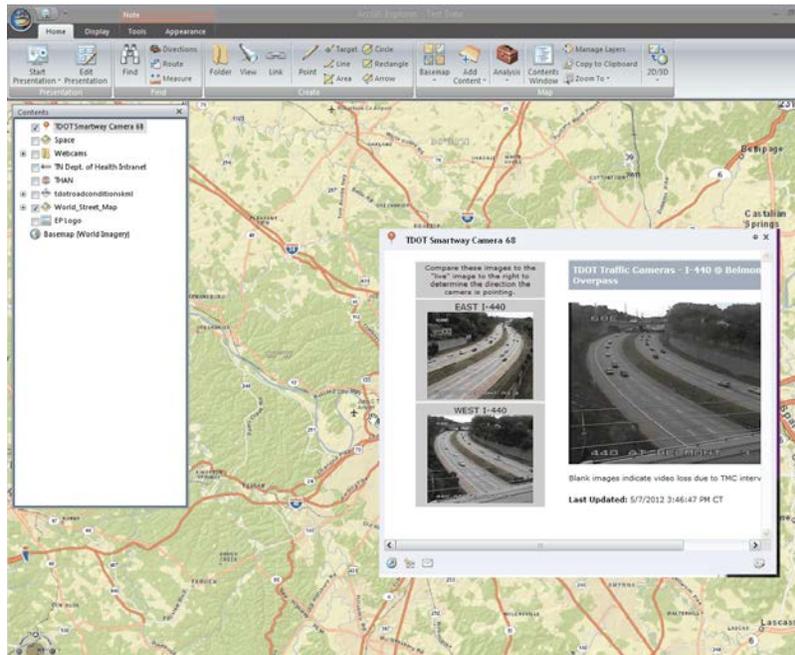


Below is the resulting image of copying and pasting content into the notes box for a website.





The same is true with any type of point on a map.



Other helpful tips:

- You can pin any window to your map to make it stay open. Every window has a small pin icon in the upper right corner next to the “X” to close the window.
- To change the default icon for the note, right click on it in the “Contents” window (or on the map). Go to “Symbol” and change to another photo or browse to your own saved

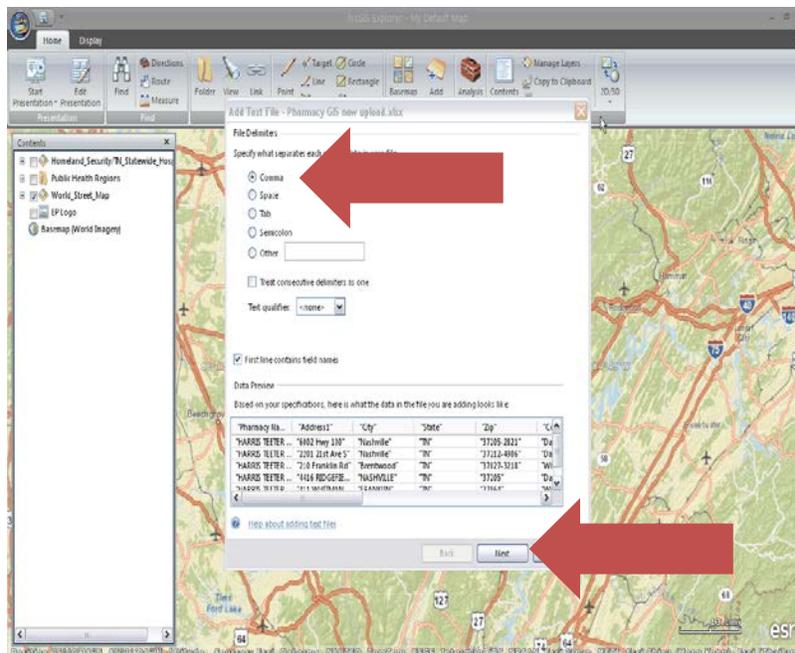


image file. To do this for a group of items, highlight all the items (or the folder they are all saved under) and follow the same process.

- Under “Properties”, you can specify the Longitude/Latitude of the point for accuracy.

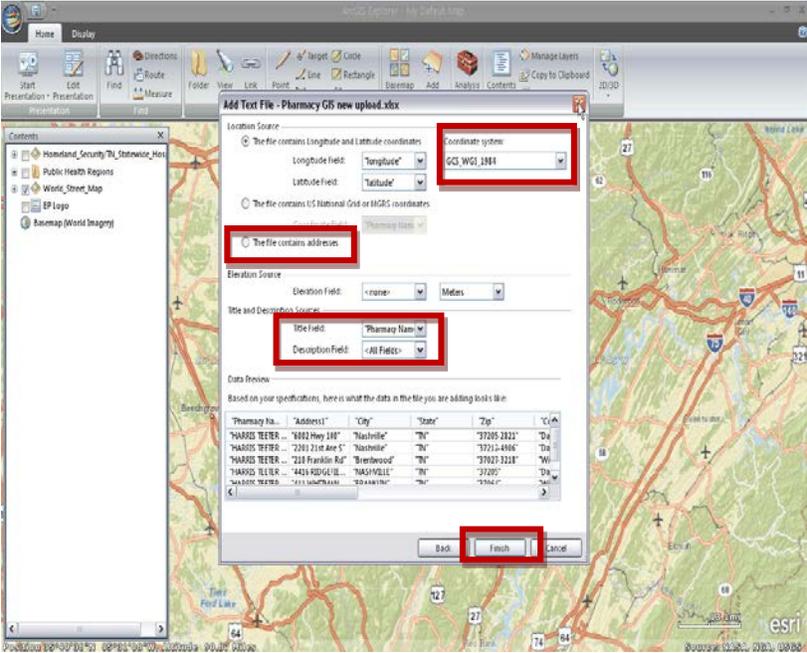
4.4 Adding multiple points to your map using text files

This method of adding points to your map is recommended if you know the address, lat/long coordinates or have multiple points to add at one time. If you have a list of addresses or latitude/longitude points to add as a group, go to “Add Content,” “Text Files”. Your list will need to be in a comma-separated values (.csv) format, which can be created from an Excel Spreadsheet. Navigate to your saved file and follow the prompts.

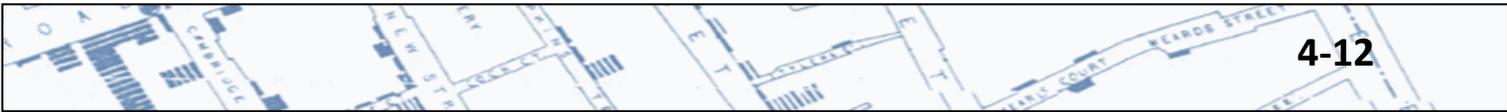




If you have latitude and longitude coordinates, click in the “coordinate system” box. If you have an address, click the radio button “the file contains addresses.” To map the correct name and address fields, use the drop down menus. Once all fields are selected, follow the prompts to proceed.

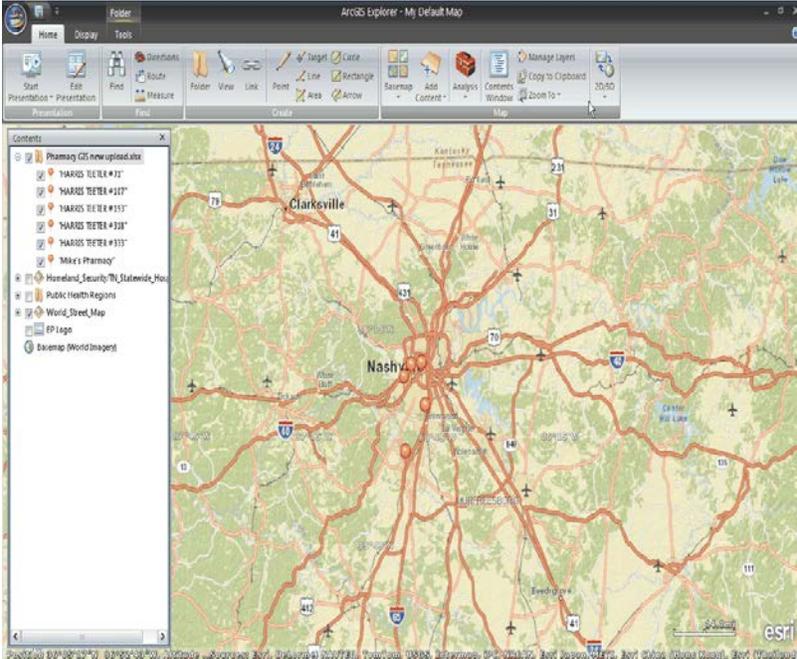


NOTE: For best practices on formatting your data, see Chapter 1: **Preparing Address Data for Geocoding** of this Geocoding Cookbook on Geocoding Addresses. This will help eliminate errors and bad data.

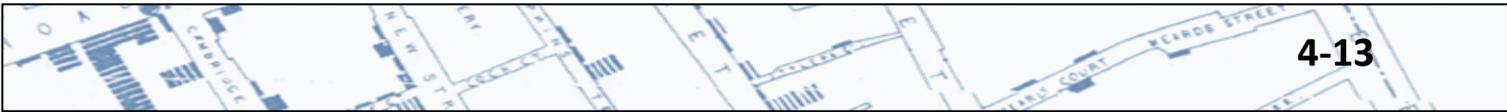
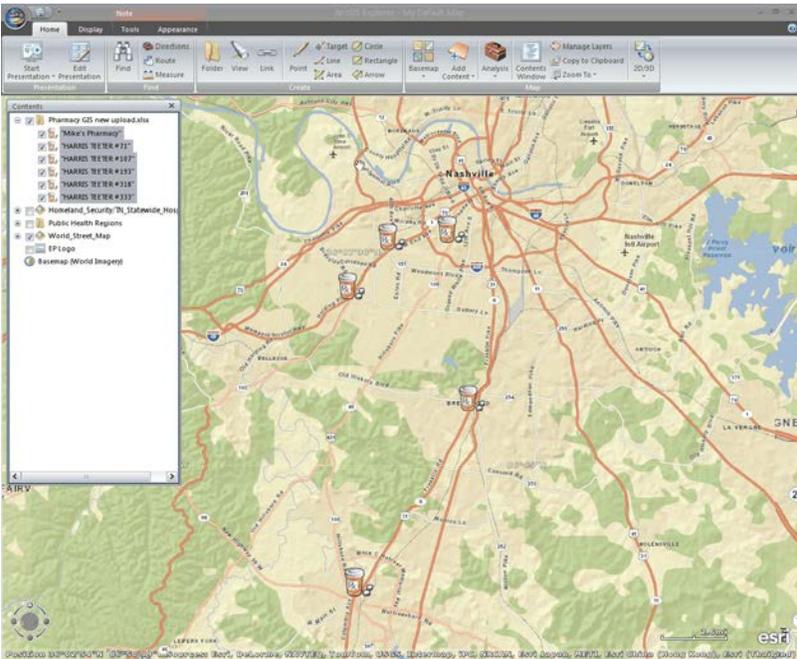




The data from your spreadsheet are now points on a map!



To change the default icons, highlight the points in the Contents Window, right click and go to “Symbol” to select another default symbol or navigate to your own saved icon.



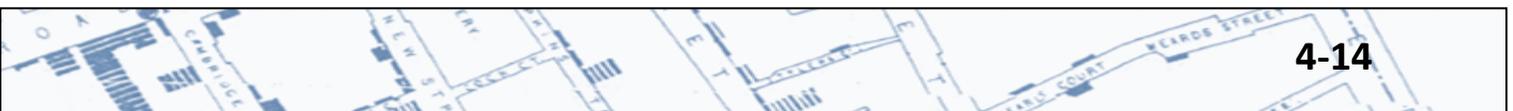
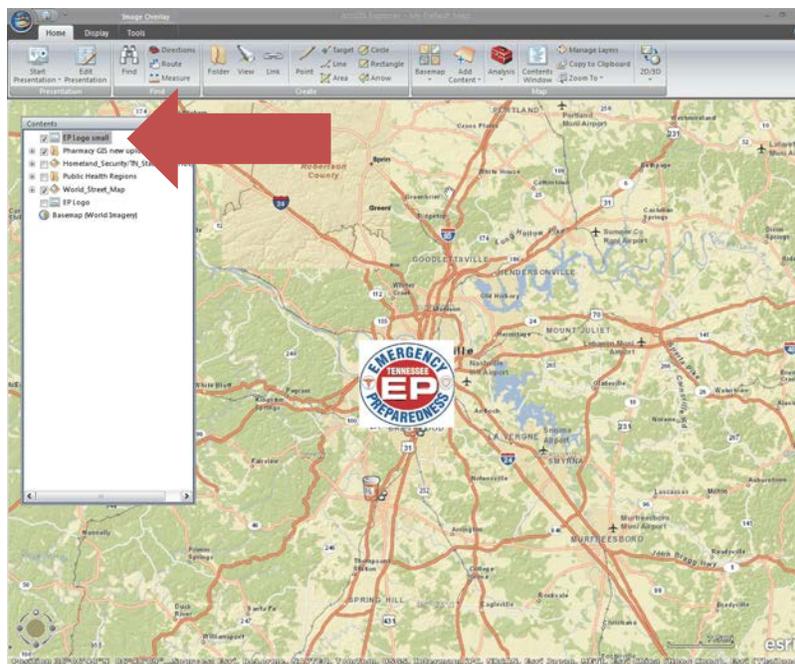


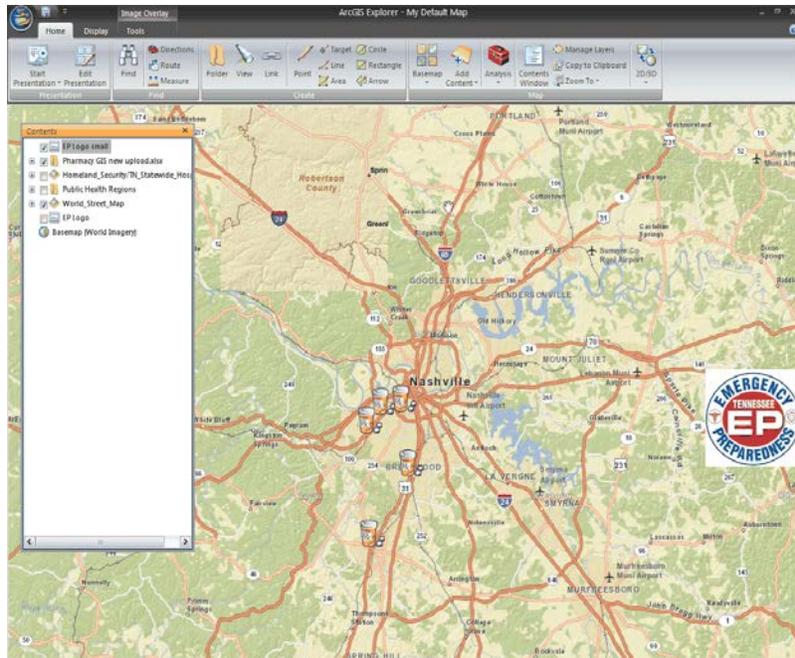
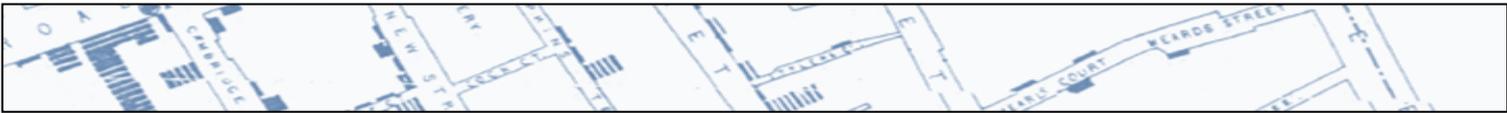
4.5 Adding shape files or other data

Most anything you want to add to your map can be found under “Add Content”, including shape files, KML files, GPX files, and other standard GIS formats. In general, ArcGIS Explorer has fairly limited functionality. These files would need to be created in other software, but they can be imported into ArcGIS Explorer. For those in the Central Office, a good source of these types of data can be found at: H:\CEDS\GIS.

4.6 Adding other image files

If you want to add a logo or other image, you can add most image file types to your map, including .bmp, .jpg, .png, .gif, and .tiff files. Go to “Add Content” and click on “Image Overlays”. Navigate to your saved image file and click “Open”. To move your image to another part of the screen, right click it in the Contents window and select “Position”.



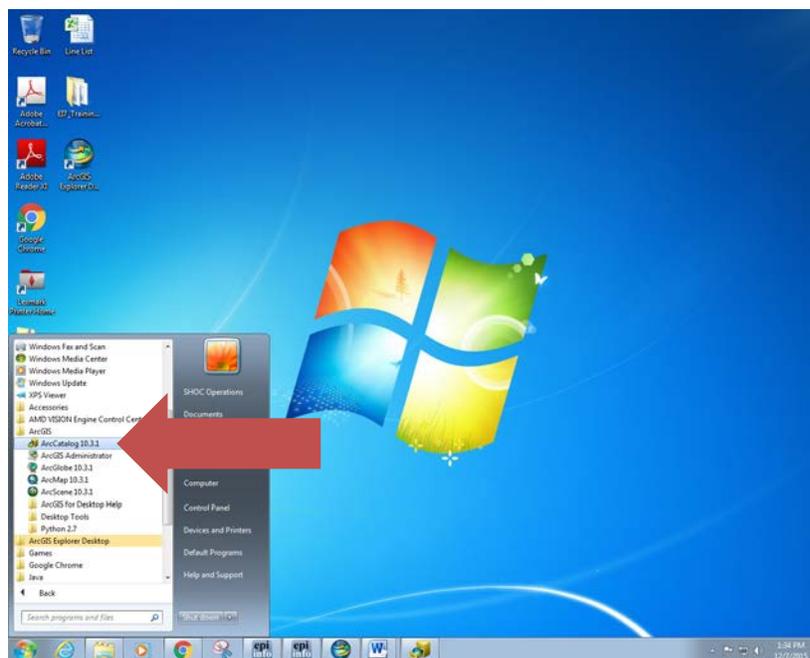


Chapter 5: Geocoding with ArcGIS

5.1 The Basics

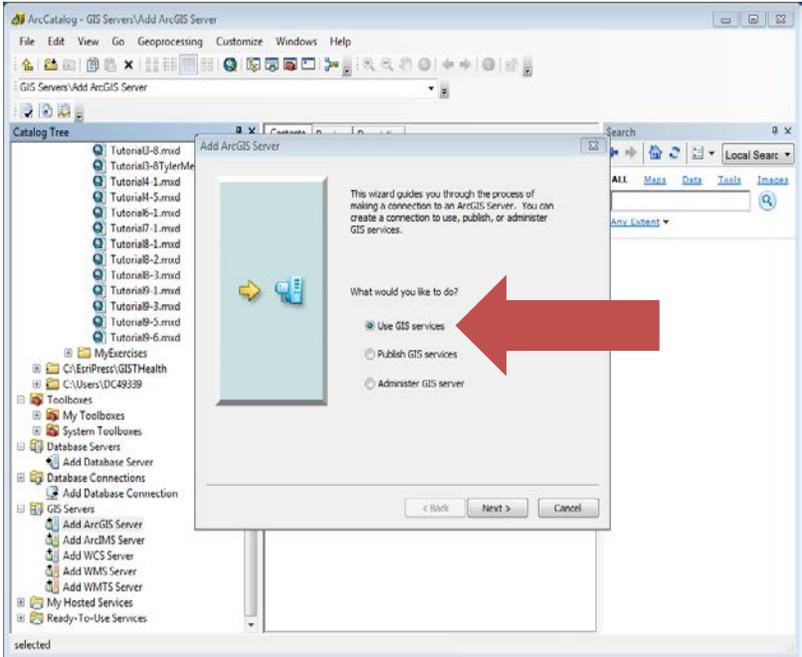
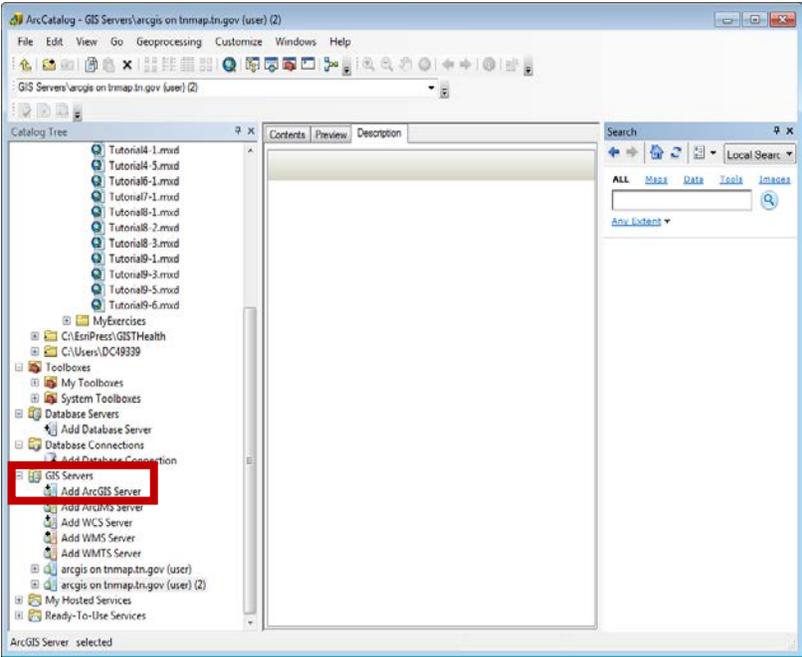
The ArcMap user may need to access data layers from other sources within the state, their division, or external agencies. State employees wishing to access the state’s GIS data will first need to set up connections to the folders storing those data. An index of available data may be found on STS GIS Services website <http://tnmap.tn.gov/>.

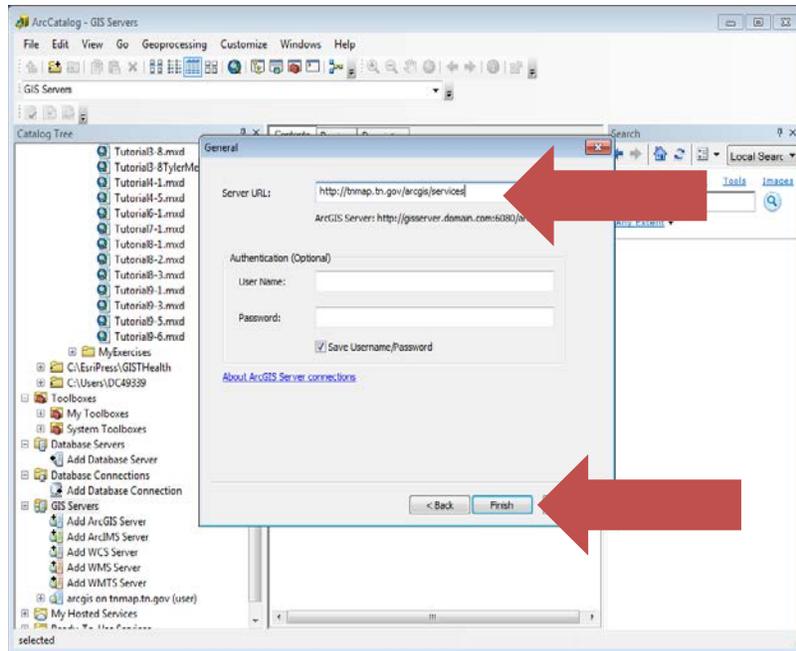
There are two options for accessing the state’s data. The first is through a GIS Server. To access the state’s data on ArcGIS Server, open ArcCatalog by clicking Start, Programs, ArcGIS, then ArcCatalog.





When ArcCatalog opens, navigate to GIS Servers, then double click Add ArcGIS Server. In the Add ArcGIS Server box, click the radio button for Use GIS Services, then Next. In the Server URL box, type <http://tnmap.tn.gov/arcgis/services>, then click Finish.



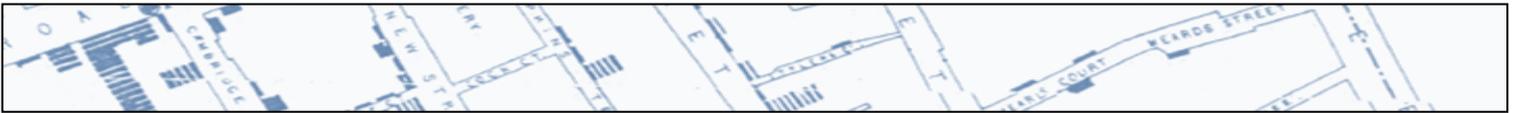


The second way to access the state's data is through a database connection to STS-GIS Services' database. A Direct Connect file is required to be installed on the user's computer. To receive the Direct Connect file and instructions, contact STS-GIS Services at tnmap.gis@tn.gov. The instructions for setting up a direct connection are available here: <http://tn.gov/assets/entities/finance/oir/attachments/GIS-Data-How-To-Connect-TNMap.pdf>

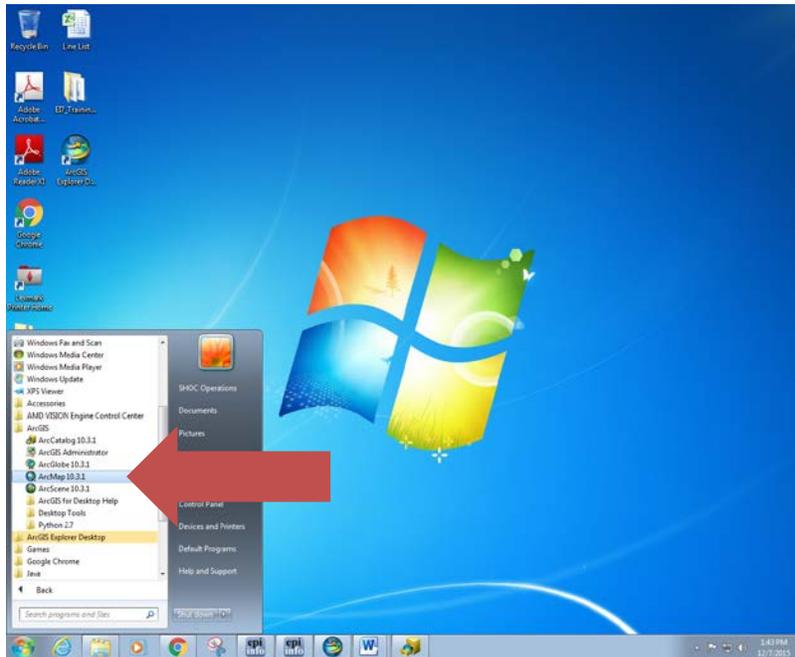
Feature classes and shapefiles are also available for download from ESRI, the U.S. Census Bureau, and other agencies. In addition to what is available from the state, the Department of Health also has some commonly used shapefiles that could be emailed or otherwise made available.

To access and add feature classes or shapefiles (layers) to an ArcMap project, open ArcMap, open a blank map, then either use the Add Data icon or drag the files to ArcMap from ArcCatalog.

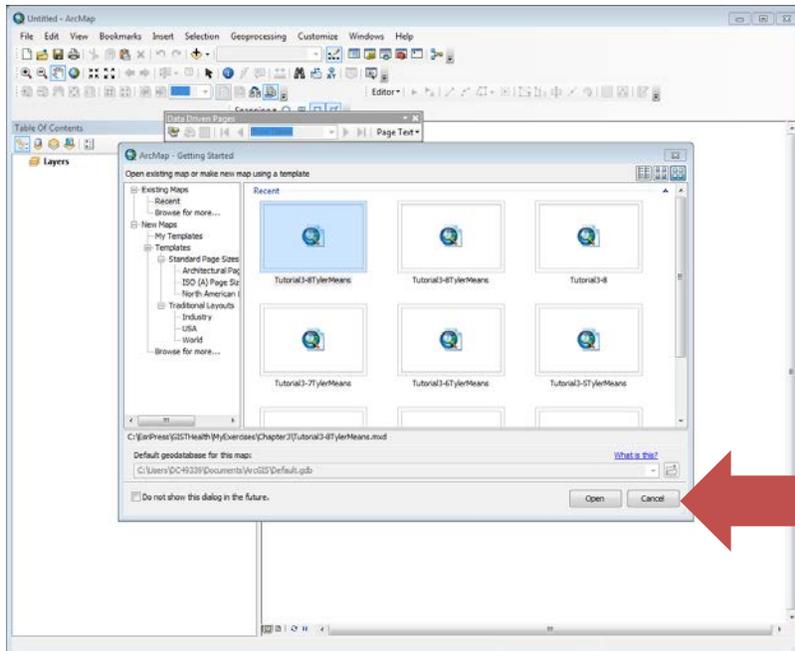




Open ArcMap by clicking on the desktop shortcut icon,  or, from the desktop, click Start, Programs, ArcGIS, then ArcMap.

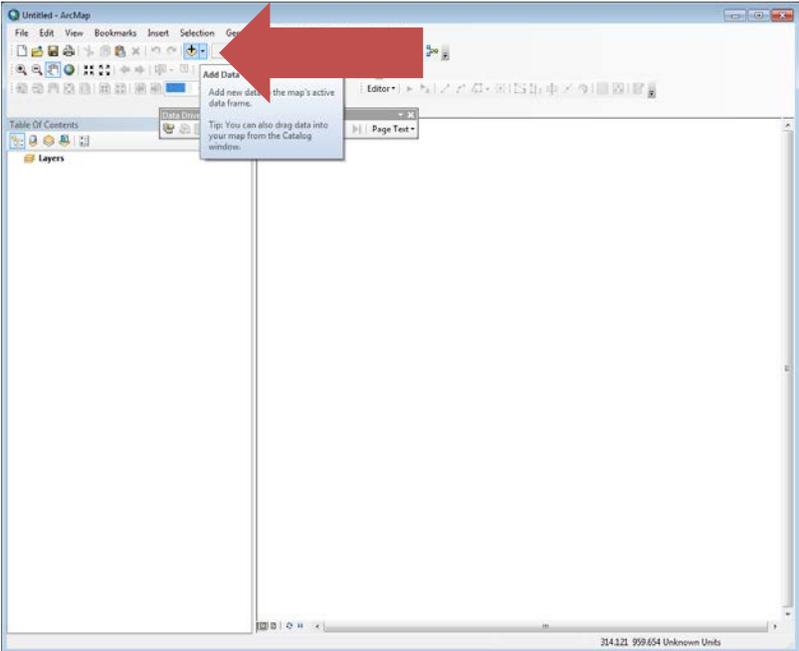


When ArcMap opens, open a blank map by clicking Cancel on the Getting Started box.

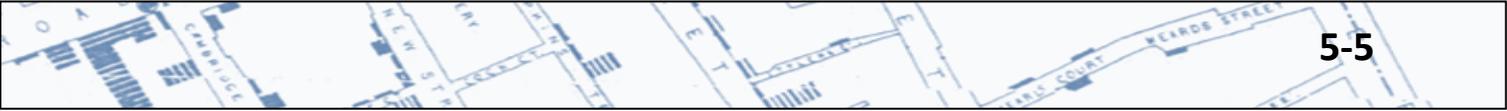
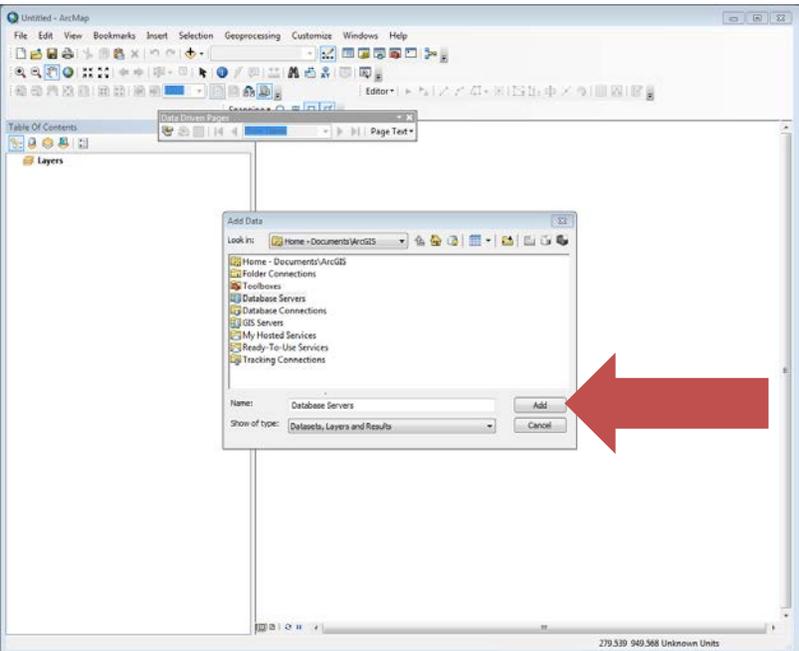


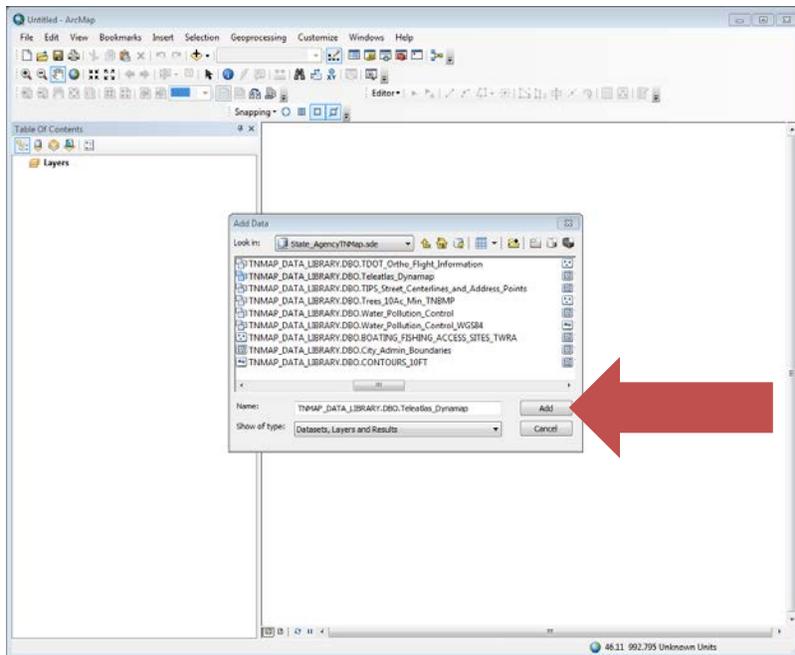
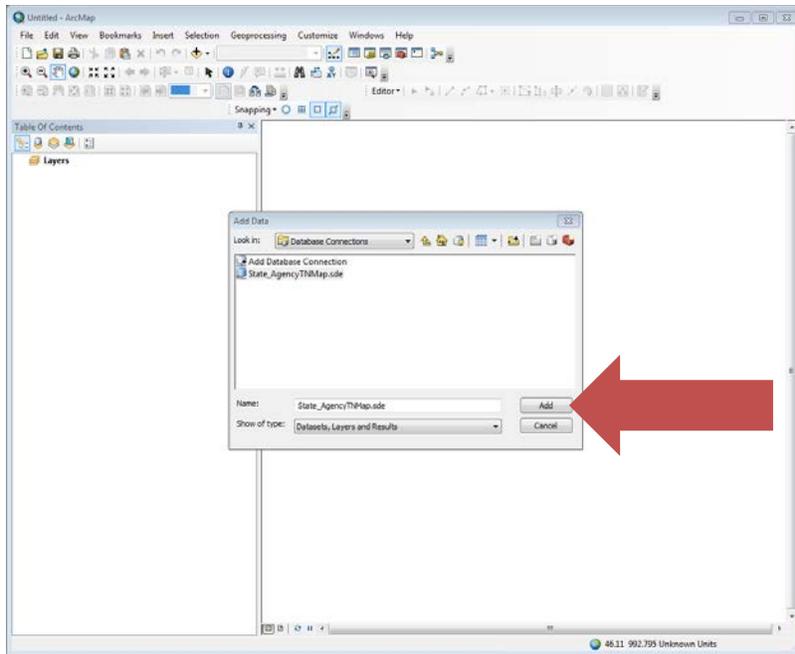


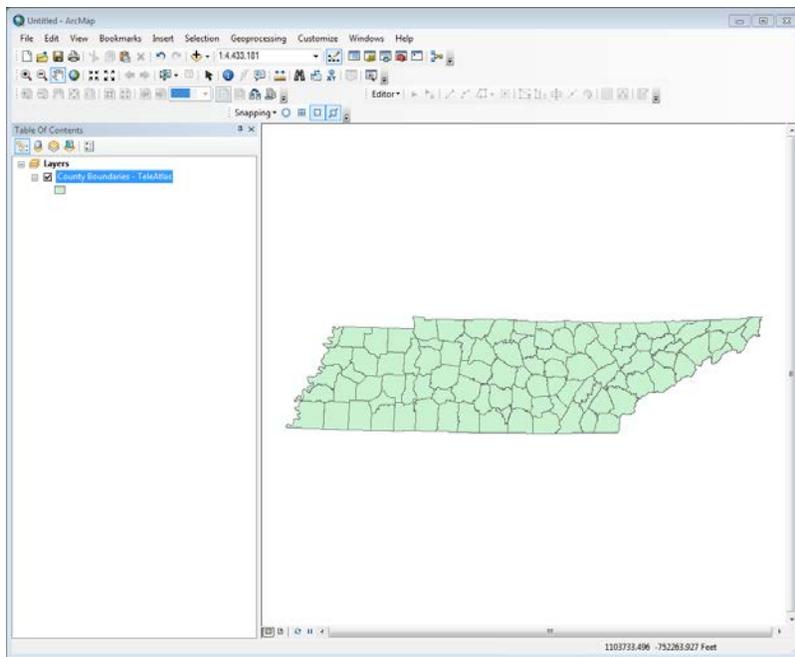
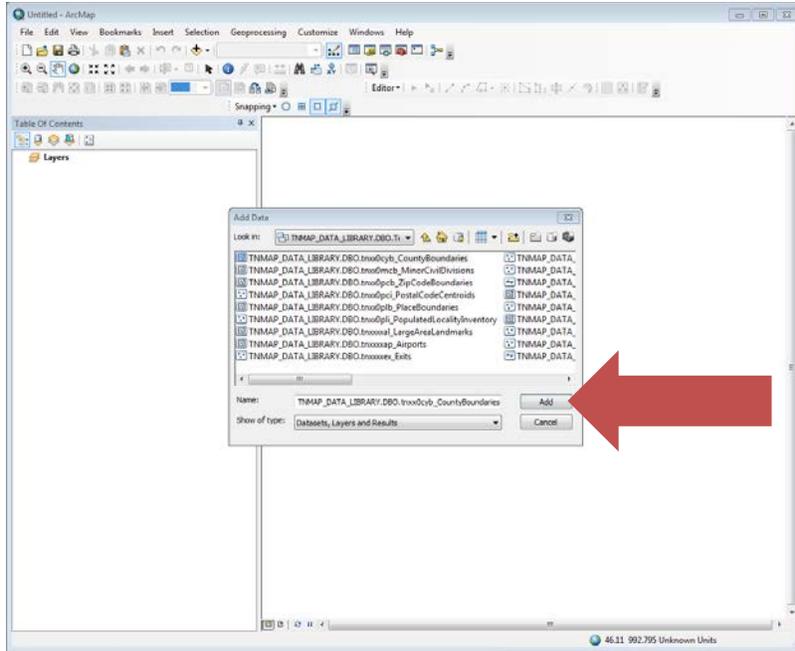
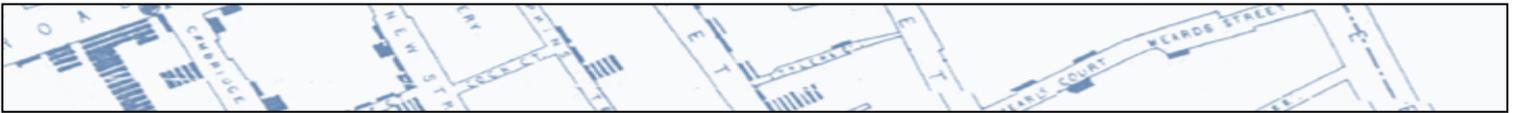
To add layers to the map, click the Add Data button.



Navigate to where the data are stored, then click Add.

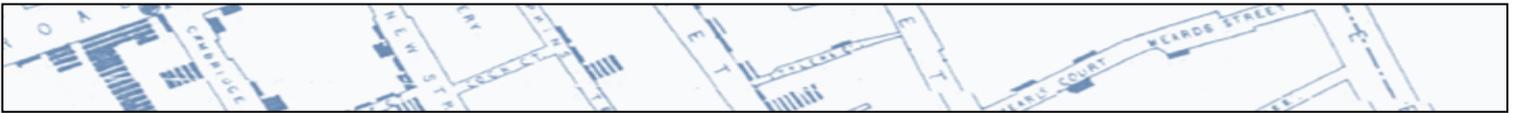






To add a base map with roads, topography or imagery, click Add Basemap, select the one you want, and then click add. The base map will be added to your map and Table of Contents.





If the basemap is added before other layers in your map, the base map will likely be zoomed out to the world view. To avoid having to zoom back in, add a layer to the map before adding the base map. To zoom in and out on the map, use the items on this tool bar . The blue arrow takes you back to the previous extent. Another trick when zooming — right-click on a layer name in the table of contents and clicking “Zoom To Layer”.

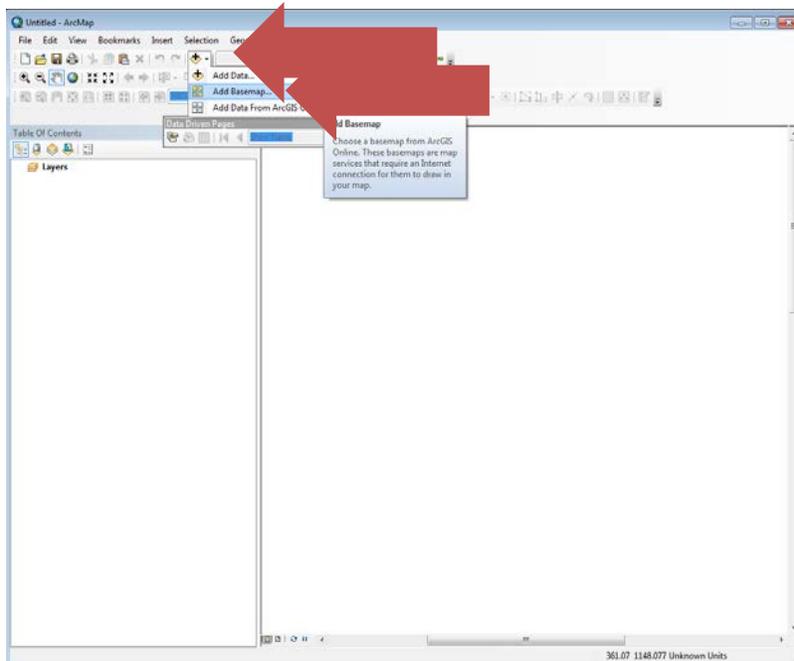
5.2 Geocoding Addresses

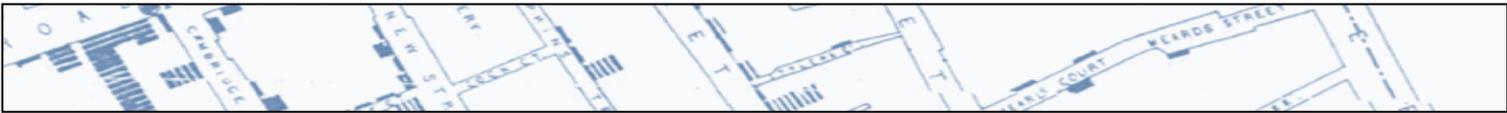
Open ArcMap by clicking on the desktop shortcut icon,  or, from the desktop, click Start, Programs, ArcGIS, then ArcMap.

When ArcMap opens, open a blank map.

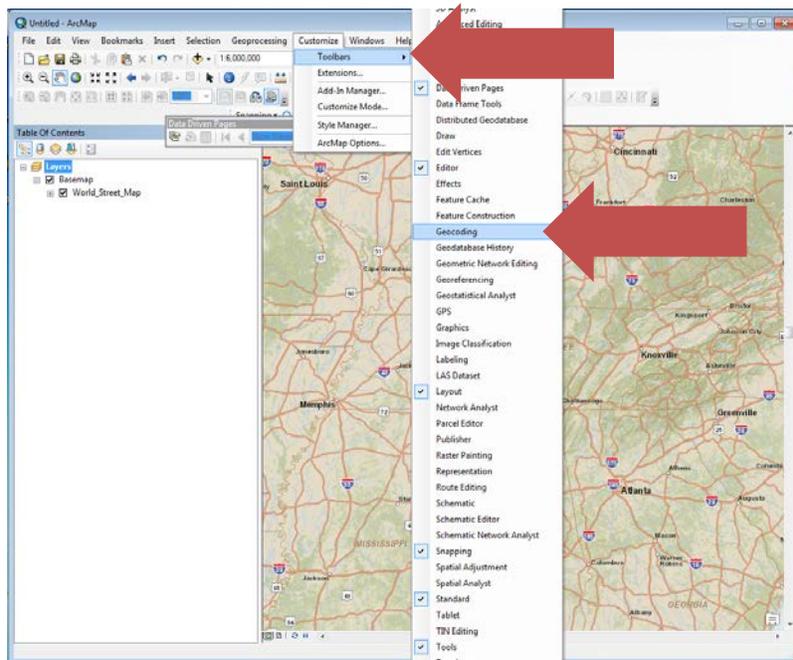
(Optional but recommended) Add county and zip code boundaries. Adding these reference polygons will help in correcting or validating data points. To use the state’s data, users will need access to the data via the GIS Server and/or the Direct Connect feature from STS GIS Service’s data.

As a reference, add a base layer which contains streets.



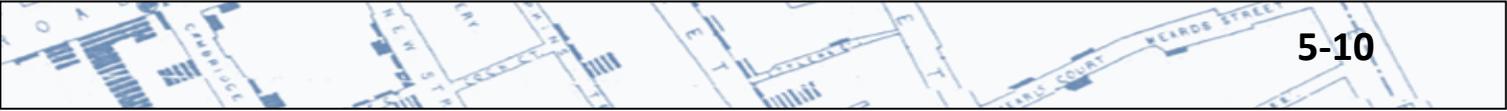
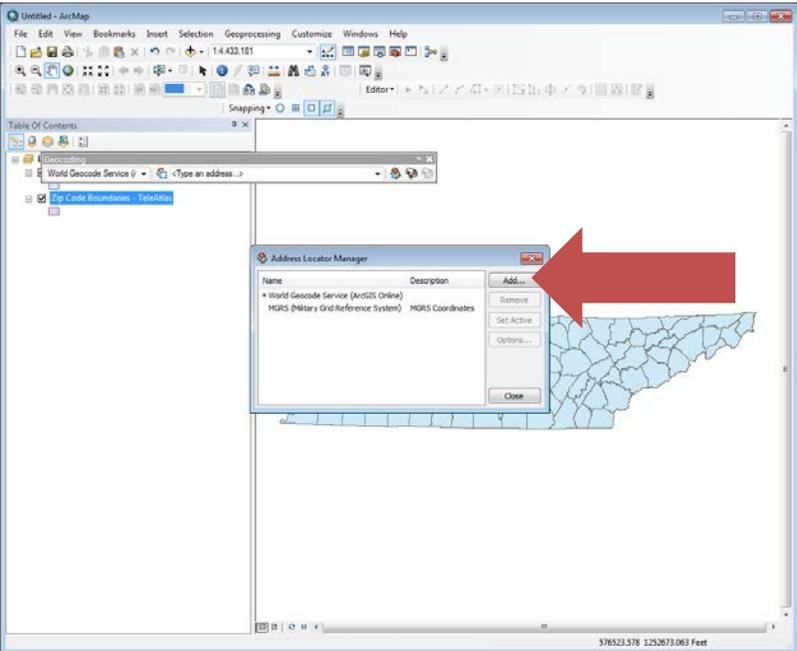
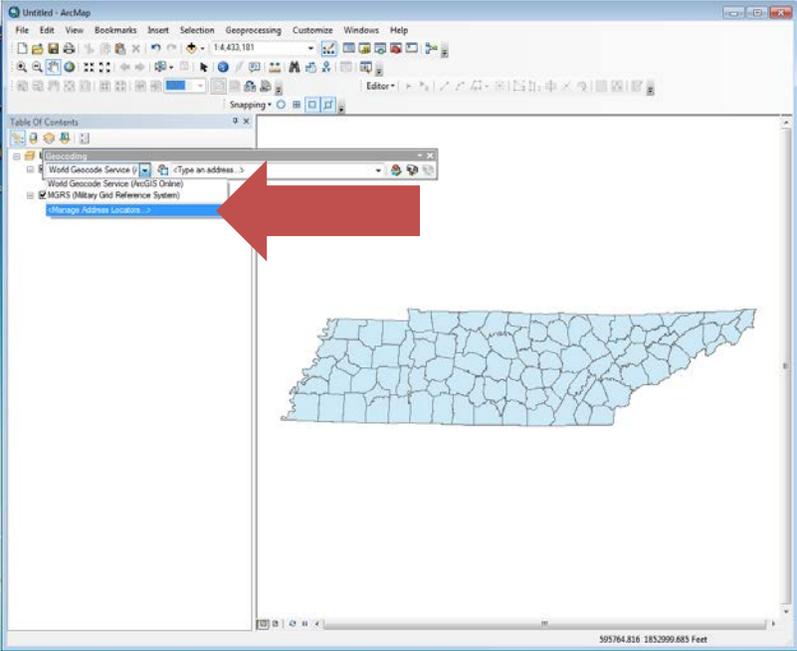


Add the Geocoding Toolbar by clicking on the Customize tab, Toolbars, then Geocoding.





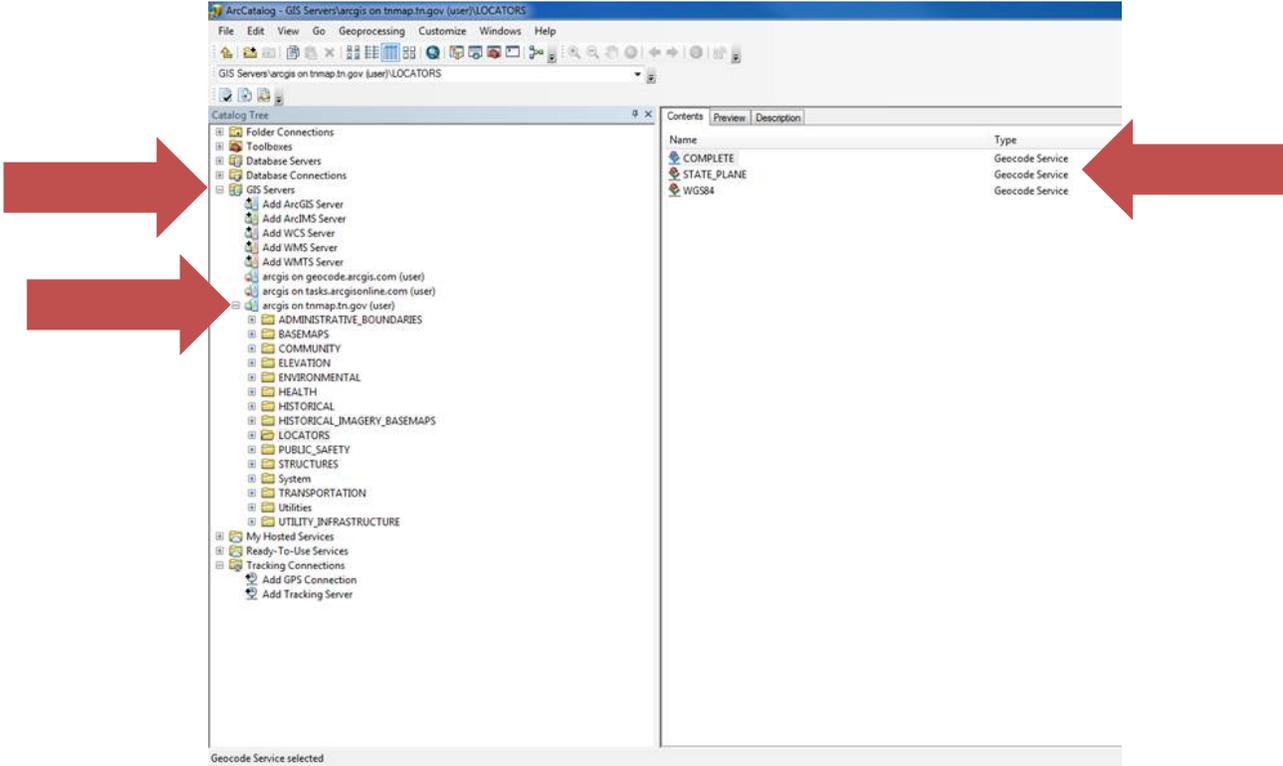
When the tool bar appears,  use one of the Geocode Services listed or add one from another source. To change the Geocoding Service, click on the first drop down menu in this toolbar, and select the desired geocoding service. Or, to add a geocoding service, such as one from the State of Tennessee's STS GIS Services, use the first drop down menu in the tool bar, click Manage Address Locators, then click Add in the Address Locator Manager box (See Section 5.1 above for access to the state's data).





Navigate to the location of the geocoding service. If using the state’s geocoding service, navigate to GIS Servers, arcgis on TNMap.tn.gov. Three options are provided; Complete, STATE_PLANE, and WSG84. Details for each are available at <https://tnmap.tn.gov/arcgis/rest/services/LOCATORS>

Select one and click Add. The selected service should now be available for selection in the drop down menu on the geocoding toolbar. Repeat for each available service you wish to use.



Note: This image is snapped from Arc Catalog not the Address Locator Manager.



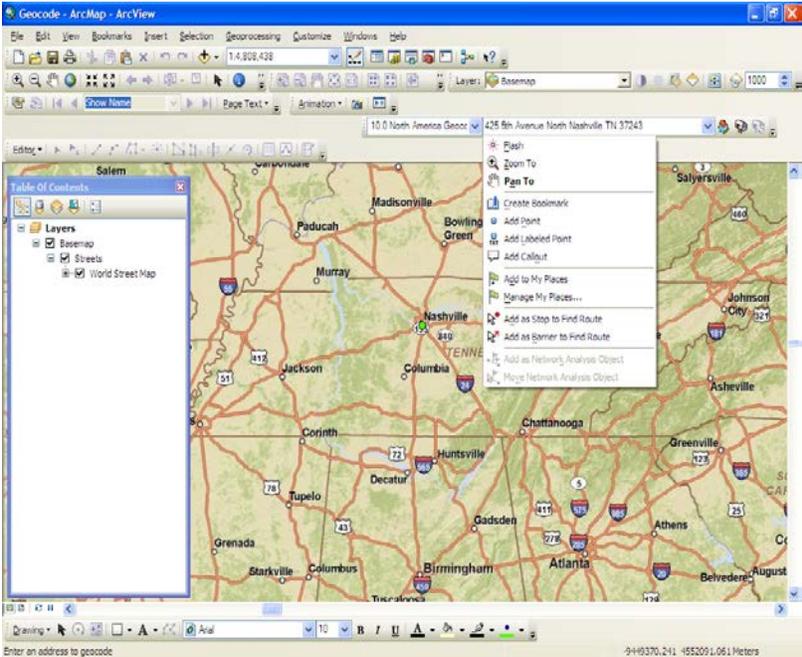


Single Addresses

Single addresses may be geocoded by typing the address in the address field of the Geocoding Toolbar.



After typing in the address, hit Enter, then right-click then choose an option.

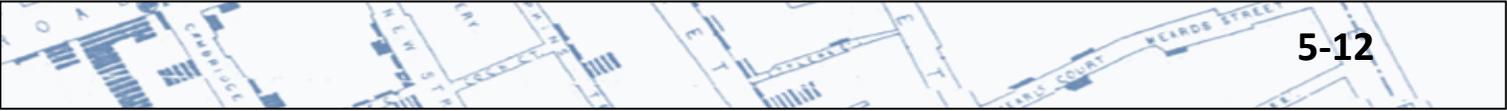


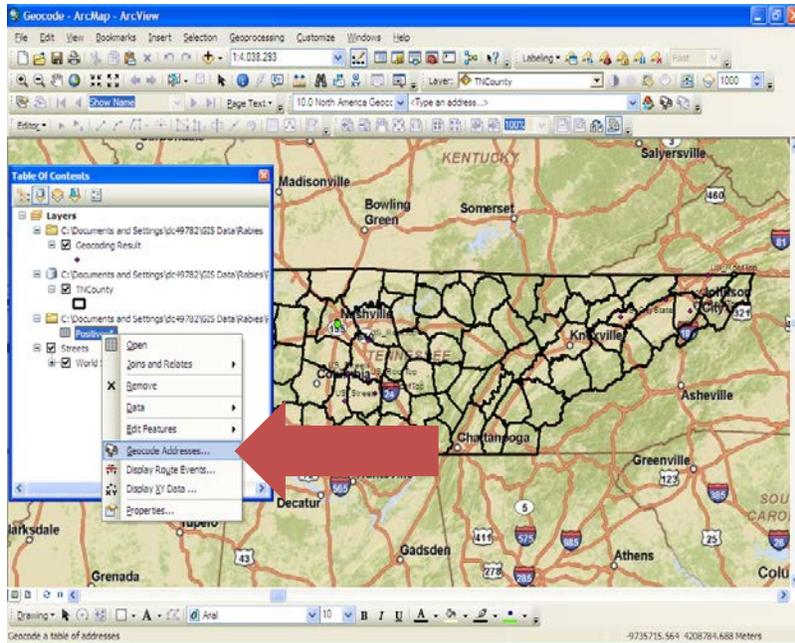
Lists of addresses

To geocode a list of addresses, first make sure that all of the addresses are as complete as they can be and are in a standard format in Excel. (See Chapter 1: Preparing Address Data for Geocoding)

There are a couple of ways to geocode addresses:

Add the table of addresses (*.csv or *.dbf files types) to ArcMap, either by using the Add Data button, or by dragging the table over from ArcCatalog. The table will appear in the Table of Contents. Right click on the table of addresses in the Table of Contents. Then, click the geocoding addresses option.



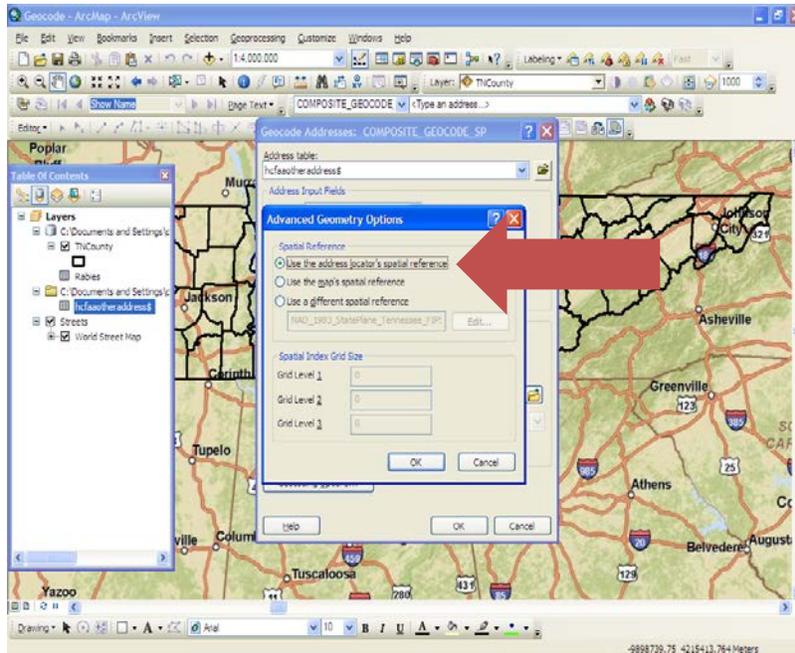
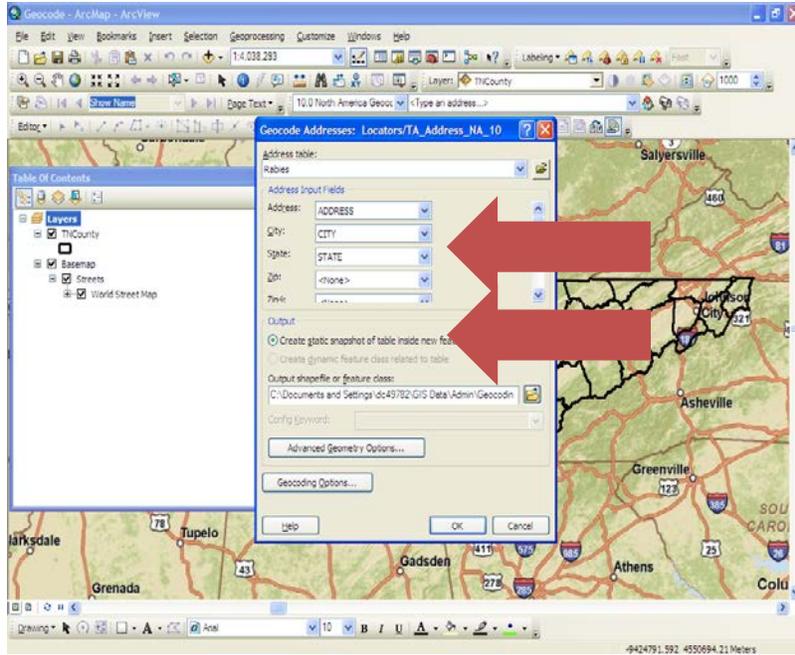


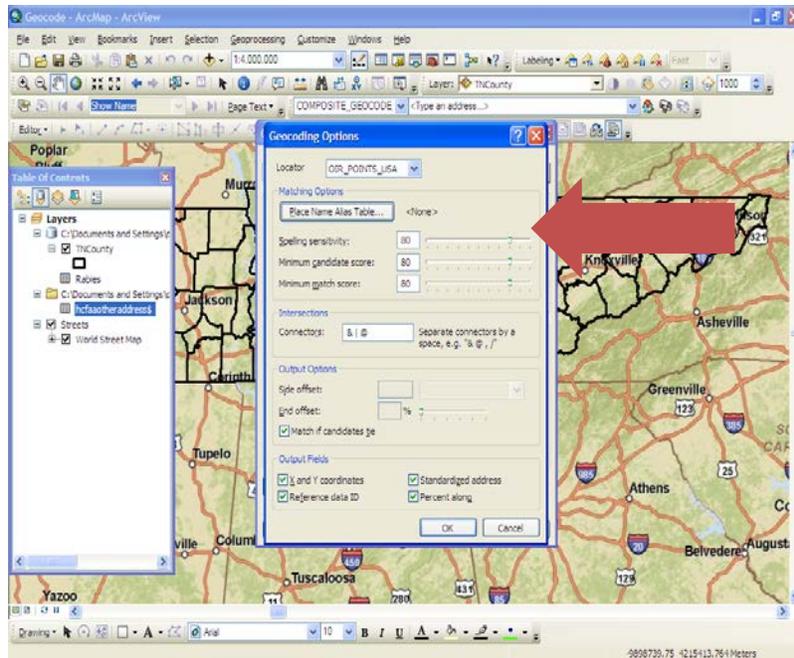
Or, on the Geocoding Toolbar click the mailbox  select the geocoding service you would like to use and click OK.

No matter which way you chose to geocode, a Geocode Addresses box should appear. In the Geocode Addresses box (shown below), navigate to the table of addresses then use the drop down arrows under Address Input Fields to point the geocoder to the fields in the table containing address, city, state, zip, or zip4. It is not necessary to have all of these fields in your list, but it is necessary to have an address and city or ZIP code.

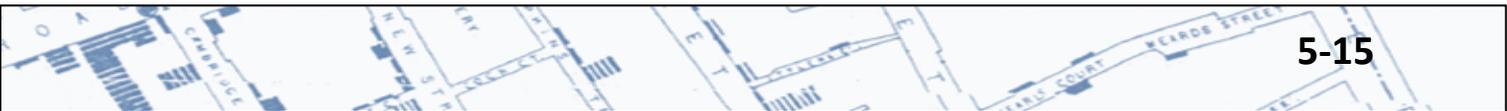
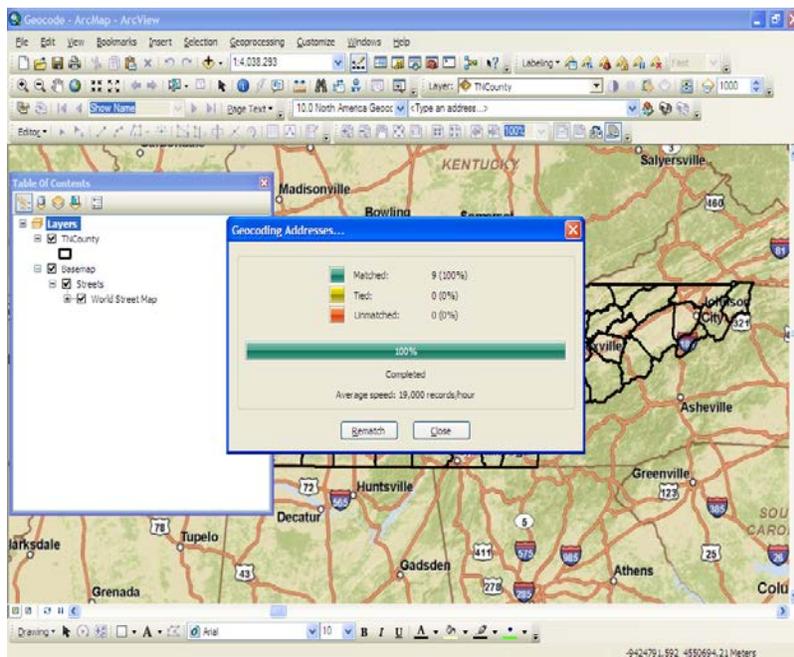
The “Create static snapshot of the table inside new feature class” radio button should be populated. The dynamic feature is only available if you have an ArcEditor or ArcInfo License. The Advanced Geometry Options are to create output in a different spatial reference (i.e. projection or geometry) than that of your current map project. The Geocoding Options allows for changes to the default geocoding settings such as changes to the spelling sensitivity or match candidate score. Depending on what condition the data are in and how the data are to be validated, it might prove beneficial to increase the Match Score. Increasing the Match Score increases the reliability of those addresses being “matched” to a real address on the map, but it also may create more “Ties” or “Unmatched” records that will need to be validated.





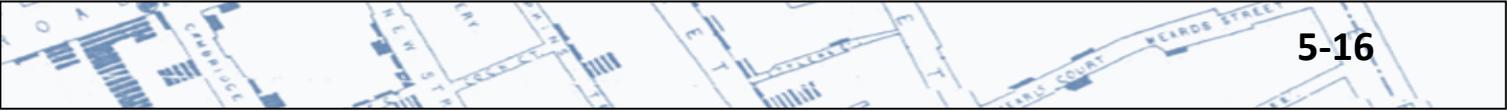
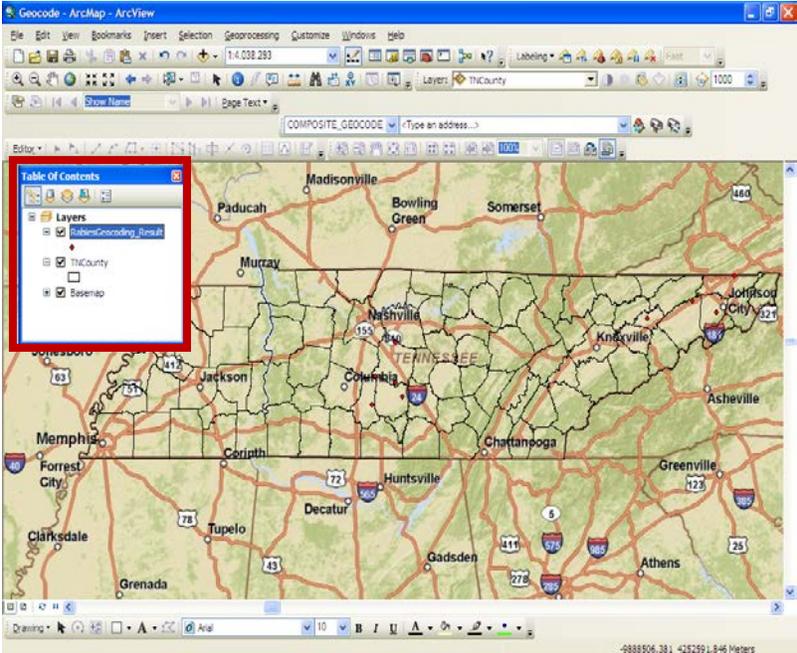


Click OK in the Geocode Addresses box. Once geocoding is complete, a box will appear showing how many records were “Matched” to a single address, “Tied” to multiple addresses or “Unmatched” to any address in the geocoder.





You can either click Close to close the dialog box or Rematch to open the Interactive Rematch box to review, edit and rematch the addresses. When you click Close, the addresses that were “Matched” or “Tied” are added to the map as points and the geocoding result feature class or shapefile (layer) appears in the Table of Contents.



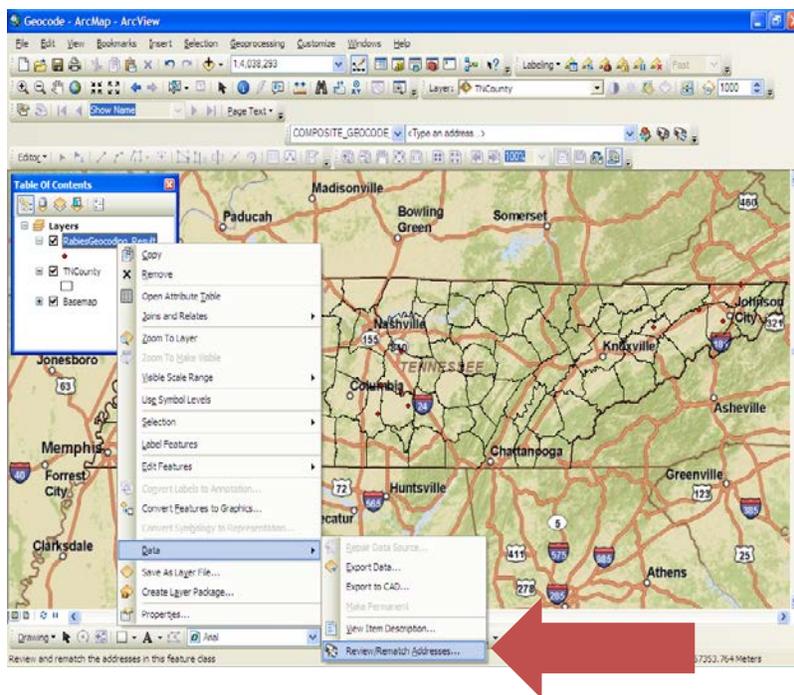


5.3 “Rematching” Geocoded Addresses

Just because a dot on the map was created and the geocoder indicated that “Matches” were found for 100% of the addresses, does not mean that the dots on the map actually correspond to real addresses! Depending on the intended use of geocoded data, it may be necessary to do a little quality assurance.

To edit addresses, to select only one address to use when the geocoder found “Tied” or multiple addresses, or to use a place on the map as the address, “rematching” can be done at step 4 above or any time after the geocoded results have been added to the Table of Contents, see step 5 above.

If rematching is necessary after the results have been added to the map and the Table of Contents, right click on the Geocoded Results layer in the Table of Contents; go to Data, then Review/Rematch Addresses.



When you click Rematch, the Interactive Rematch box opens.





FID	Shape	Loc_name	Status	Score	Match_type	
0	Point	US_Rooftop	M	100	A	213 Stafford St, Bristol, TN, 37620
1	Point	US_CityState	M	100	A	Morristown, TN
2	Point	US_Rooftop	M	100	A	335 F Jackson Ln, Greeneville, TN, 37745

Locator: US_CityState

1 Candidate

Loc_name	Score	Side	Match_addr	House	PreDir	PreType	StreetName
US_CityState	100		Morristown, TN				

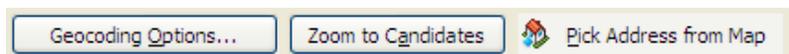
Candidate details:

House	
PreDir	
PreType	
StreetName	
SuffType	
SuffDir	
City	Morristown
State	TN
ZIP	
X	-83.293038
Y	36.215034
Disp_Lon	0
Disp_Lat	0
Street_ID	
Addr_Type	City
FromAddr	
ToAddr	

The Loc_name, Status, and Score columns contain important information to evaluate the accuracy of the addresses shown on the map. For addresses that were “Matched” to a location on the map, the most accurate address is one that has a Loc_name of “US_Rooftop”, Status of “M” (for Matched), and a Score of “100”. The least accurate “Matched” address would be one that has Loc_Name of “US_State”, Status of “M”, and a Score of “100”. The latter means that the only place on the map that could be found was the state. So, the geocoder placed the dot in the center of the state, likewise for US_Zipcode, or US_City. For example, the highlighted record above was matched only to the city of Morristown. So, the corresponding dot on the map is in the center of Morristown, not the 2356 Fairway address shown to the left.

To edit addresses, use the box at the left to type in the correct address for the highlighted record.

For “Tied” addresses, one of the addresses found by the geocoder may be selected. To zoom in to a location, use the Zoom to Candidates button at the bottom of this interactive box. When this button is clicked, the map zooms in to the record in question.

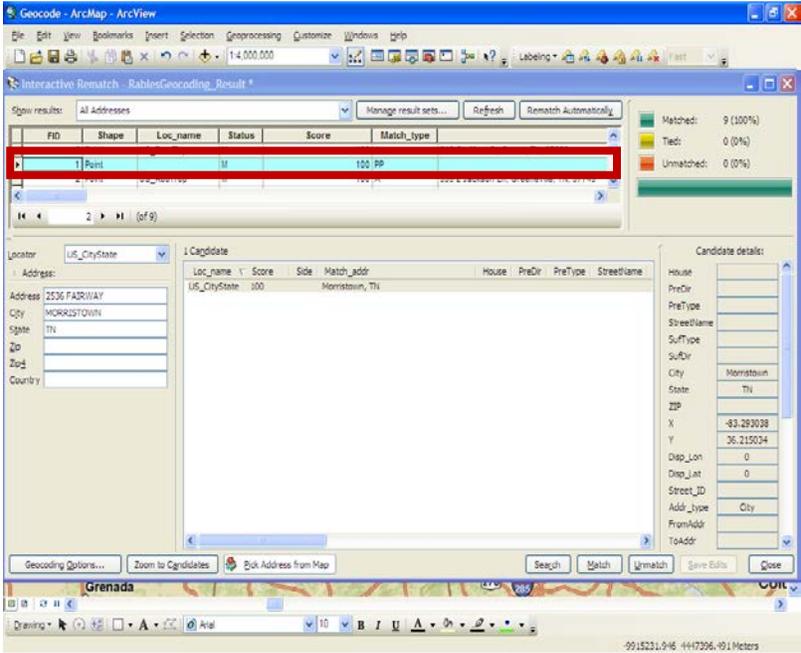


An address can be picked from the map by clicking the  Pick Address from Map button at the bottom of this interactive box. Highlight a record to be edited, click the Pick Address from Map button, minimize the interactive box, and zoom in to the desired location on the map. The cursor should be an arrow with a





dot at the tip. When you find the right spot, right click, and choose Pick Address. This places the dot on the map and updates the address locator record to Status of “M”, Score 100, and Match Type PP.

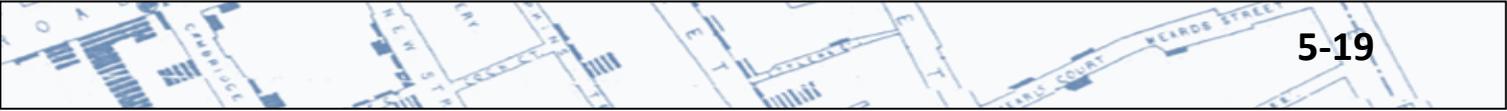


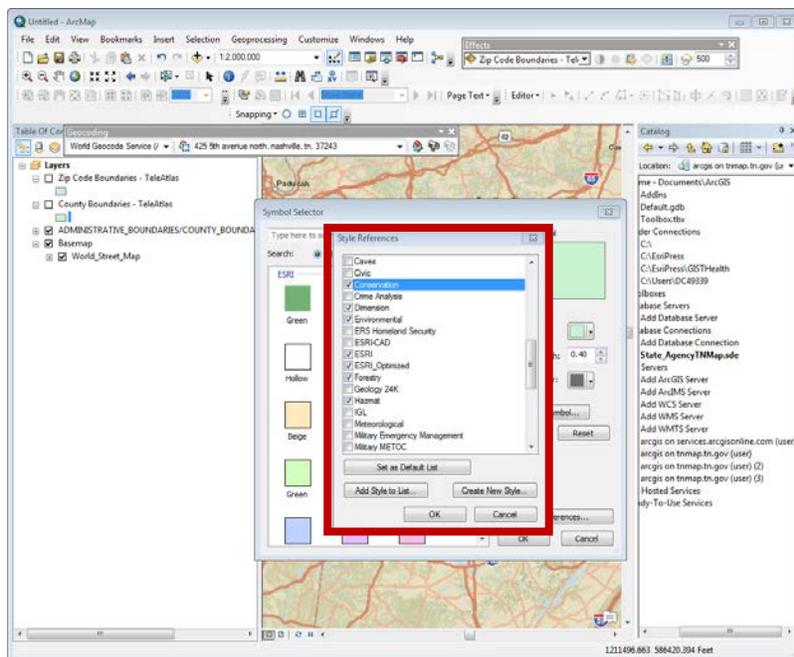
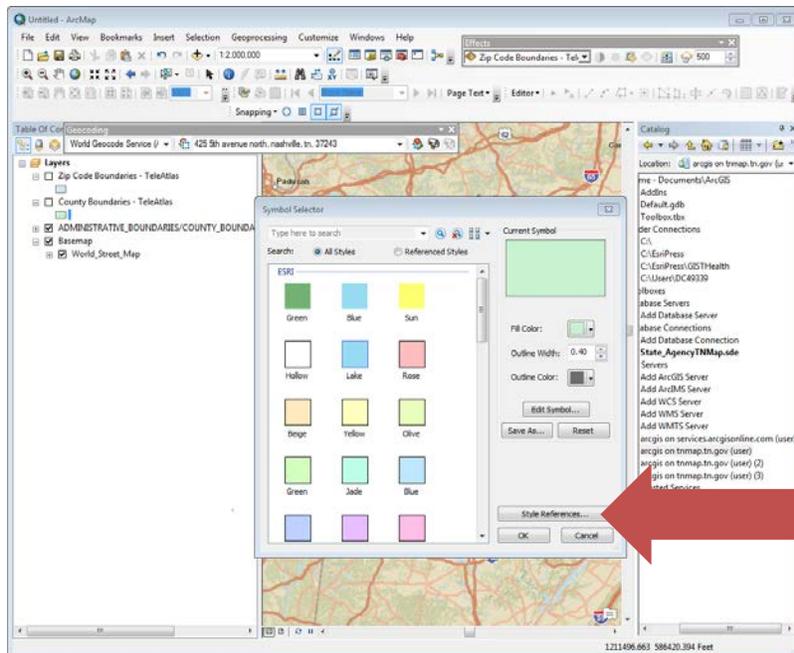
When you are satisfied with the accuracy of the locations, click the close button in the lower right-hand corner of the Interactive Rematch Box. Your changes are saved in both the map and the associated shapefile. The geocoded shapefile is available outside of this map project and can be added to another map or shared with others.

5.4 Labeling and Symbolizing the Map

After geocoding the addresses, there should be dots representing addresses, a reference base map, and ideally, city, county, or zip code boundaries on the map. But this map doesn't really provide any information and the dots may be difficult to see. So, you may want to change the colors and symbols, add some labels, title, legend, scale bar and north arrow.

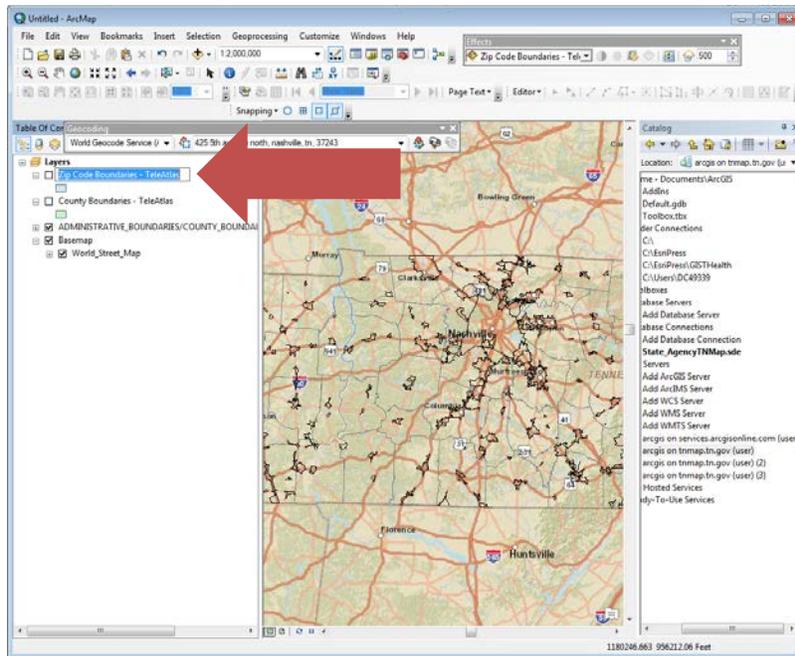
To change the color and shape of the symbols on the map, change the color or symbol in the Table of Contents by double clicking the symbol under the layer name. The Symbol Selector box should open, from which a variety of shapes, colors, and sizes of symbols can be selected. If the shape you are interested in is not shown, others are available by clicking on the Style References button and adding the category of symbols you are interested in seeing on your map.



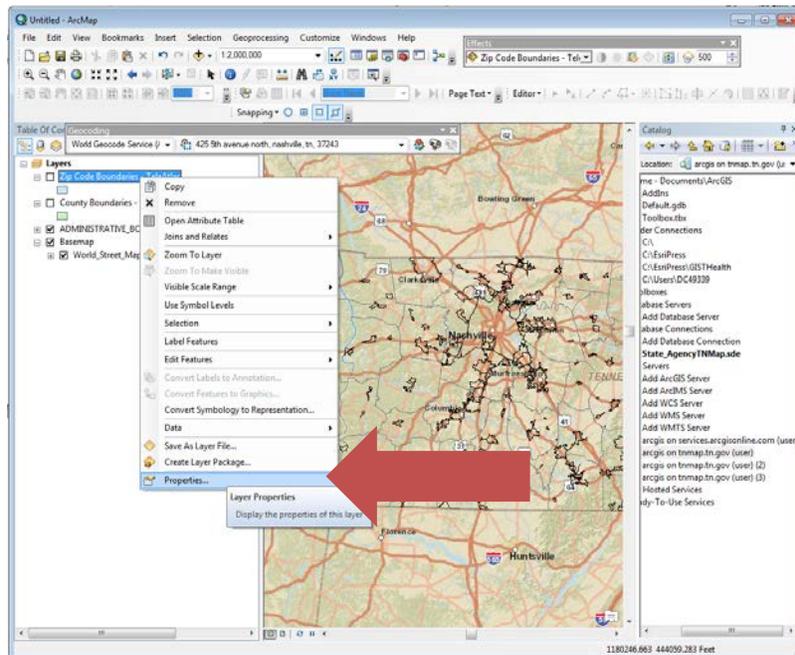


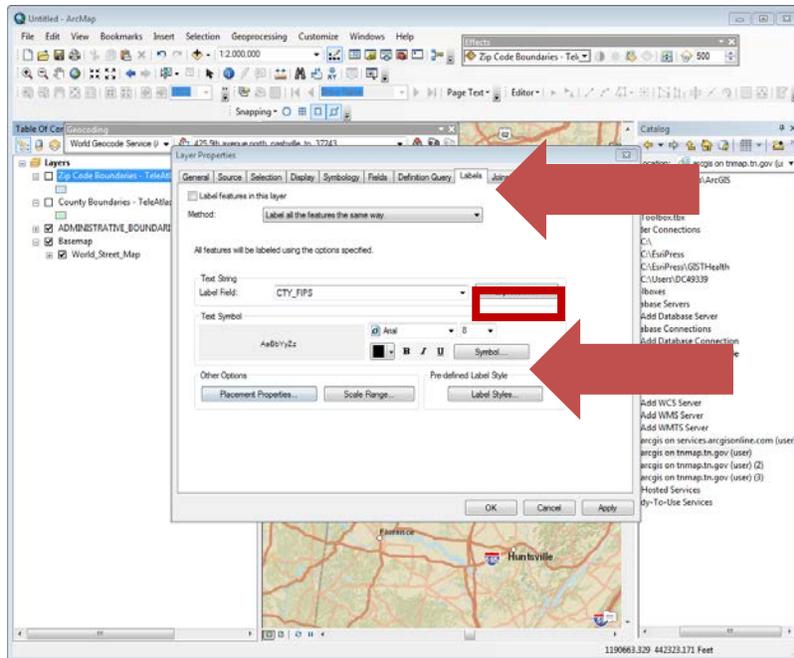
To change the name of the layer, click the name of the layer in the Table of Contents. The words should highlight and you should be able to move the cursor to where you want it and type in the box. This could be important later if you want to add a legend to your map, as the layer name appears in the legend as it is in the Table of Contents and it is easier to edit from the Table of Contents than it is in the legend. Remember that changing the name of the layers in the ArcMap project does not change the name of the geocoded results shapefile that was saved previously.



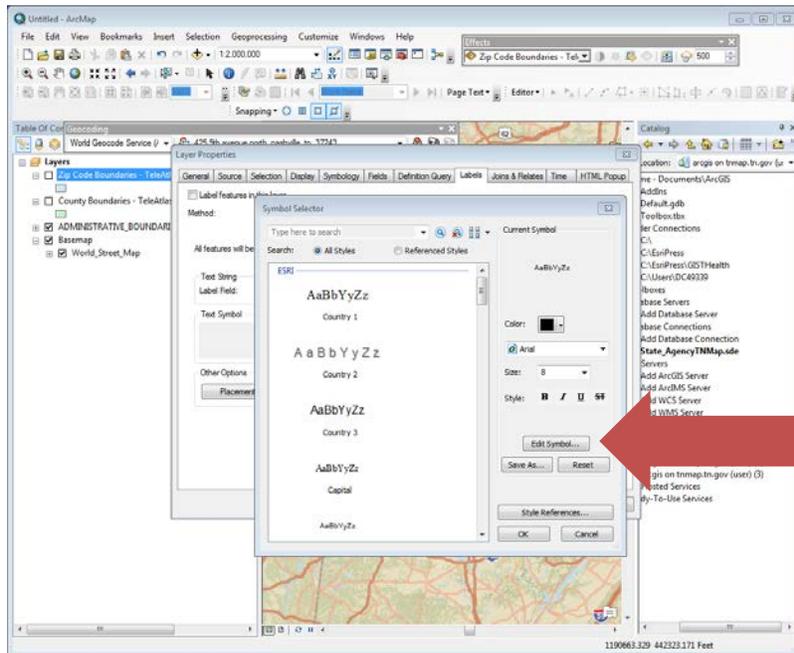


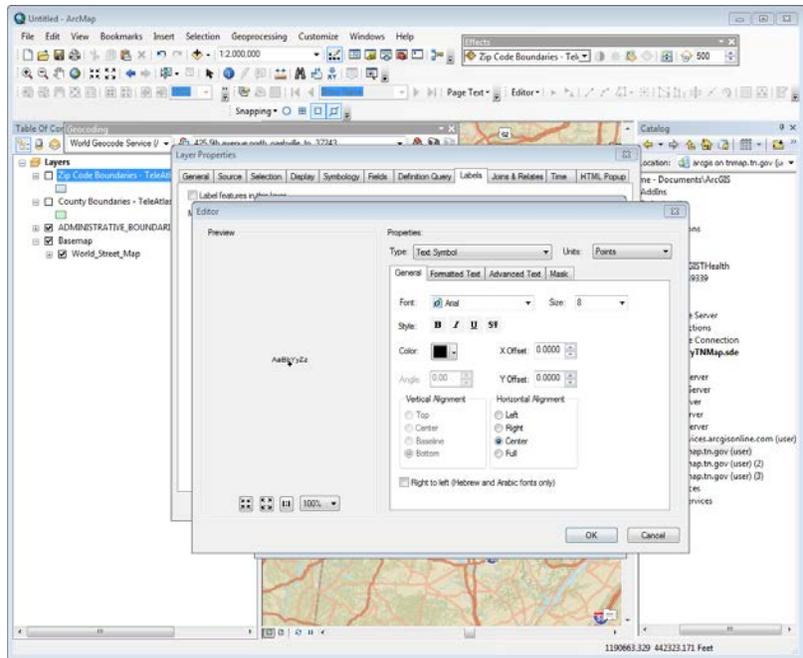
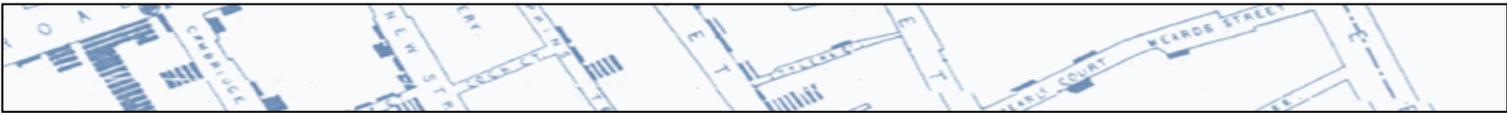
To label features on your map, right click on the layer name in the Table of Contents, scroll down to Properties, then click the Labels tab. There you will find several choices. In the Label Field drop down menu should be a list of all the fields in the attribute table for the layer you have selected. Any of these fields or a combination of fields can be a label on your map. To make a combination of two fields as a single label, use the Expression button. Different font types and sizes can be selected.





Also, by clicking the Symbol button more label styles are available in the Symbol Selector box. In the Symbol Selector box, click Edit to change the appearance of the label, or to give it a background color or halo.

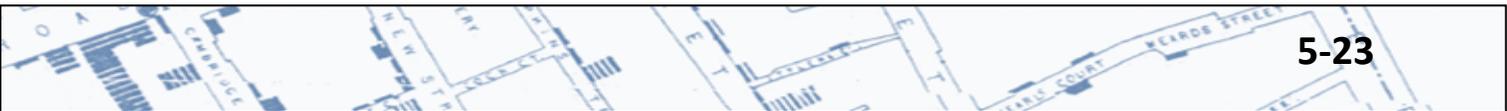
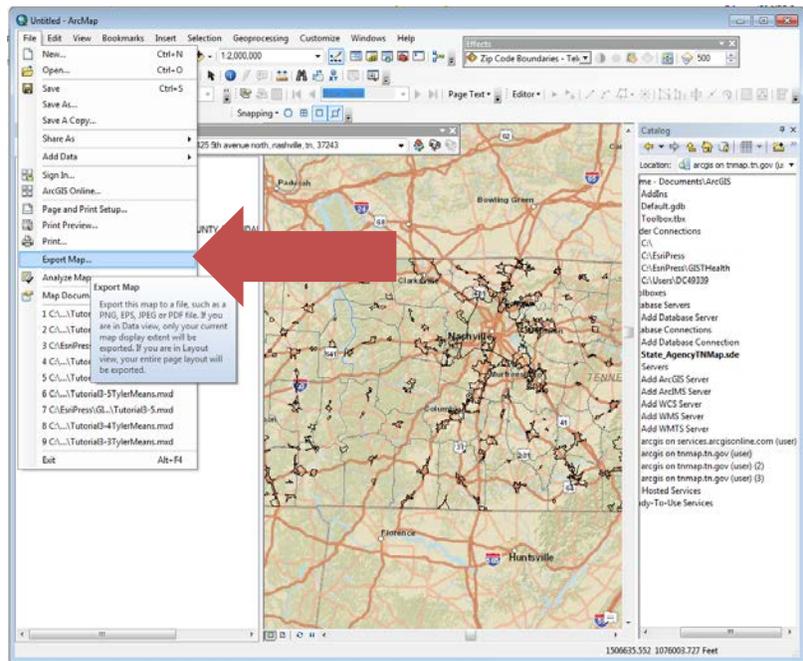


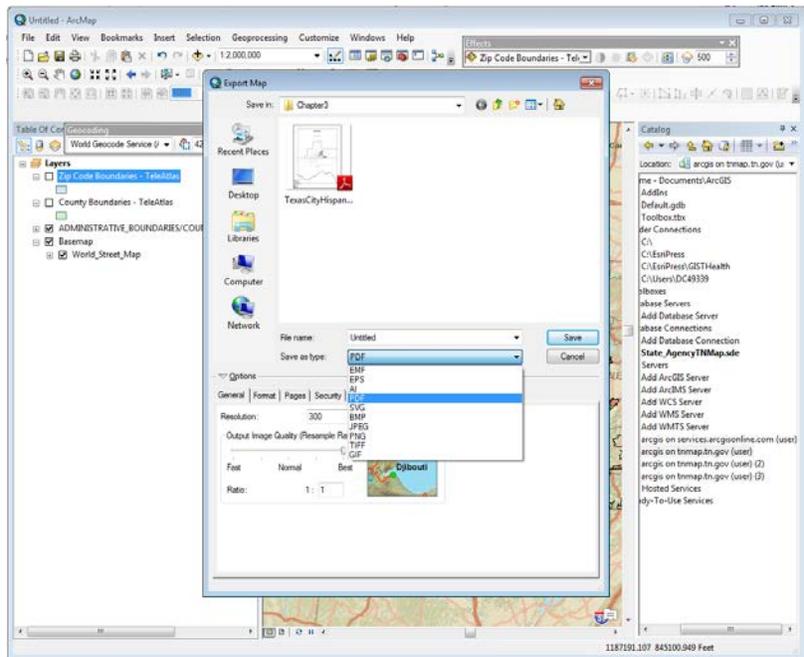


Save your ArcMap Project!

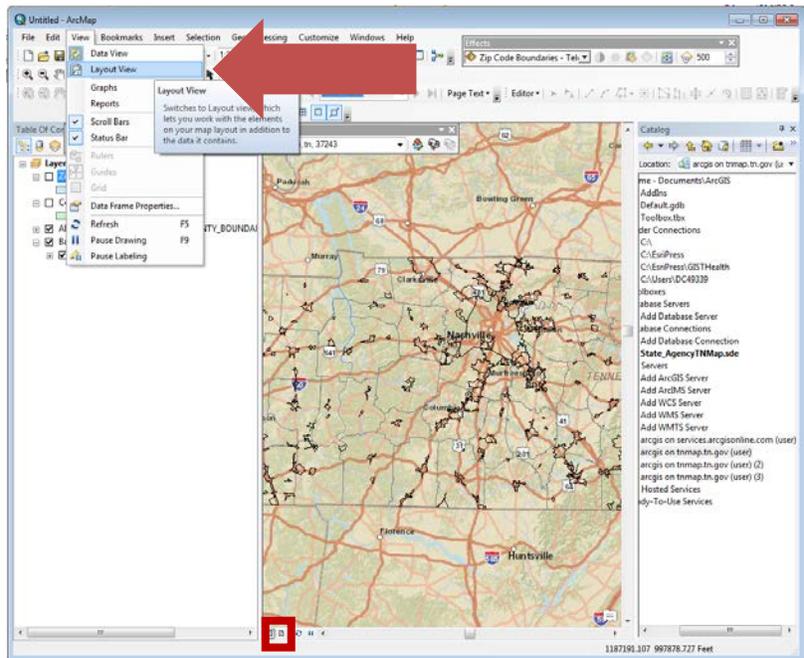
5.5 Exporting the Map and Layout View

There are several ways to export or save an image of your map. The easiest is to go to File, Export Map, and then choose the format in which you would like to save the map. The map could be saved as a jpeg, TIFF, GIF or pdf that could then be added to a PowerPoint or other document.

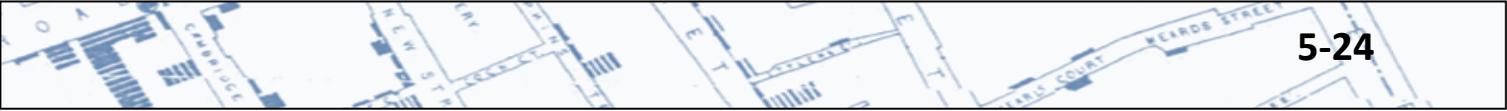


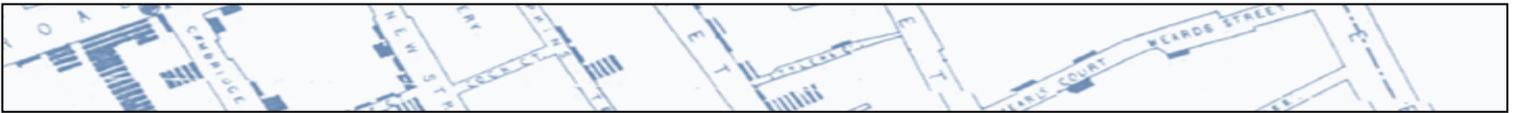


Exporting the map this way in the Data View does not give you the opportunity to add a legend or other map symbols, such as a legend, north arrow, scale bar, or title, etc. To get this added functionality; go to the Layout View by clicking the View tab, then Layout View – OR– Click the Layout View icon in the lower left corner of the map.

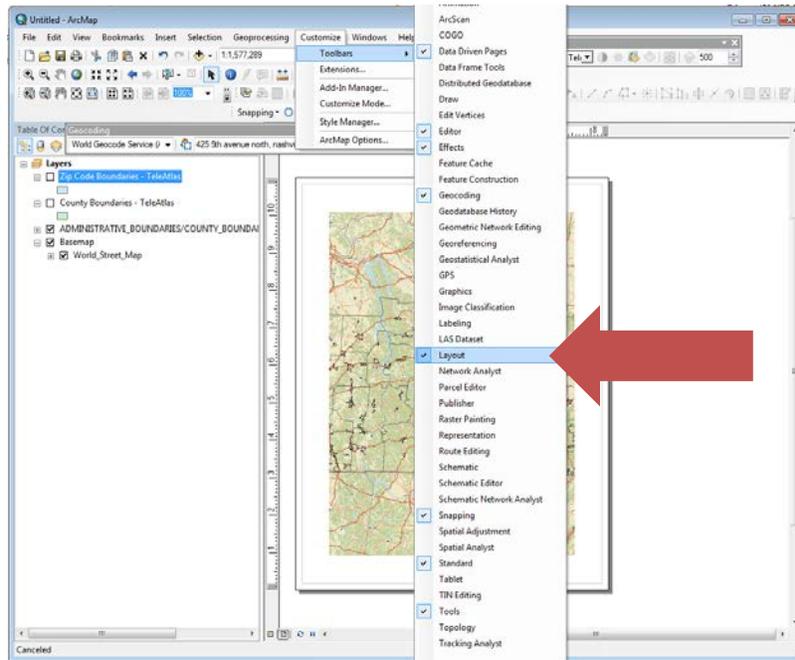


In the Layout View, make sure the Layout Toolbar is available by clicking the Customize tab, Toolbars,





then Layout.

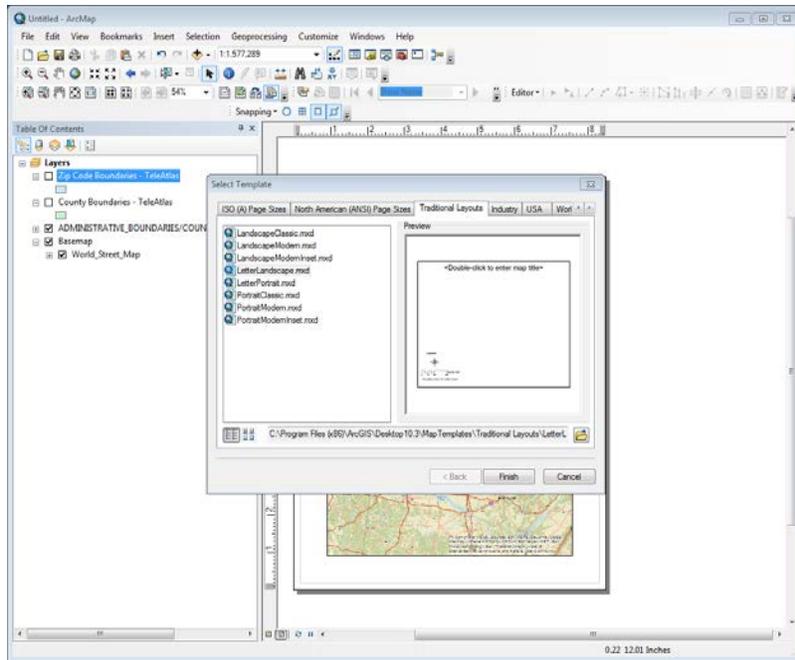
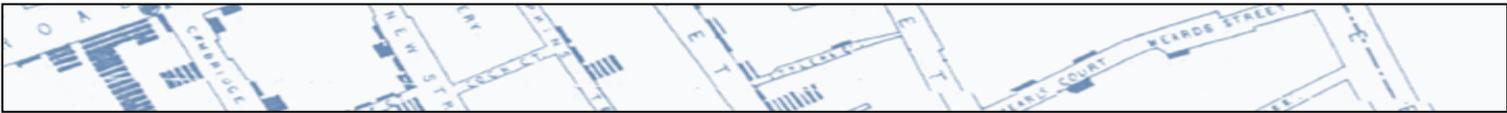


This tool bar should be added to the top of your map.



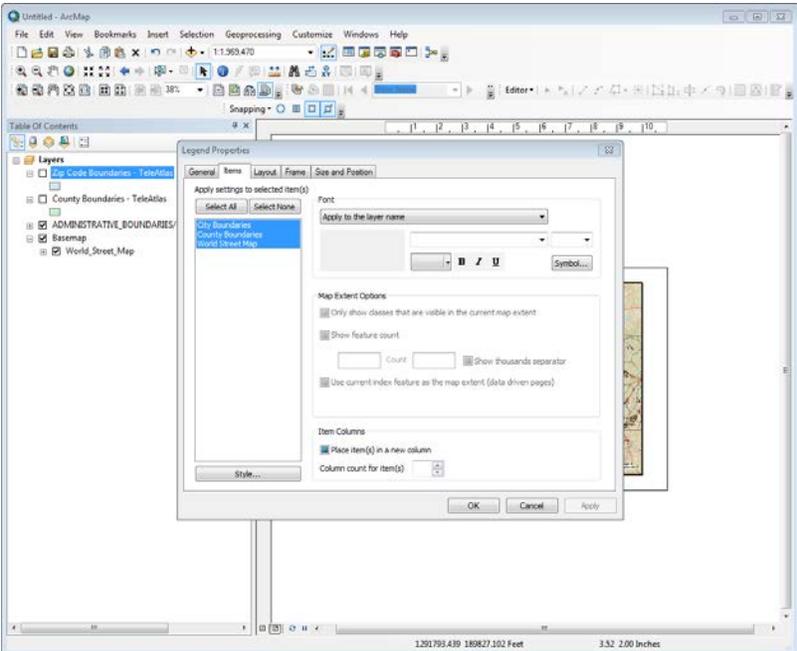
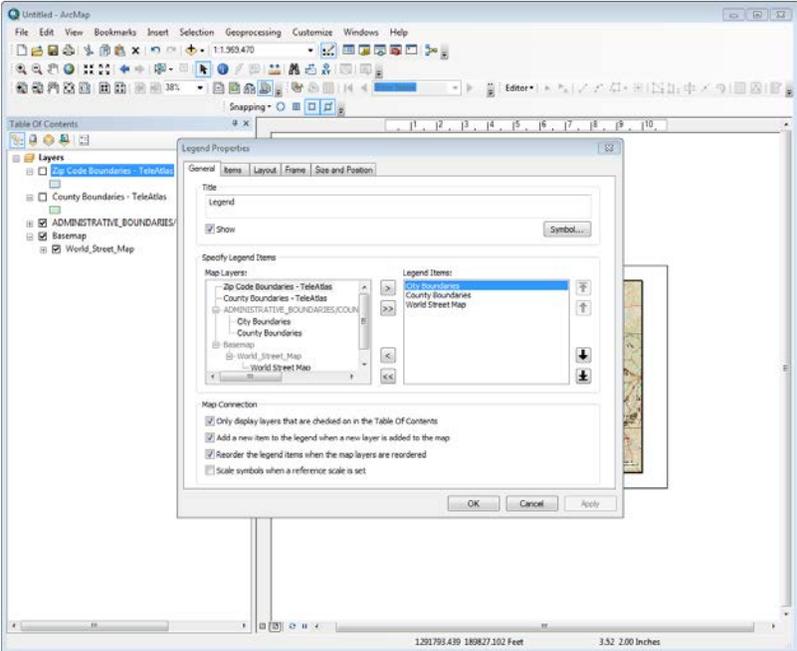
It may be necessary to change the Layout to landscape. Do this by clicking on this button on the layout toolbar  and selecting the desired layout. Click the Finish button when finished.



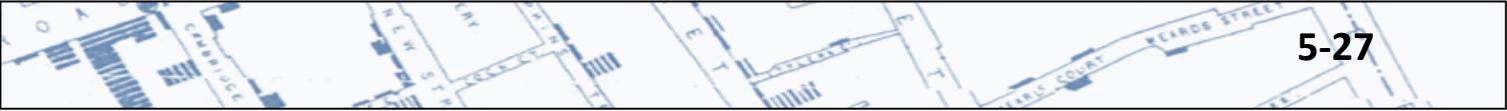




The map layout now will have several elements that you can move, delete or edit such as, scale bar, title box, and legend. To edit these map elements, right click on the one you want to edit, then go to Properties. For example on the legend, right click, go to Properties. Then a Legend Properties box pops up where you can edit the items in the legend.

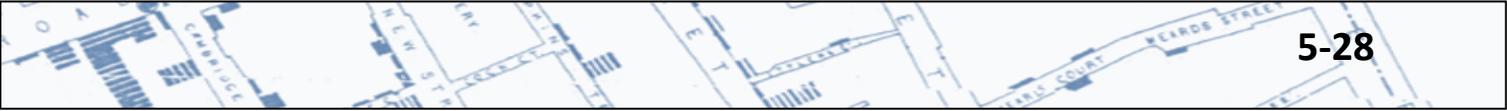
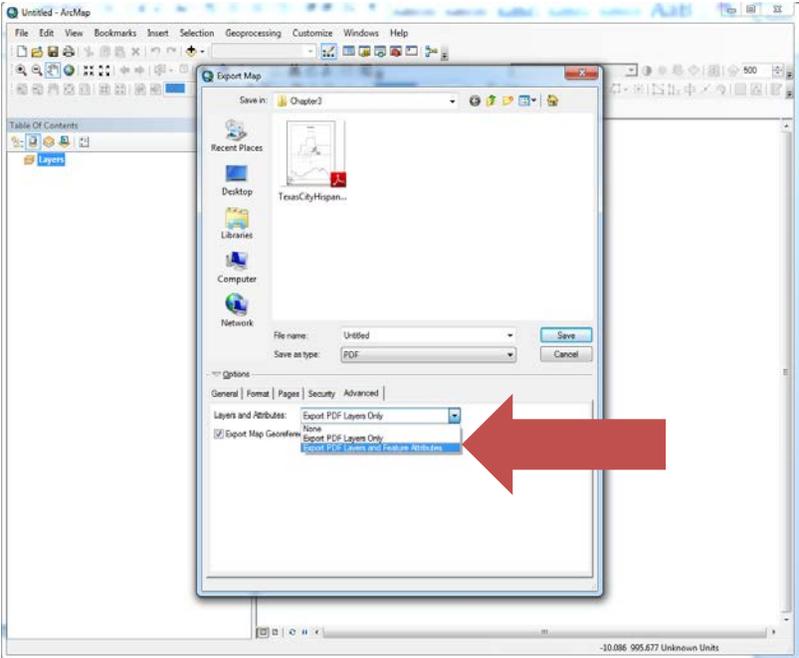


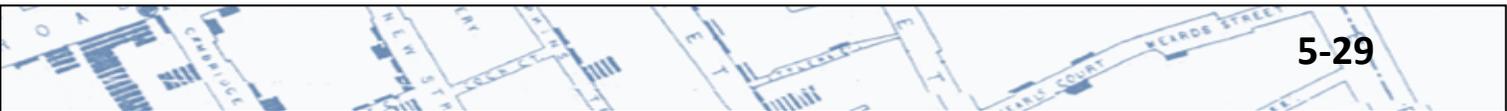
When the map is the way you want it, save it by going to the File tab, then Save. Export the map by going to File, then Export.





Note: If exporting to pdf there is an option to export a georeferenced map. This pdf would contain all the data in the attribute table for layers depicted in the map. Exporting in this manner allows others to use the map to get latitude and longitude and to use the identify tool in Adobe Acrobat Pro or Reader to click the dots on the map and get information about each dot. To export a georeferenced .pdf, go to the File tab, Export Map and under the Advanced tab choose the Export PDF Layers and Feature Attributes. A word of caution: if case patient names and addresses are in the attribute table they will be available to viewers of this georeferenced pdf.

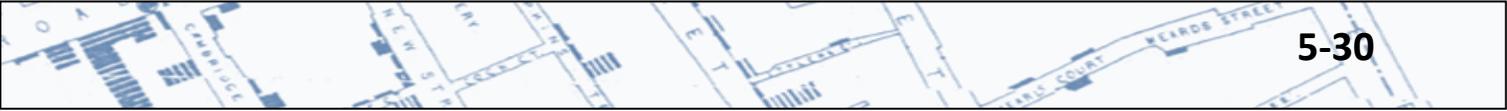
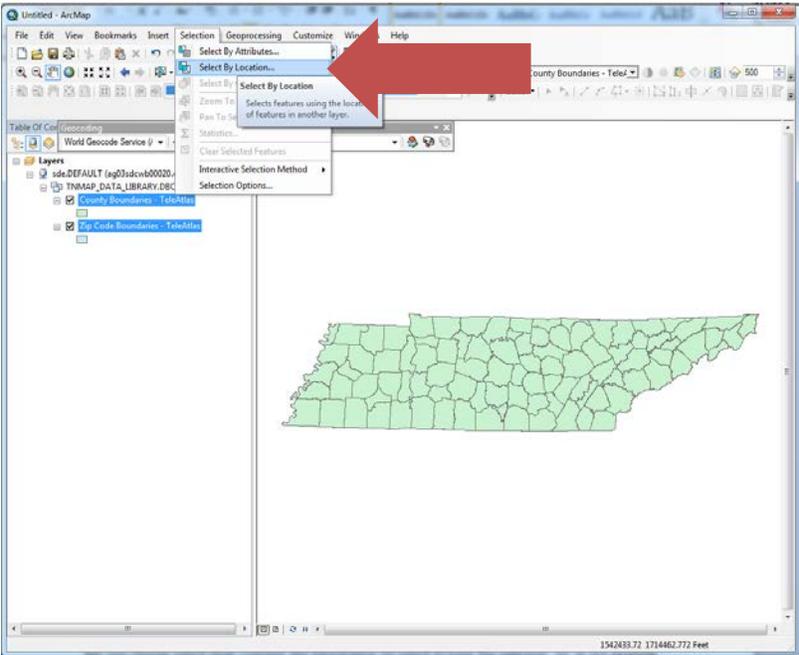






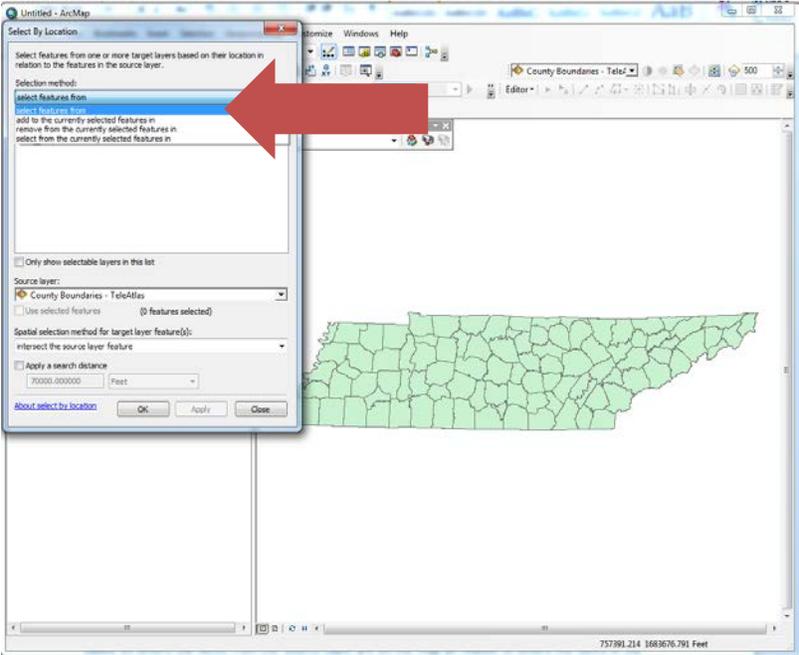
5.6 ArcMap is more than a map!

ArcMap is part of the overall ArcGIS suite of tools available for visualizing and analyzing data, it is a visual database. Within ArcGIS are many different kinds of tools to create various types of maps, statistical analyses or other geographic analyses. There may be many different ways to complete a task in ArcGIS, depending on how the data are compiled and are to be used. One common task that can be accomplished in ArcMap is creating a map depicting counties or census tracts containing case patient addresses. To select counties which contain the geocoded cases, go to the Selection tab, then Select by Location. A Select by Location box will appear providing choices of ways items can be selected based on the layers in your Table of Contents.

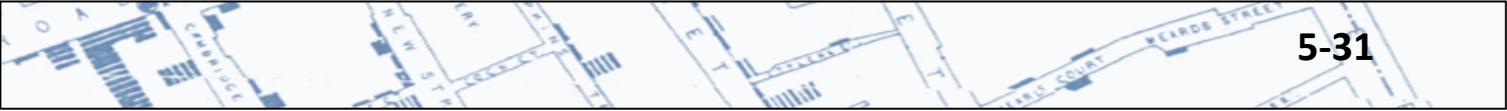




In the Select by Location box, under the Selection Method Drop down are choices related to whether the selected data will be unique or added to or removed from other selections in the layer that you select in the Target Layers drop down.

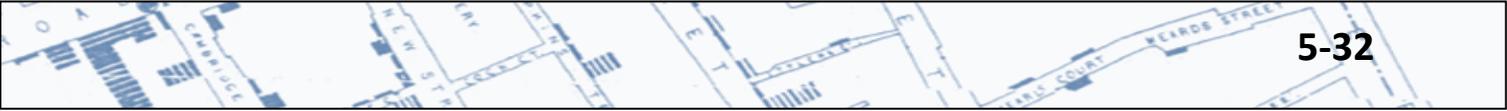
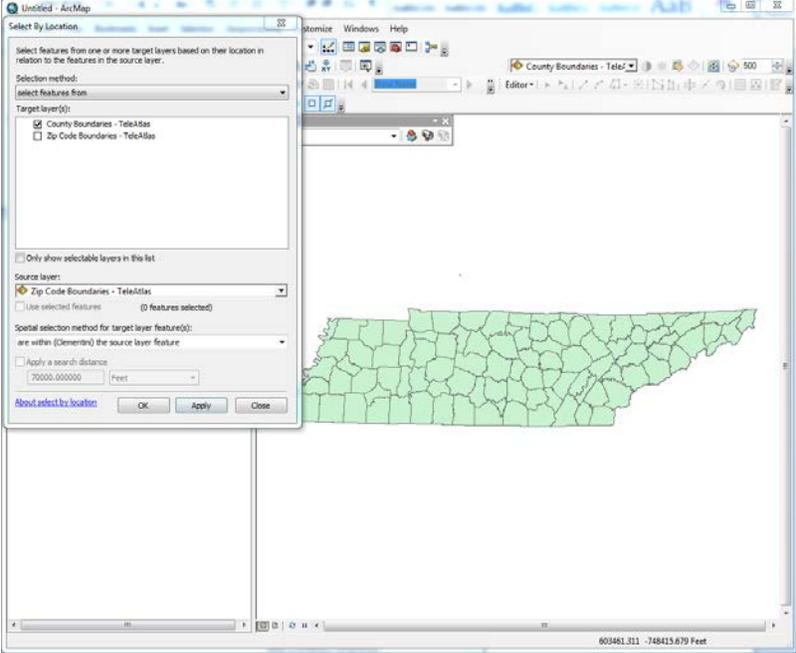


The Target Layers box refers to which layer the selection will be made in. The Source Layer drop down lets you choose which layer contains the information on which to base the selection. So, in our example we want to select counties containing rabies cases. The Target Layer is Counties and the Source Layer is the Rabies Cases.



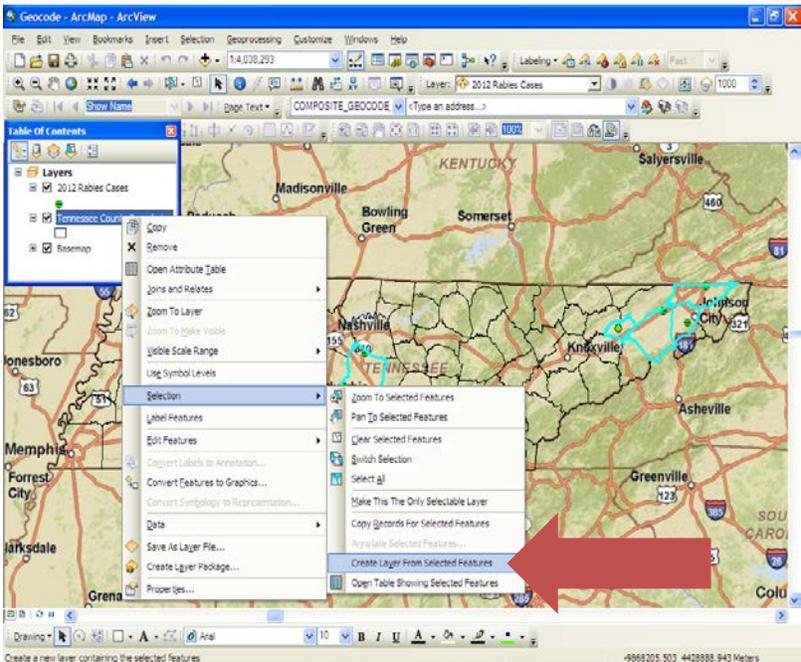


The Spatial Selection Method drop down, provides choices related to how the selections will be made based on where the items from the Source Layer are on the map as related to where the items in the Target Layer are on the map. For this example, we want the selection of counties to be made depending on whether rabies cases are contained within the county. There are several choices in this drop down, and several ways that spatial containment is defined. The help text is useful in understanding the differences, some of which sound subtle, but make huge differences in the result! For this example, the choice that defines “Contains” as Clementini will generate the best result.

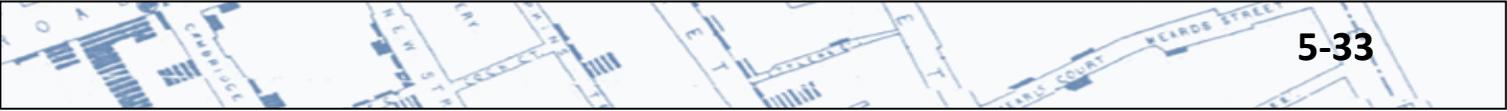
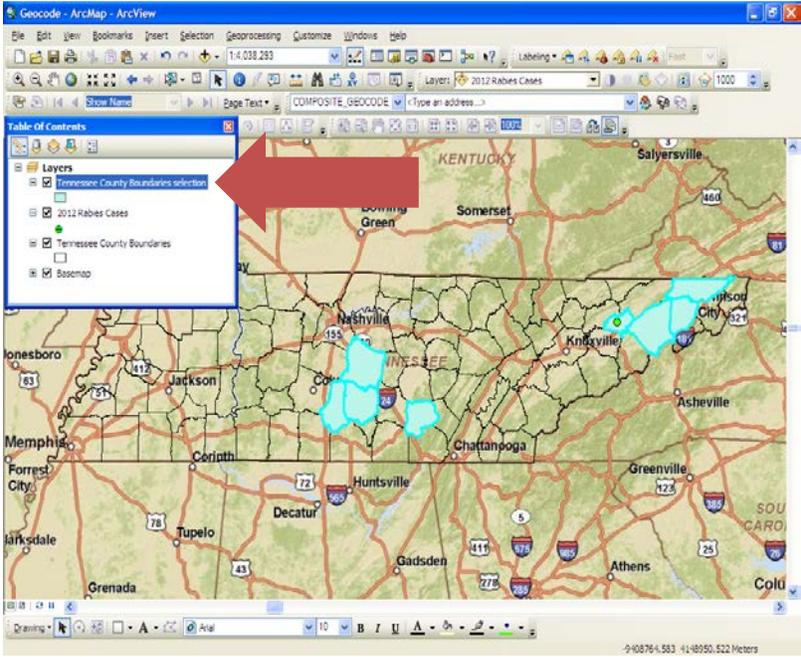


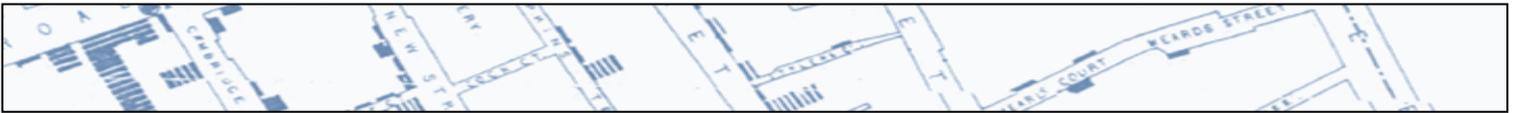


The counties with cases should now be selected on the map. This is just a temporary selection. Interaction with only the selected data in this layer would be difficult as it is still linked to the layer containing all of the counties. Creating a layer of just the selected features is beneficial if you need to interact with only those selected features. To do this, right click the layer containing the selected features, click Selection, and then Create Layer from Selected Features.



This will add a new layer to the Table of Contents and the map.



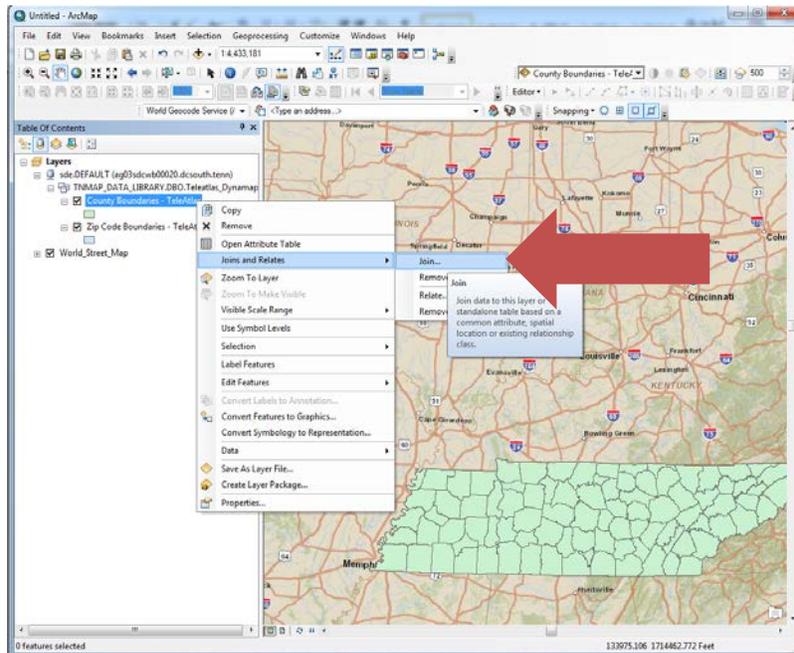


A shapefile will be created, saved in the location you specify, and then a question will be asked if you want to add this layer to the map.

Layers are shown on the map in the order that they appear in the Table of Contents, with the top layer being on top of everything else in the map. So, when you make this new layer it will go to the top position in the Table of Contents. To get the geocoded points back on top, just click on the layer you want to move and drag it to the position where you want it to be shown on the map. To clear out the selections on the map, click this button  on the Standard toolbar.

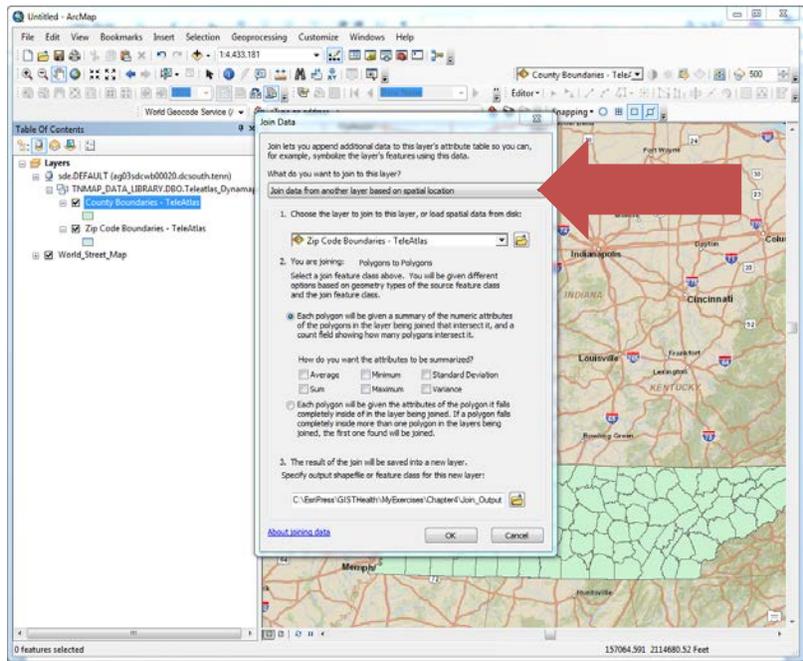
For geocoded data, a choropleth map can be made. There are several ways to make this type of map, but in this example we are using a spatial join with the Tennessee Counties layer and the 2012 Rabies Cases layer made from our geocoded table of addresses.

Right click on the county layer, then click on Joins and Relates, then Join.

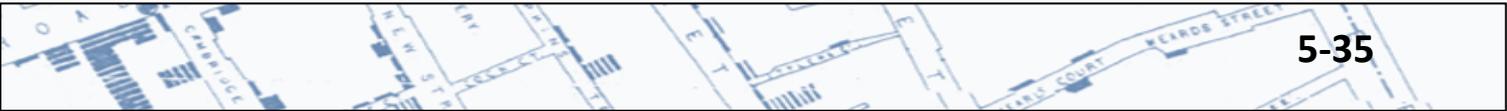
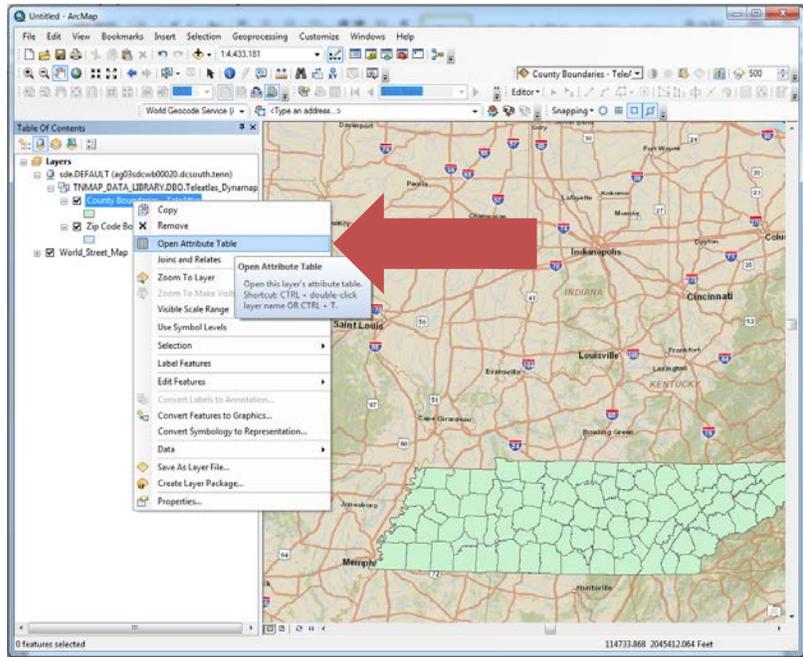


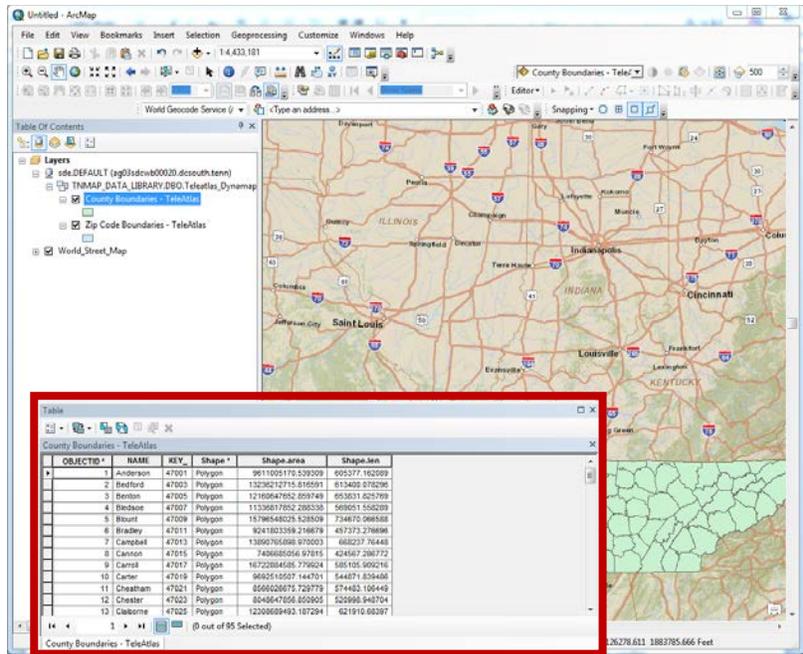
A Join Data box should appear. The drop down box asks “What do you want to join to this layer?” In this example, we are “joining data from another layer based on spatial location”. The next box, item #1 asks us to choose a layer to join to this layer. The item #2 box gives choices related to joining the data in the two layers based on whether the feature is a point, line or polygon and since this data are points how we want the number of points in the polygon (county) to be shown in the table. To make a choropleth map, we need the sum of points in the county so that we can symbolize the map based on number of cases. Item #3, asks where you want to save the resulting shapefile. The newly created layer will be added to your map.



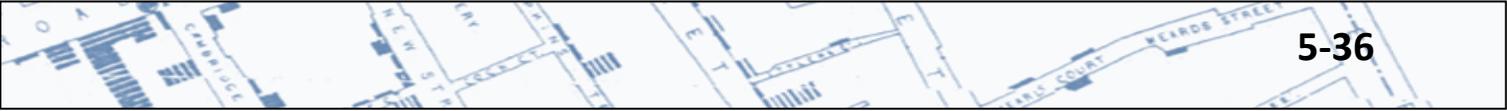


When the new layer adds to the Table of Contents, open the attribute table to make sure that new layer has fields from both layers and the number of cases were counted. Right click on the new layer, then click Open Attribute Table.



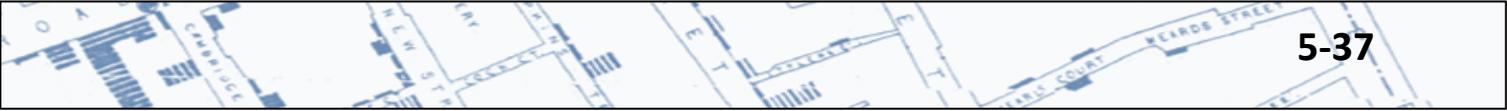
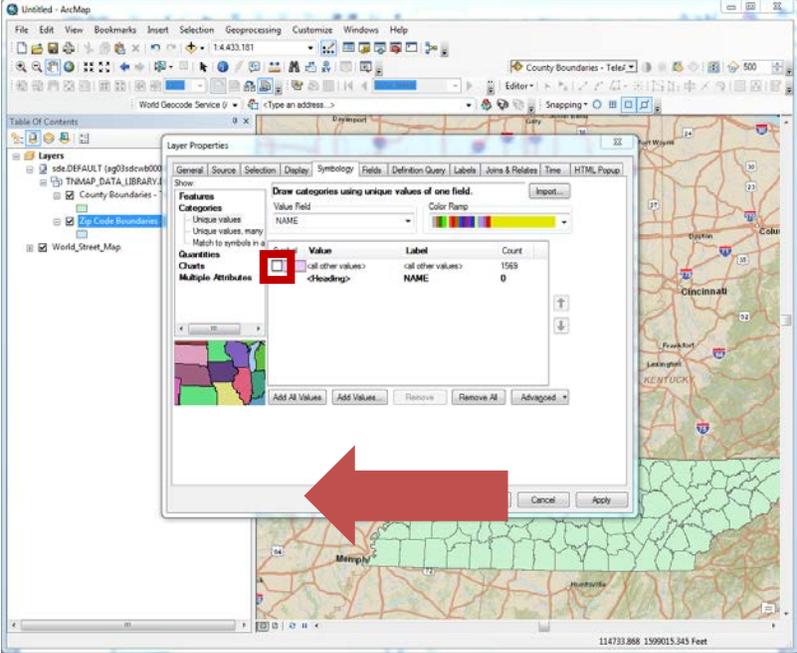


Counties can be shaded according to how many cases have been reported in each county or the number range for cases in each county.



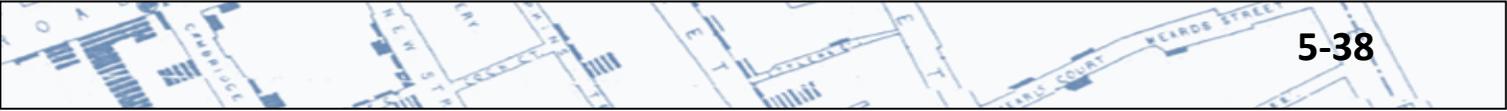
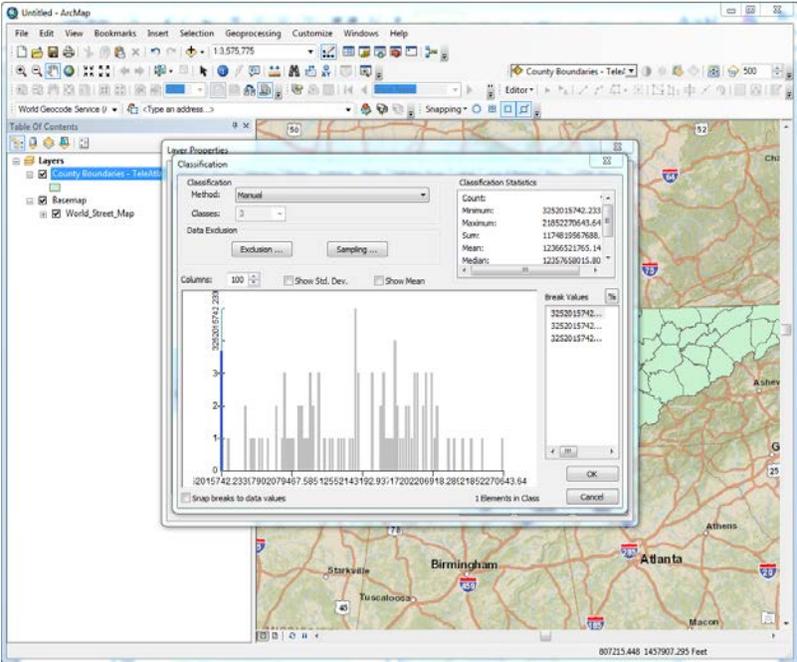
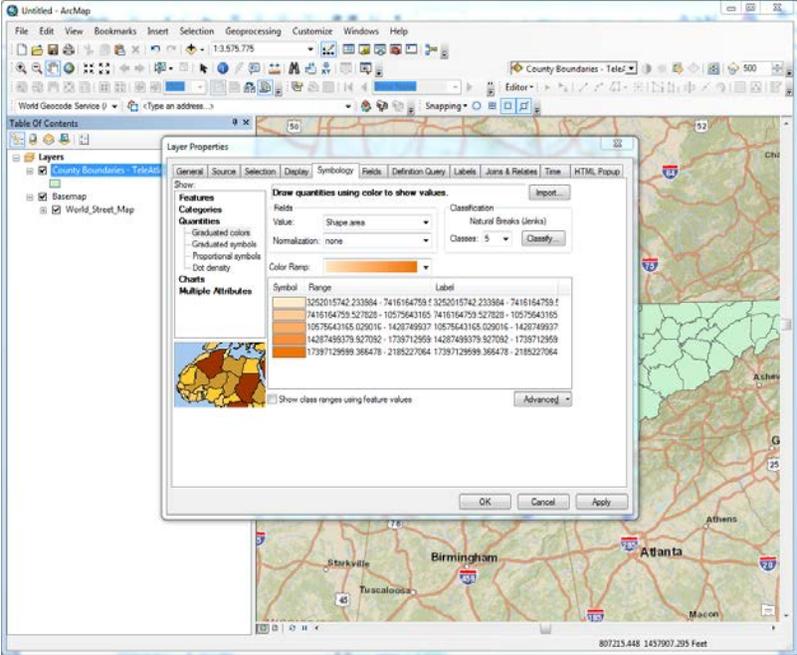


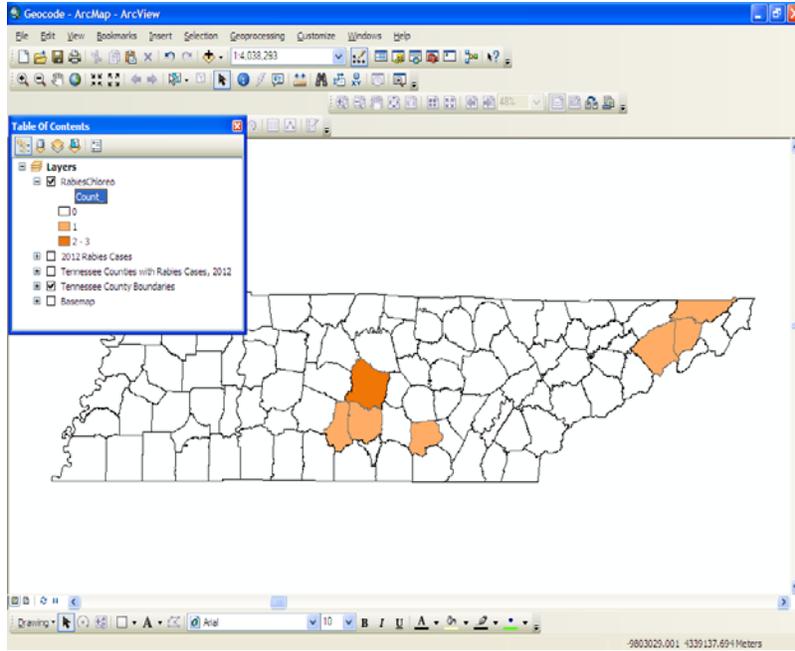
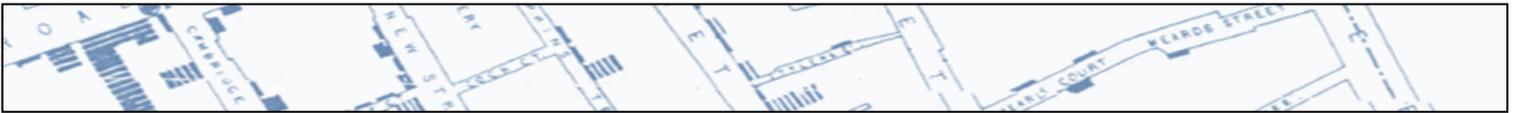
Right click on the layer, and then click Properties. In the Layer Properties box, click the Symbology tab. To symbolize based on the number of cases, in the Layer Symbology box, click Unique Values under Categories in the Show box on the left. In the Value field choose the column in the attribute table corresponding to the count or number of cases per county. Colors can be chosen from the Color Ramp or individually assigned by clicking on the colored boxes under Symbol. Uncheck the “all other values” in the Symbol box, and then click OK.



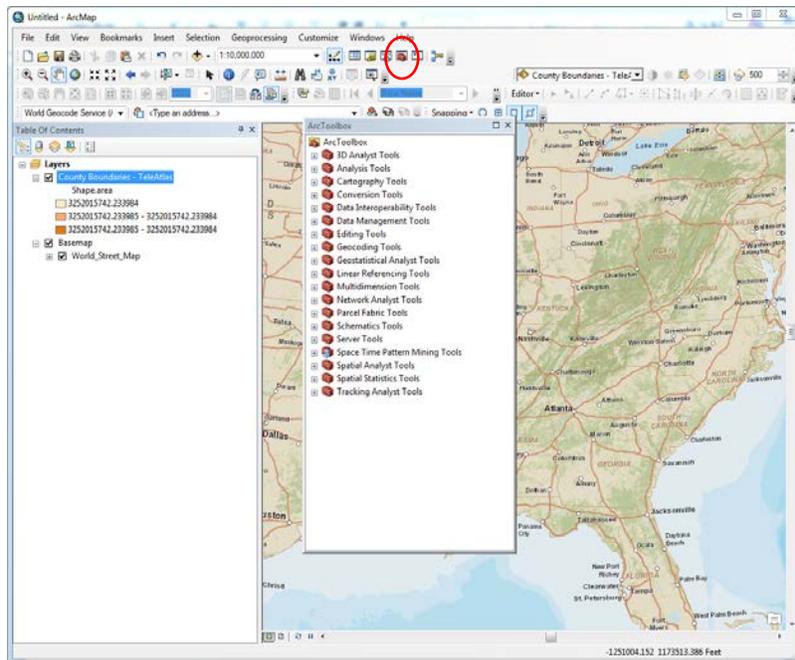


To symbolize using a range of numbers, in the Layer Symbology box, click Quantities in the Show box, then Graduated Colors. In the Value drop down choose the column that contains the number of cases per county. In the Classification box, different divisions of the data range can be made by different statistical methods. To change the Classification method, click the Classify button. To change the number of breaks in the data, use the drop down menus.





Many other tools and analysis methods are available within ArcGIS. Some off the shelf tools are located in the ArcToolbox. Others are available depending on which license is available or as add-on extensions.



The ArcGIS help text is extremely useful and there are many opportunities for online or classroom training. Please see the resources section for training information.





References

Tennessee STS–GIS Services, January 11, 2007. *Geocoding Standards*.

https://www.tn.gov/assets/entities/finance/oir/attachments/geocoding_standards.pdf

TNMap Portal, <http://tnmap.state.tn.us/portal2/StateUsers.asp>

ArcGIS Resource Center <http://resources.arcgis.com/>

Training

<http://training.esri.com/gateway/index.cfm>

<http://gis.state.tn.us/>

http://www.fws.gov/southeast/gis/gistraining_cookeville_2k16.html

<http://www.globalpositions.com/Free.html>



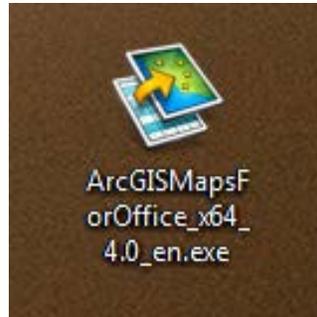


Chapter 6: ArcGIS Maps for Office

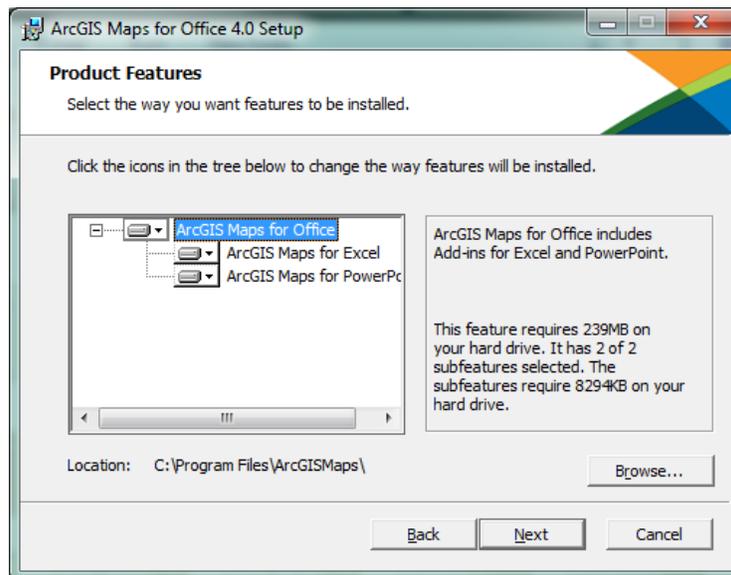
6.1 Installation and Signing On

Esri Maps for Office is an Add-On for Excel and PowerPoint. It allows you to geocode and create maps directly from your spreadsheet data.

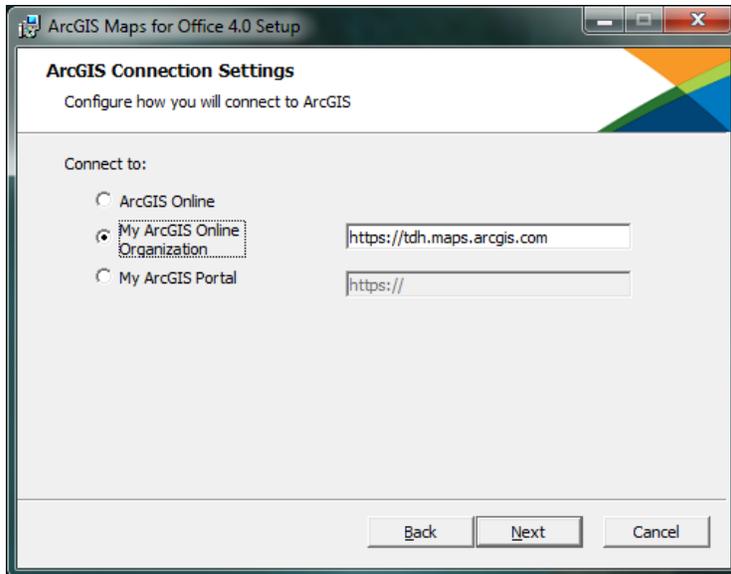
To download: <http://www.esri.com/software/maps-for-office#mapsForOfficeDownload>



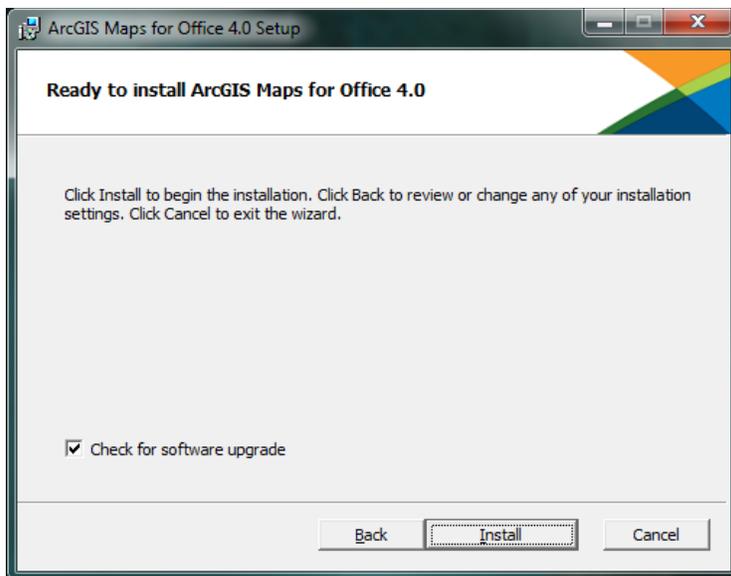
To install the ArcGIS Maps for Office Add-On, you'll need Administrator privileges on your computer. (If you don't have that, contact the Help Desk for assistance.) Double-click the icon to begin installation.



Click Next.

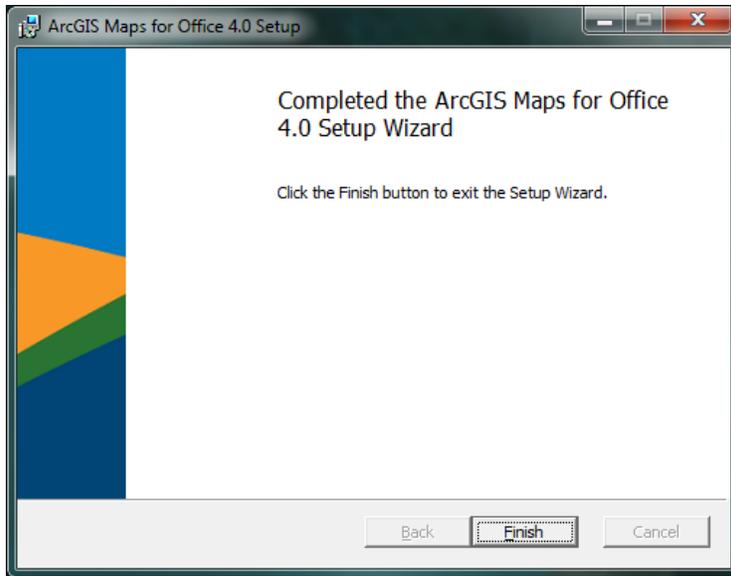


Select “My ArcGIS Online Organization” and in the box next to it, type **https://tdh.maps.arcgis.com** as above. Click Next.



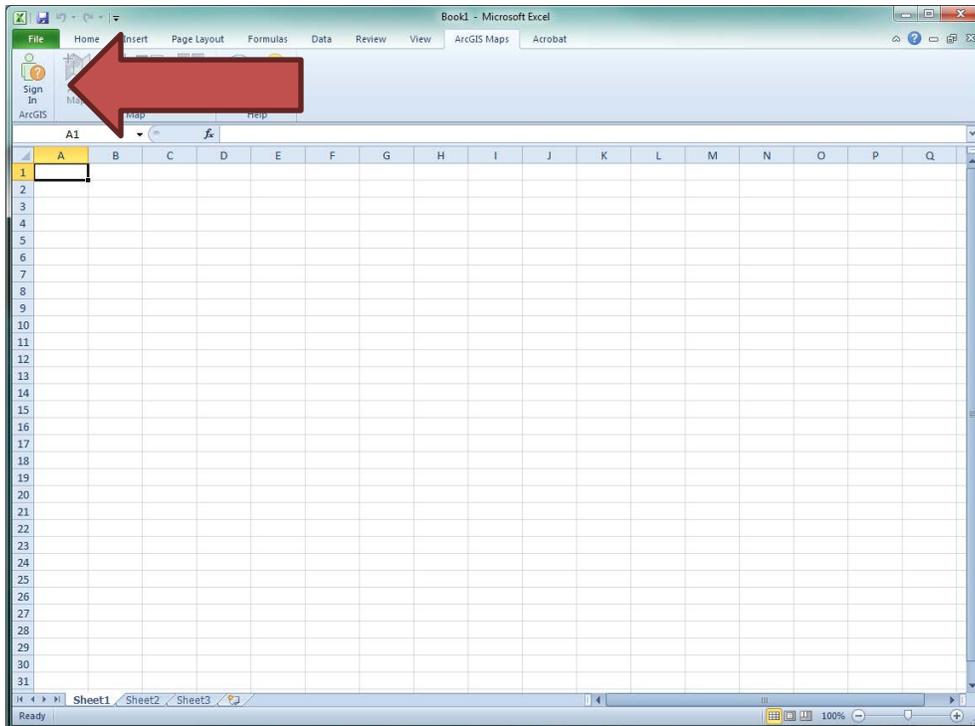
Click Install.





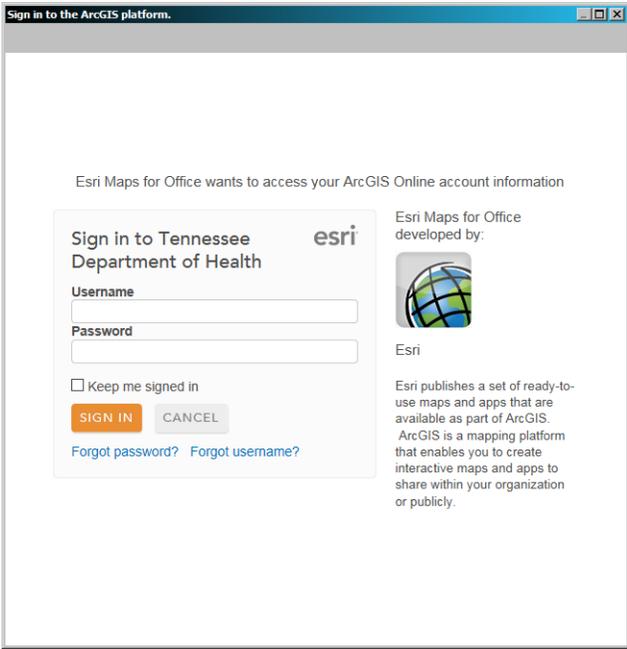
Click Finish.

Now you should see a blank spreadsheet with the Esri Maps for Office menu ribbon at the top. The first thing you'll need to do is sign in with an ArcGIS Online for Organizations account. Click Sign In.

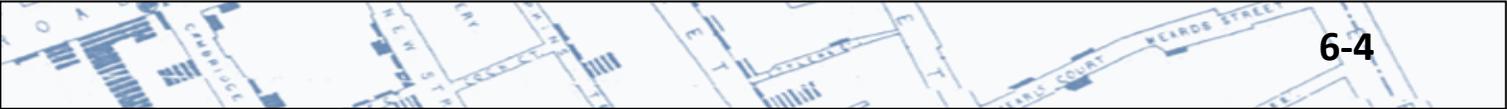


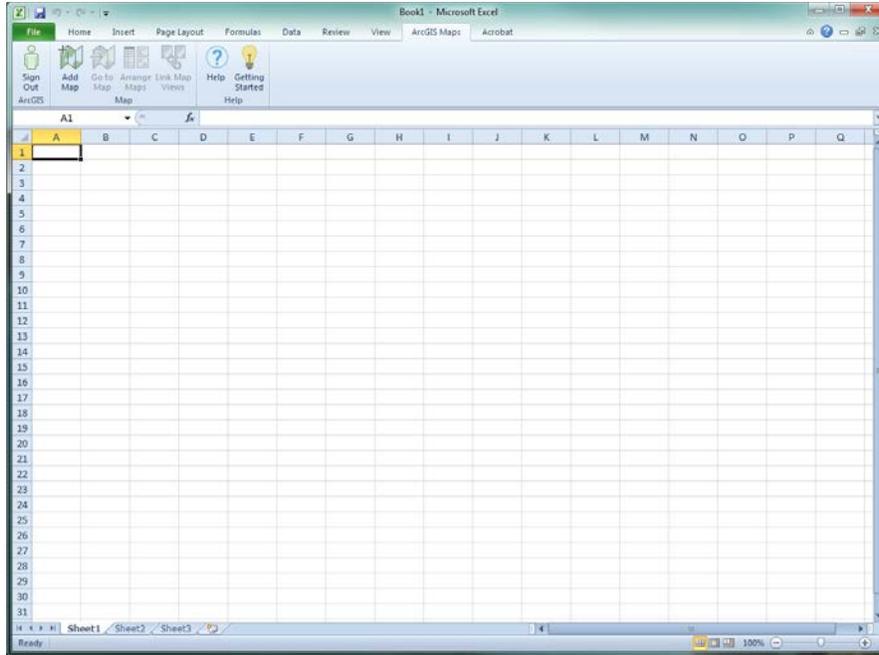
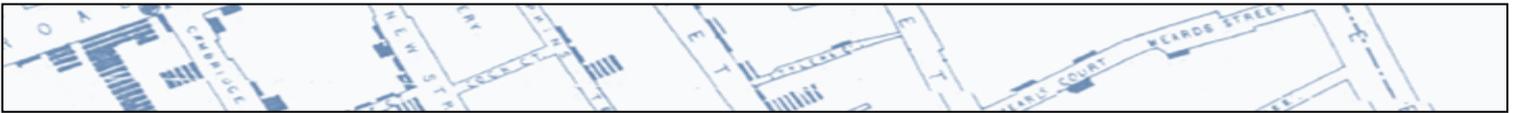


In the Sign in window, type your ArcGIS Online for Organizations username and password. Click SIGN IN. If you are affiliated with the Tennessee Department of Health and do not have a username and password, contact CEDEP.Surveillance@tn.gov to obtain one.



After you've signed in, the menu items in the ribbon will become available. At this point, you can open your spreadsheet with addresses you'd like to geocode. You'll need the same basic information to do geocoding here as you would in any other application: Street Address, City, and State. Zip is always helpful, but not required.

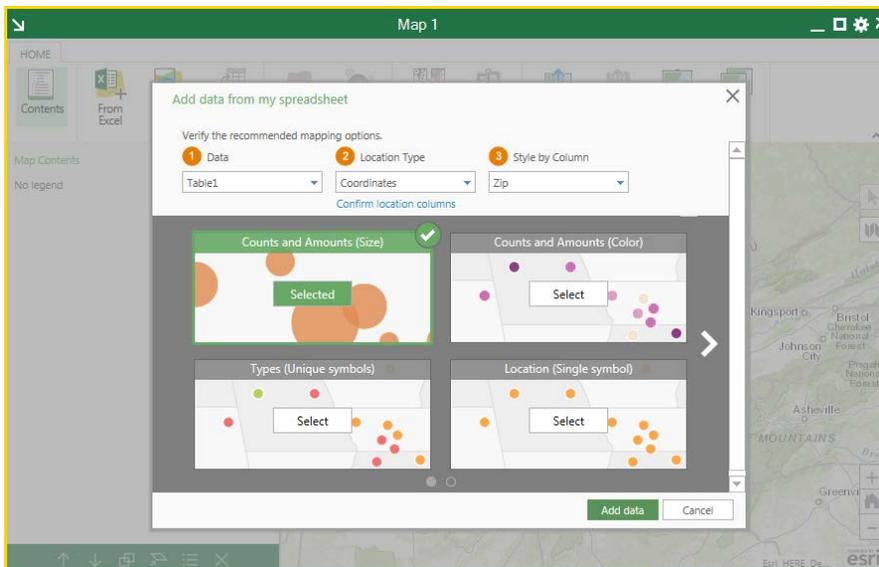




There are a few ways to identify the ranges for your data: a Table, a Cell Range, or a Named Range. (Any of these will work, but Esri recommends using Table. To convert your data to a Table, highlight all the columns and rows and select Insert---Table. Make sure the box “My table has headers” is checked. Click OK.)

Once your data is ready, click Add Map in the ArcGIS Maps ribbon.

If you made your data into a table, ArcGIS Maps for Office should detect it and go straight into the mapping options screen:

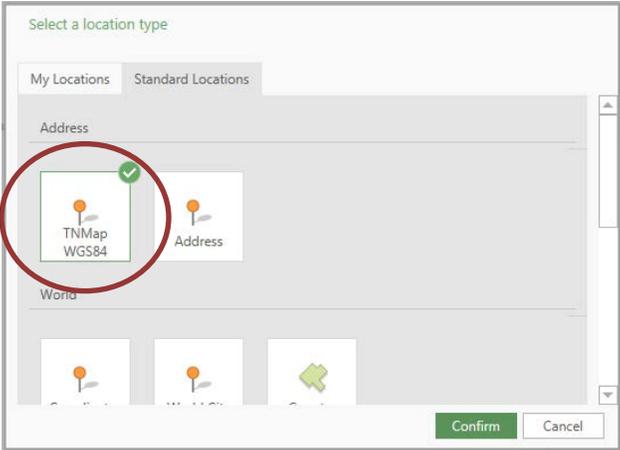




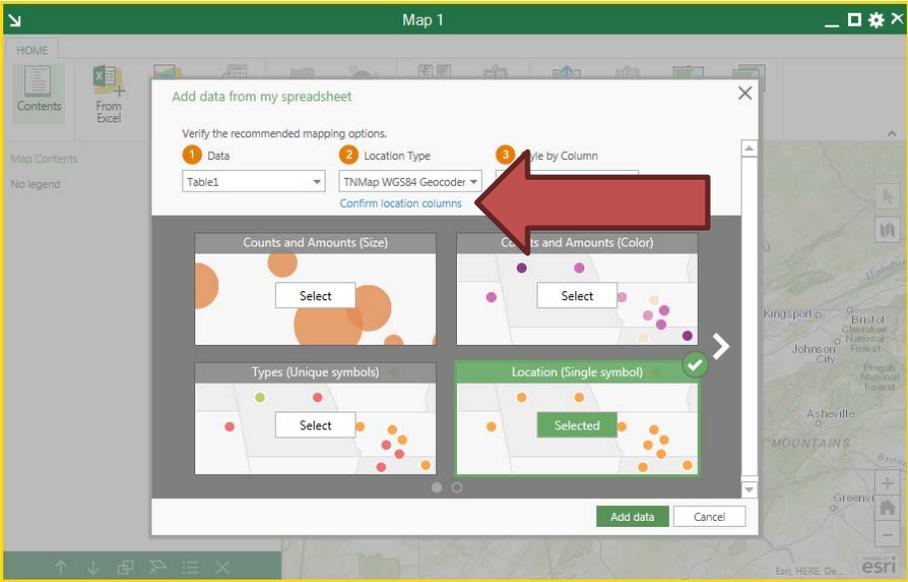
6.2 Selecting Your Data, Location Type, and Style of Symbol

On this screen you'll select your Data, your Location Type and the Style of the symbols you want to use. For Step 1—Data, confirm that your selected data appears in the box below. For Step 2—Location Type, click on the drop-down arrow in the box and select More...

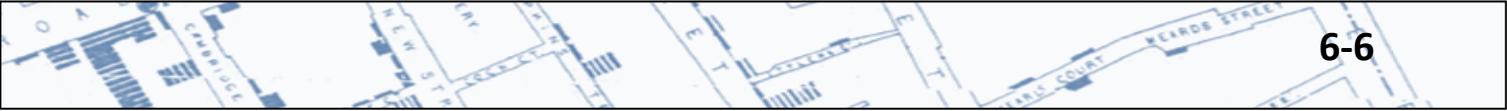
This will open the “Select a location type” window. Click on “TNMap WGS84” to select it, then click Confirm. (This option lets us use the State’s own geocoder for finding addresses.)

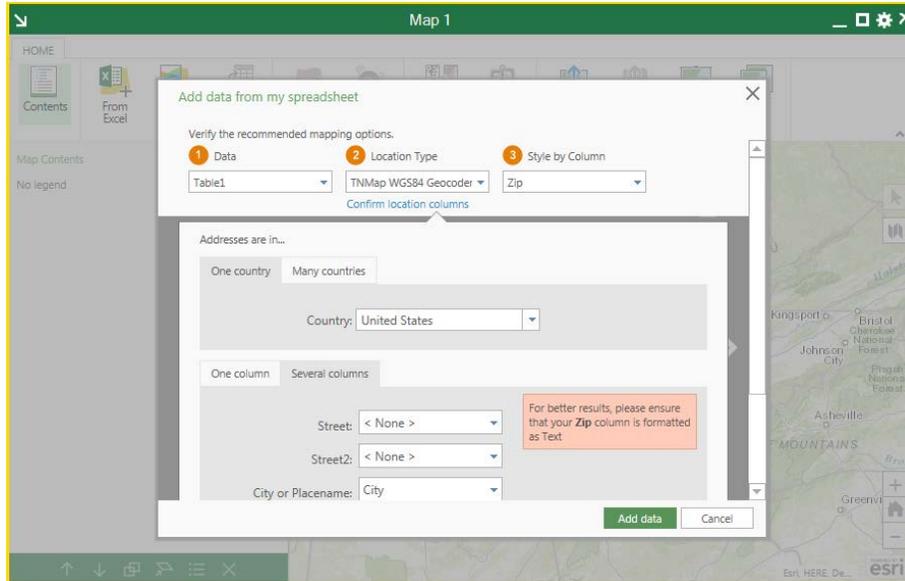
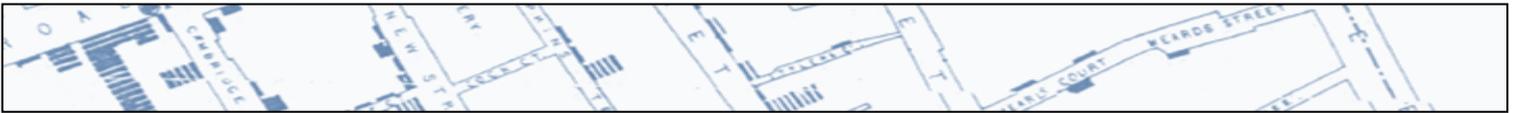


Underneath Location Type, click on the blue words “Confirm location columns”.



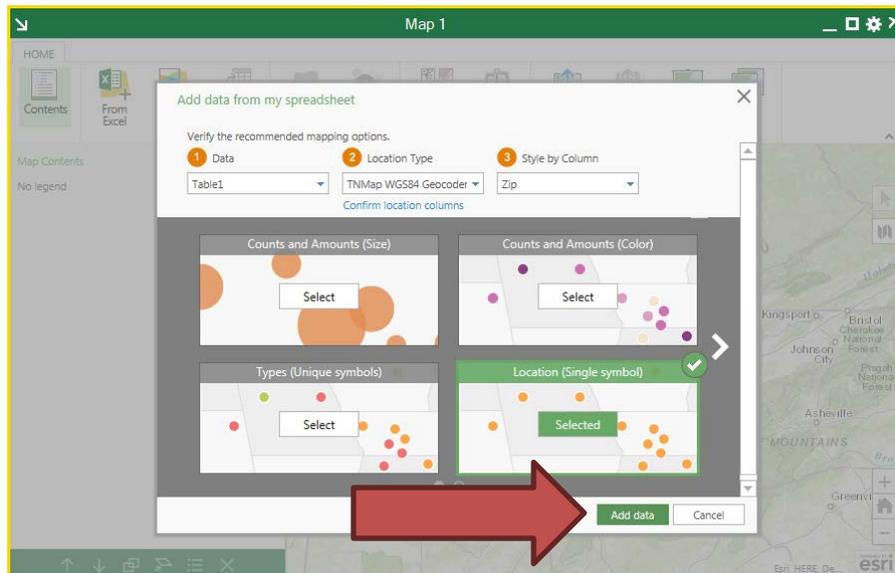
This opens the column selector for your addressing data. Make sure that the Country is United States, then select the columns that represent the various address elements for Street, City or Placename, and State. Select the column for Zip Code if you have one. Once you are finished, click OK.





For Step 3—Style by Column, select the column in your data you wish to symbolize your locations by, if any. If the column you select is a numeric value, the options will include various graduated symbol styling. Otherwise, it will show you category styling options. You can also select <None> to simply show a single symbol for every location. This is not terribly crucial at this point as you can always change the symbol styles later.

When you are finished with the Style of your symbols, click Add data.

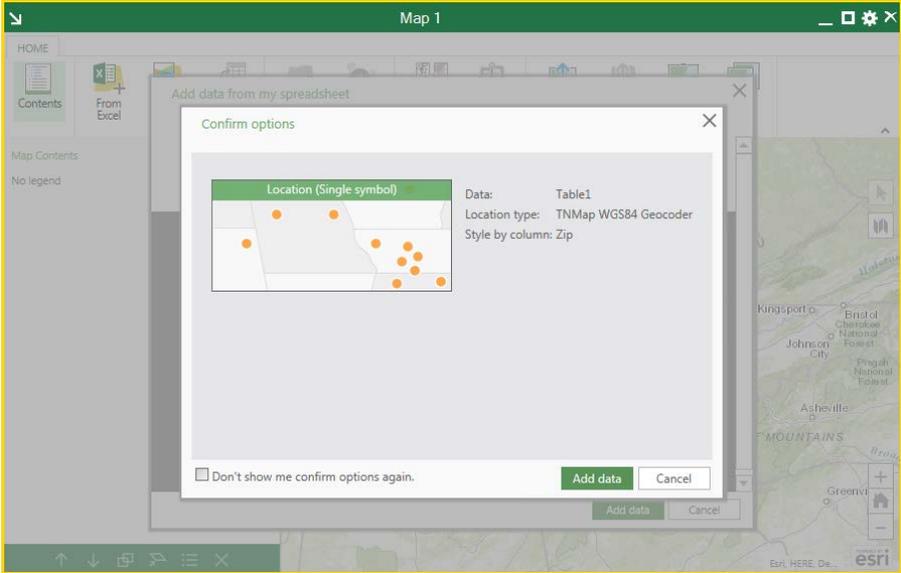


The next and final screen will be a Confirm options window. Pay attention to the lower-left area and see if you get a “Credit usage” report. If you do, this means you haven’t selected the TNMap WGS84

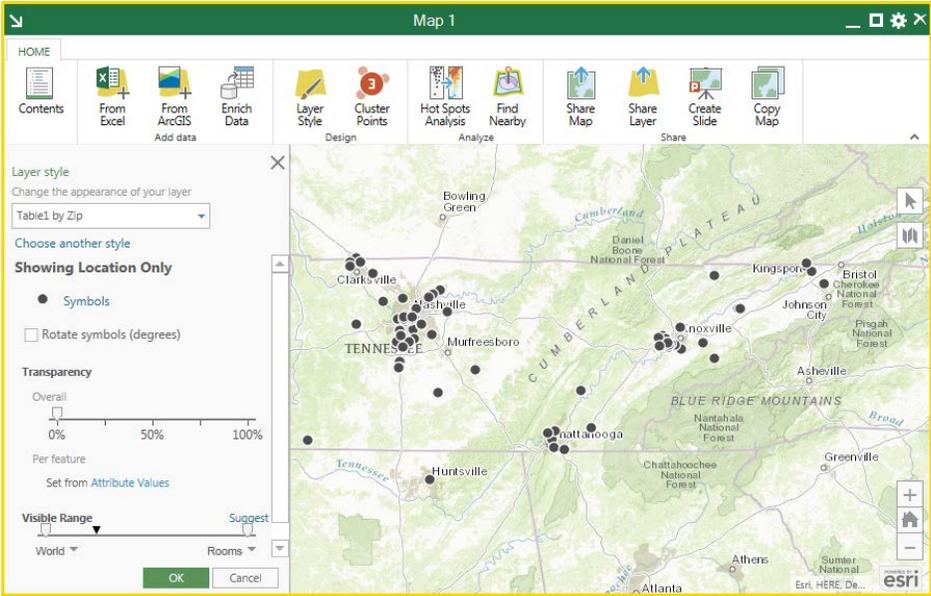




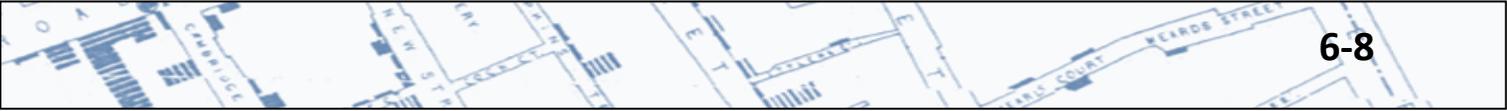
Geocoder for your Location Type. You can click Cancel and go back to change this. If you do not see a “Credit usage” report, then click Add data to generate your map.

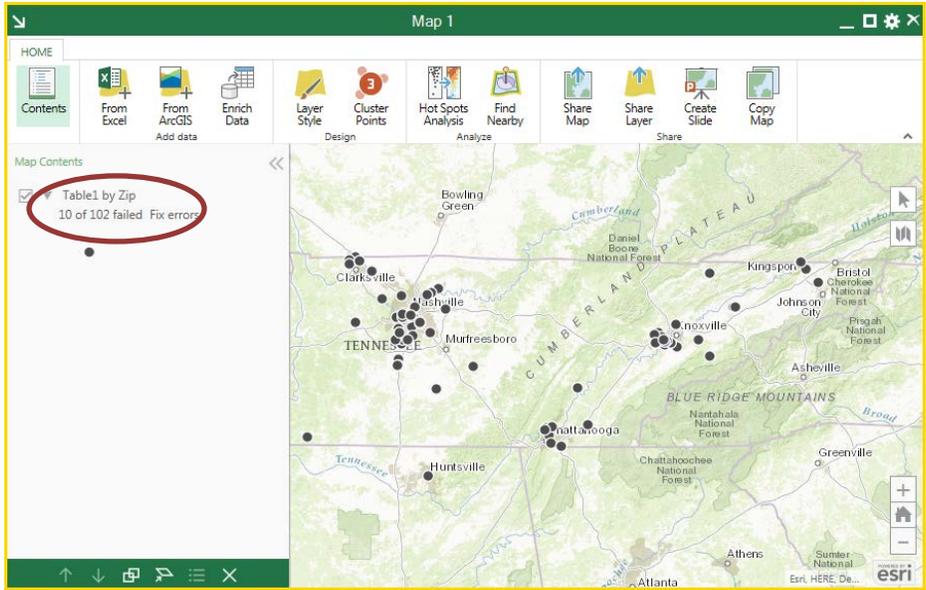
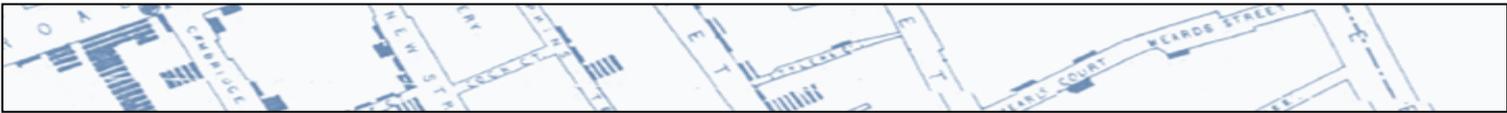


ArcGIS Maps for Office will make an initial run at locating your addresses and placing them in the map. But before being able to check your geocoding, you’ll be given another chance to change the style of the layer. Click OK to move on to the Geocoding.

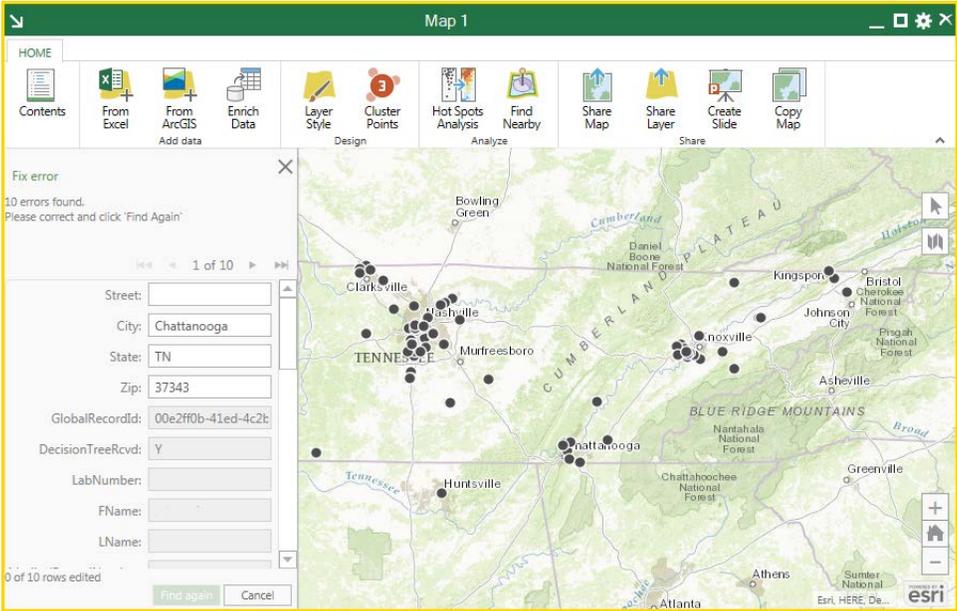


Now notice your layer in the Map Contents panel on the left. In our example, 102 addresses were successfully located, but 10 of them failed. To review and fix these errors, click on “Fix errors”.



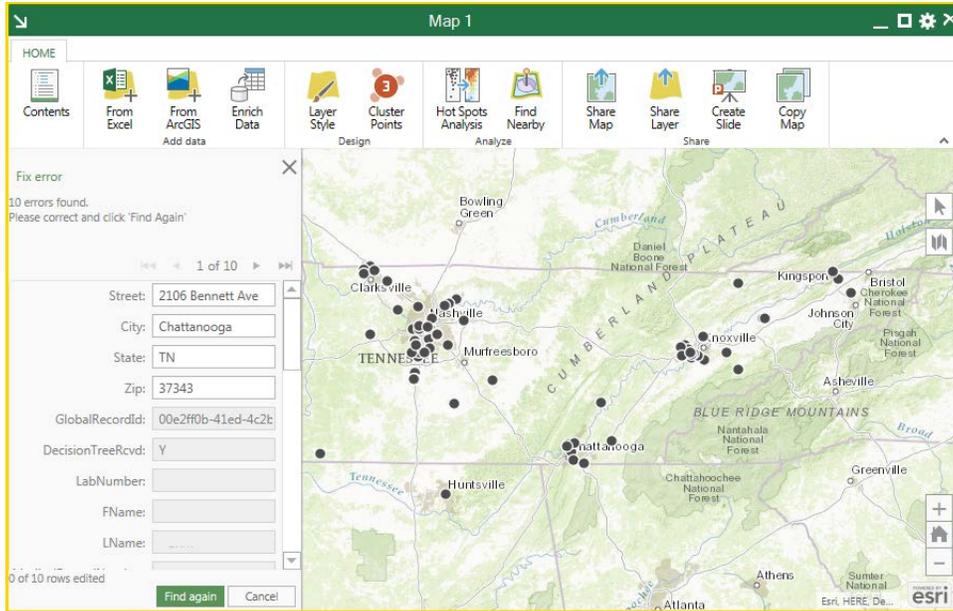


This changes the Map Contents panel to allow you to review each address and make changes as necessary.



In our example, the street address was missing from this record. You can type the correct address in the box, then move on and fix other errors as needed. When finished, click Find Again.

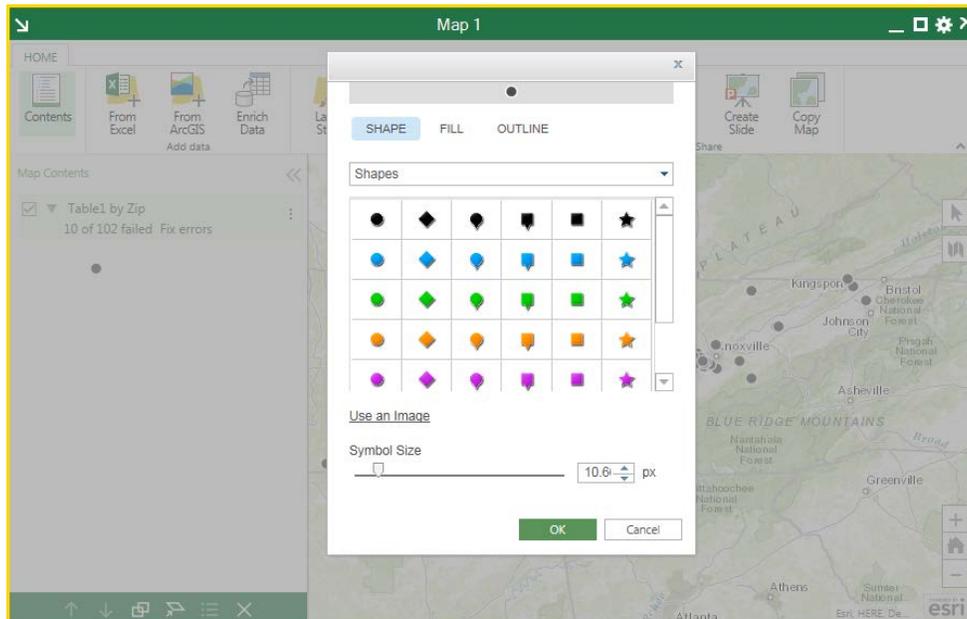




6.3 Editing your Layers and Symbols

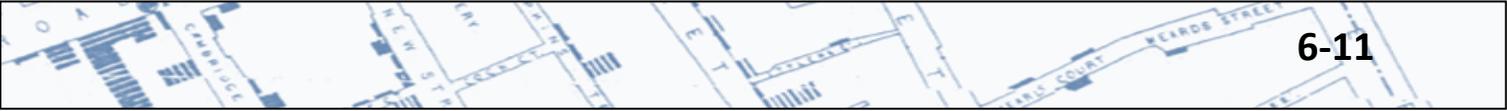
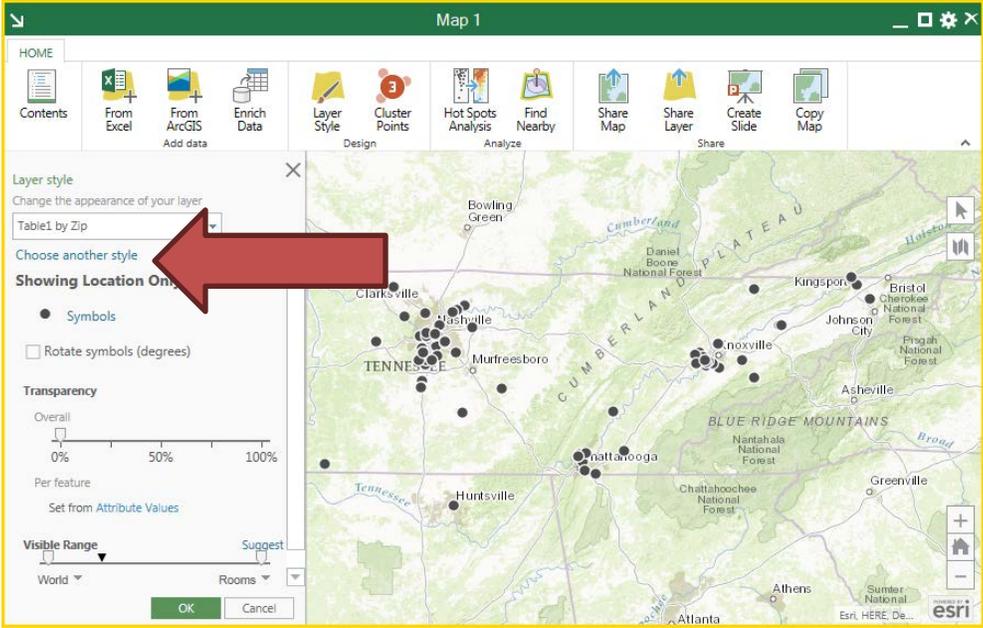
Now that you've located your addresses and have a layer in a map, you can style the map how you want. You can change the symbols and the type of display to clusters or heat map. You can also share the map to your ArcGIS Online for Organizations account, or simply make a PowerPoint slide for a presentation.

To change the map symbol for your layer, click on the symbol itself in the Map Contents panel. This will open up another window that lets you select from a wide variety of available symbols.



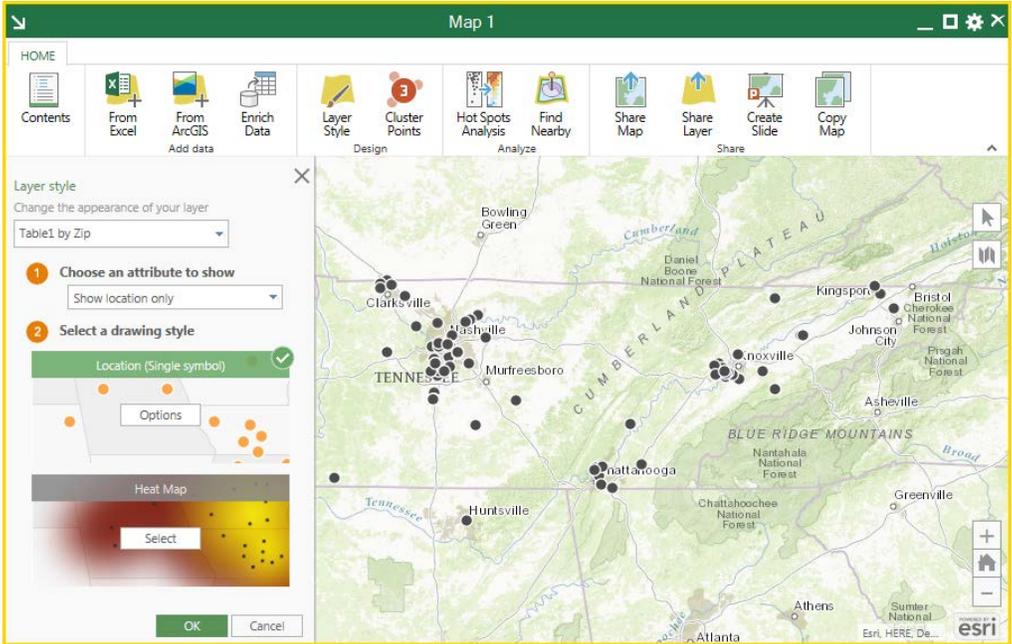


To change the entire Layer style to another form of display, click on Layer Style in the ribbon. This changes the Map Contents panel to the Layer Style panel, and you can change the symbol, the transparency, and even the visible range of your layer. (Visible range hides the layer when at a particular zoom level.) To change the Layer Style, click on the blue words “Choose another style”.

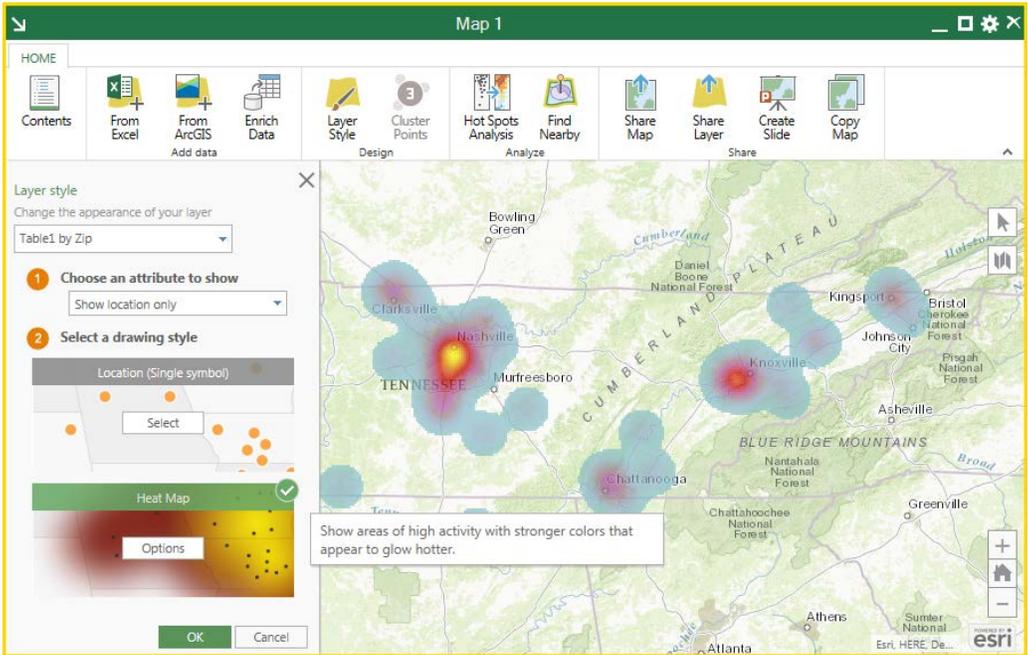


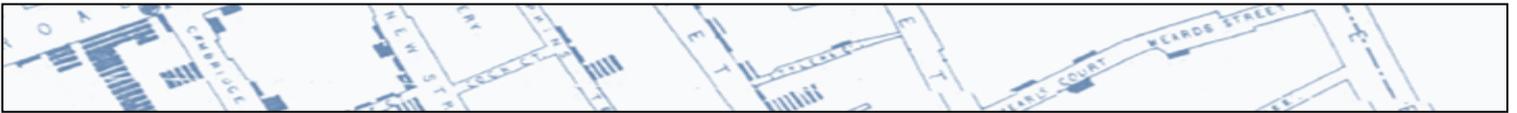


In option 1, you can select whether to display a simple location, or if you want to have the symbol reflect some attribute of your data, such as a different color for different categories of locations. In option 2, you can select the style of the display, such as colors and sizes, or even a Heat Map to give an impression of density.



In our example, we have selected Heat Map for display. You can also change the options by clicking on the Options button to set thresholds and other display options.





When you are finished, click OK.

Those are the basics of finding addresses and creating a map with the ArcGIS Maps for Office Add-In for Microsoft Excel. For more information online, go to <http://doc.arcgis.com/en/maps-for-office/>



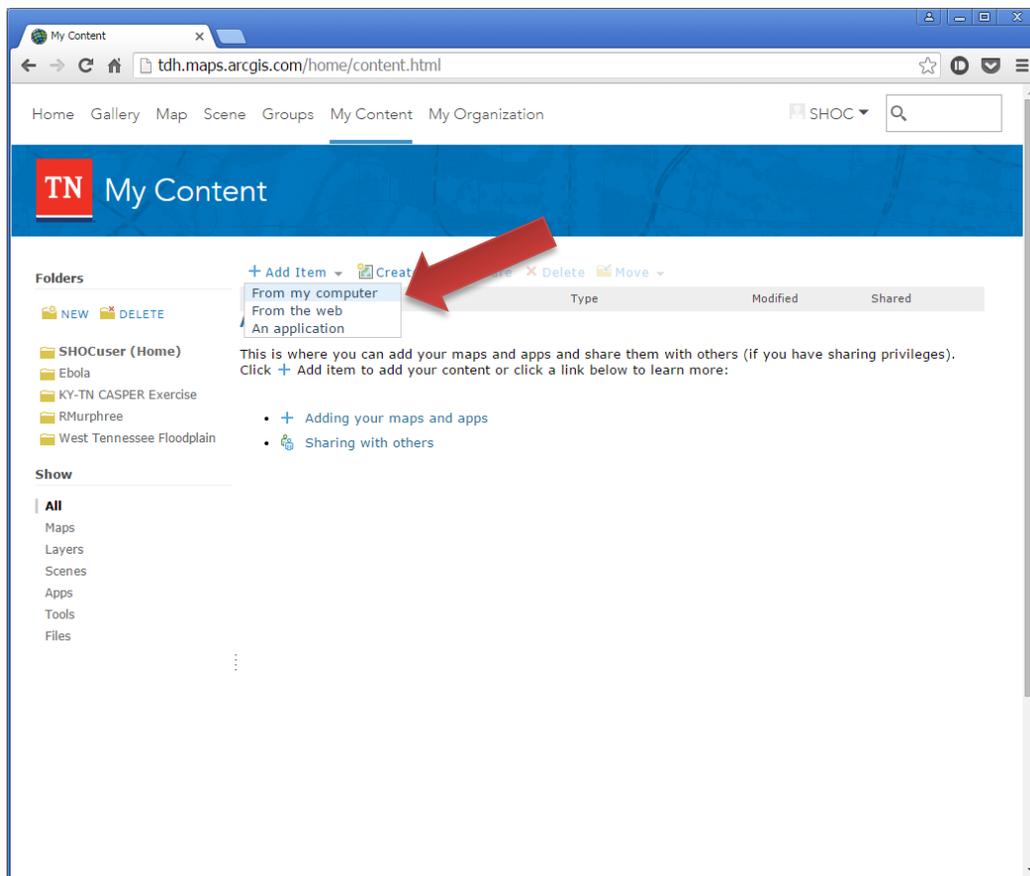
Chapter 7: Geocoding with ArcGIS Online

7.1 Loading the Files

Geocoding with ArcGIS Online for Organizations is another easy alternative if you don't have the ArcGIS Desktop suite of applications. All you need is access to an organizational login for ArcGIS Online and the latest version of your web browser. (Chrome is preferred over Internet Explorer, but in any case, the later the version, the better.)

It's necessary to first take your list of addresses and save it to a comma-delimited text file (.csv) in order to send it to ArcGIS Online. You must have at least a street address field, a city or town field, and a state. It's always better to have more data, so zip codes are helpful, but addresses can be found without these if you're using Tennessee's address locator. (If you are geocoding with the TDH ArcGIS Online for Organizations account, the State's geocoder is the default.)

Login to your ArcGIS Online organizational account. Under the **My Content** tab, select the **+Add Item** option, and from the drop-down menu, select "From my computer".





In the Item from my computer dialog box, select **Choose File** and browse to the location of your saved .csv address file. You must also include a title and a tag. The title is automatically set as the filename of the .csv file after you select it, but you can change it to something else if you prefer. Tags are like a keywords used to search for data in ArcGIS Online, and everything there must have at least one tag.

Item from my computer ?

Add an item from your computer.

File: No file chosen

Title:

Tags:

Once you select your file, ArcGIS Online will determine what sort of file it is and what can be done with it. After loading our example file, you'll notice the dialog box changes to accommodate the processing of a .csv address file. The title is the name of the file, but we need to add a tag. You can create one if you want, or select from ones already in use. In this example, the tag is simply "tdh" for the Tennessee Department of Health. We want to make sure that there is a check mark in the "Publish this file as a hosted layer" box. (If we didn't mark this option, the .csv file would simply be uploaded to ArcGIS Online as a file, and nothing would be done with it.)

Item from my computer ?

Add an item from your computer.

File: health_depts.csv

Title:

Tags:

Publish this file as a hosted layer
(Adds a hosted layer item with the same name.)

Use: Latitude/Longitude Address Table

Select geocoder:

Review the field types and location fields. Click on a cell to change it.

Field Name	Field Type	Location Fields
ADDRESS	String	Street
ADDRESS2	String	Not used
CITY	String	City or Placename
STATE	String	State



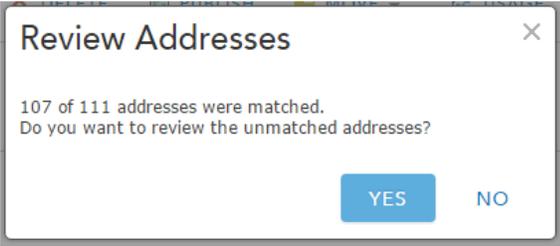


Underneath that is the option for the type of geocoding. Next to where it says **Use:** you see the options *Latitude/Longitude*, *Address*, and *Table*. In our example we will use *Address*, since that is the form our data is in. If you already had Lat/Long values in your .csv file, you could use those instead. (The *Table* option would allow you to simply upload your data as a table file, specifying the field names and data types.) In the **Select geocoder** box, notice it says *TNMap WGS84 Geocoder*. This is the State's default geocoder, and works best with ArcGIS Online. It also does not cost us usage credits with our organizational account since we are using our own servers to do the work.

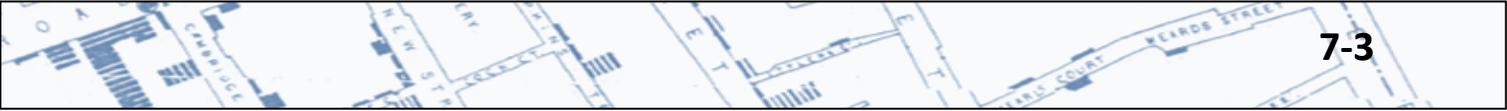
7.2 Reviewing the Addresses and Field Types

In the next section you are meant to review the field types and their corresponding location fields. Here is where you will specify which fields in your .csv are to be used for locating the address. Specify which field is the Street field, which is the City or Placename, State, and Zip. ArcGIS Online will attempt to auto-assign these, but it is not perfect. Review these and change them if necessary by clicking on the Location Fields cells. Once you are finished, click the ADD ITEM button.

ArcGIS Online will begin processing your file and converting it to a Feature Layer. Once that process is complete, you will receive a report of the geocoding results. If you have addresses that did not match (and it's rare not to), then select YES when prompted to review the unmatched addresses.



ArcGIS Online will then open a new map viewer with your matched addresses as points, and unmatched ones will be listed in the table below the map. To begin matching these addresses, select one in the table (see below). If ArcGIS Online is able to find some close possibilities, they will appear in the Suggestions box on the left of the map. For the first address in our example, there are no suggested matches because the street address is a suite number without a street name or number. This was a data entry error, and can be corrected by double-clicking the address field and manually typing the correct address in its place. Once that is done, a number of suggestions appear in the box on the left.





health_depts

tdh.maps.arcgis.com/home/webmap/viewer.html?layers=c91dd46b010644b5b88359e09d1f24e6&review=true

Home health_depts New Map SHOC

Details Add Basemap Share Directions Bookmarks Find address or place

Review Addresses

Suggestions Options

Address Type

No Results.

Unmatched (4 Total) Matched (107 Total) Reviewed (0 Total)

ADDRESS	CITY	STATE	ZIP	Reviewed
SUITE 200	ASHLAND CITY	TN	37015	
620 DAVIS DRIVE	TAZEWELL	TN	37879	
CORDELL HULL BUILDING	NASHVILLE	TN	37243	
840 CHEROKEE TRAIL	COPPERHILL	TN	37317	

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health_depts

tdh.maps.arcgis.com/home/webmap/viewer.html?layers=c91dd46b010644b5b88359e09d1f24e6&review=true

Home health_depts New Map SHOC

Details Add Basemap Share Directions Bookmarks Find address or place

Review Addresses

Suggestions Options

Address Type

162 COUNTY SERVICES Stree
DR, ASHLAND CITY, TN,Addr
37015

162 COUNTY SERVICES Stree
DR, ASHLAND CITY, TN,Addr
37015

162 COUNTY SERVICES Stree
DR, ASHLAND CITY, TN Addr

162 COUNTY SERVICES Stree
DR, ASHLAND CITY, TN Addr

162 County Services Stree
Dr, Ashland City, TN,
37015

162 County Services Stree
Rd, Ashland City, TN,
37015

163 County Services Stree
Dr, Ashland City, TN,
37015

162 County Services Stree
Dr, Ashland City, TN,
37015

162 County Services Stree
Rd, Ashland City, TN,
37015

Unmatched (4 Total) Matched (107 Total) Reviewed (0 Total)

ADDRESS	CITY	STATE	ZIP	Reviewed
162 county services dr	ASHLAND CITY	TN	37015	
620 DAVIS DRIVE	TAZEWELL	TN	37879	
CORDELL HULL BUILDING	NASHVILLE	TN	37243	
840 CHEROKEE TRAIL	COPPERHILL	TN	37317	

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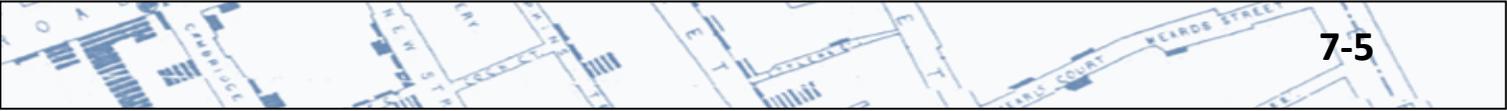


In most situations the very first address match in the list on the left will be the best candidate, but since we are reviewing them in an interactive map, we can decide if we like it or not. The map shows the point locations of matches, and there are multiples because the TNMap Geocoder is made up of multiple locators. To be even more selective about which point to choose as your match, it often helps to change the basemap to an aerial photo image to see the location of the actual building. Once you have decided on which address point to use, click on it, then click the MATCH button. This will place a green check mark in the Reviewed column of the table, and will mark that address as matched. You can then proceed to the next address, and so on.

The screenshot shows the ArcGIS web map interface. On the left, a 'Review Addresses' panel lists suggestions for '162 COUNTY SERVICES DR, ASHLAND CITY, TN, 37015'. The main map area shows an aerial view with a popup for the 'Suggested Address' and 'Location' (X: -87.052560, Y: 36.288289). A 'MATCH' button is visible in the popup. Below the map, a table displays address matches:

ADDRESS	CITY	STATE	ZIP	Reviewed
162 county services dr	ASHLAND CITY	TN	37015	
620 DAVIS DRIVE	TAZEWELL	TN	37879	
CORDELL HULL BUILDING	NASHVILLE	TN	37243	
840 CHEROKEE TRAIL	COPPERHILL	TN	37317	

It's also possible to match an address without typing one in to the Address column. This is handy when there's no good match in the list, or when you'd rather have another entrance or driveway represent the location than the geocoder provided one. When you select the row needing a match, you can zoom and pan the map to a location, and simply click on the map to generate an address point. In our example below, the Central Office location is an old one, but we can pan to the place on the map and just mark it ourselves. Click the MATCH button if you like the location, or click the DISCARD button and try again.





health_depts

tdh.maps.arcgis.com/home/webmap/viewer.html?layers=c91dd46b010644b5b88359e09d1f24e6&review=tru

Home health_depts New Map SHOC

Details Add Basemap Share Directions Bookmarks Find address or place

Review Addresses

Suggestions Options

Address Type

No Results.

Suggested Address

710 JAMES ROBERTSON PKWY
NASHVILLE TN 37219

Location

X: -86.787053
Y: 36.167667

MATCH DISCARD

Zoom to

Unmatched (3 of 4 Remaining) Matched (107 Total) Reviewed (1 Total)

ADDRESS	CITY	STATE	ZIP	Reviewed
162 county services dr	ASHLAND CITY	TN	37015	✓
620 DAVIS DRIVE	TAZEWELL	TN	37879	
CORDELL HULL BUILDING	NASHVILLE	TN	37243	
840 CHEROKEE TRAIL	COPPERHILL	TN	37317	

DONE REVIEWING

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When you are finished reviewing your addresses, click the **DONE REVIEWING** button in the lower left-hand corner. This closes the reviewing operation, and you are left with your points in a map viewer. Click on the Home drop-down menu in the upper left-hand corner and select My Content to return to the content page. You will now see that you have two new items in the list: your original CSV file, and a Feature Layer of the same name.





TN My Content

Folders

- NEW DELETED
- SHOCuser (Home)
 - Ebola
 - KY-TN CASPER Exercise
 - RMurphree
 - West Tennessee Floodplain

Show

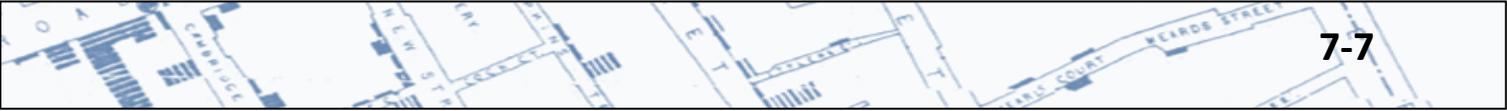
- All
- Maps
- Layers
- Scenes
- Apps
- Tools
- Files

+ Add Item Create Share Delete Move

<input type="checkbox"/>	Title	Type	Modified	Shared
<input type="checkbox"/>	health_depts	CSV	Jan 6, 2016	Not Shared
<input type="checkbox"/>	health_depts	Feature Layer	Jan 6, 2016	Not Shared

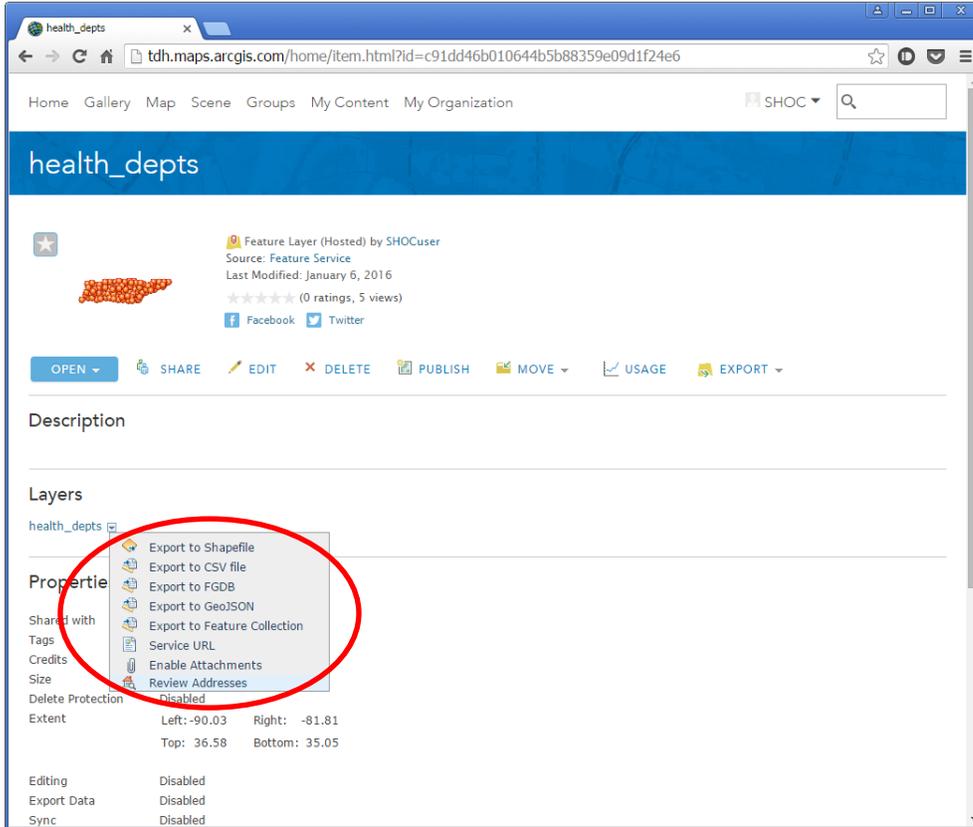
1 - 2 of 2 results

It isn't necessary at this point to keep the original .csv file, so it's a good idea to delete it. Click the check box to the left of the .csv file name, and select Delete from the menu area immediate above the list of items.

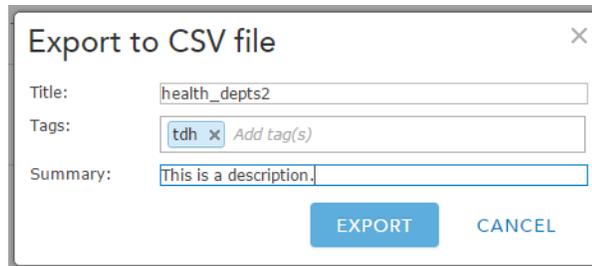


7.3 Exporting Addresses

Click on your new Feature Layer to look at the item details page. From here you can export your geocoded addresses as a shapefile or as a new .csv file. You can also go back to Review Addresses if you need to complete this task.



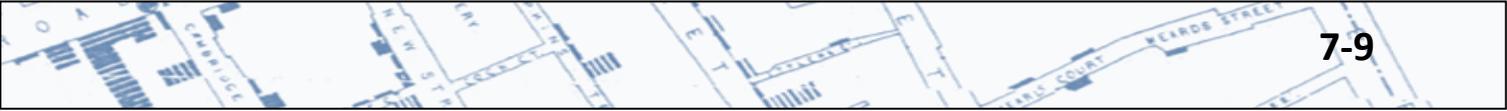
To export, click on the small triangle button next to the layer name, and from the drop-down menu, select the file type you'd like to export your geocoded addresses to. Similar to when we uploaded our original .csv and converted it into a Feature Layer, you'll be prompted to name the export, give it some tags and a description. The export process will create the file and save it to your **My Content** area. From there, you can download the file.





If you choose to save your geocoded addresses as a new .csv file, the file will include two new columns labeled “x” and “y” with the latitude and longitude of each address point.

K	L	M	N	O	P
COUNTY	FIPS	WEBSITE	FID	x	y
CARTER	47019		1	-82.2194	36.34547
RUTHERFC	47149	http://rut	2	-86.3916	35.84954
JACKSON	47087		3	-85.6543	36.3669
CANNON	47015		4	-86.0717	35.82722
WHITE	47185		5	-85.4587	35.92796
HOUSTON	47083		6	-87.6934	36.31863
PUTNAM	47141		7	-85.5227	36.14945
CHESTER	47023		8	-88.6172	35.44658





Appendix A: Additional Resources

Where to find further support

TN Department of Health GIS User Group

Geocoding and GIS User Group within the Department of Health. Notification of meetings, trainings, webinars, etc.

Contact: Rendi Murphree | Rendi.Murphree@tn.gov | 615-253-1365

TN STS GIS User Group

Geocoding and GIS User Group between all agencies in the State of Tennessee. Notification of meetings, trainings, webinars, and on-going inter-agency projects and enhancements.

Contact: Dennis Pedersen | Dennis.Pedersen@tn.gov | 615-741-9356

TN Map

<http://tnmap.tn.gov/> - TNMAP serves as the portal for accessing a wide variety of GIS related information, resources, and on-line mapping services in Tennessee.

STS GIS Intranet

<http://tnmap.state.tn.us/portal2/StateUsers.asp> - GIS presentations, links, data sources, services and FAQ's available on the State of Tennessee intranet, but not available to users on the internet.

U.S Department of Health & Human Services – MedMap project

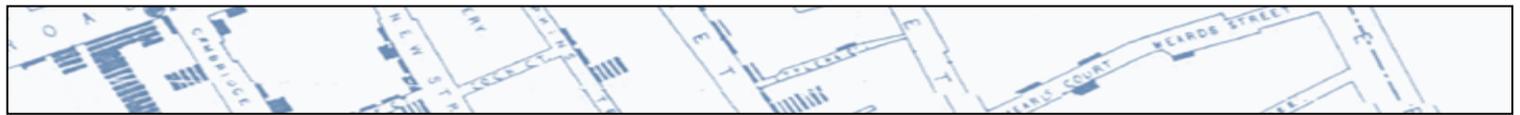
<https://gis.medmap.hhs.gov/medmap/default.aspx> - HHS is developing an interactive geographic information system (GIS)-based mapping system, called MedMap, which will include data for resources in a response to any type of hazard such as potential medical care sites and assembly centers in the U.S., evacuation routes, hazards, etc. so that up-to-date information will be immediately available by which to organize the response. Determining which local medical care and assembly center facilities are functional or not in the exposure area is essential, as is having information on what regional and nationwide resources are available.

Esri® Training Center

<http://training.esri.com/gateway/index.cfm> - Wide variety of geocoding and GIS courses from Esri®.

Esri® Middle TN Contact

Zach Layne | zlayne@esri.com | 615-599-4120



Appendix B: Glossary

ArcGIS	GIS software from Esri®. There are various “flavors” of the software with differing features and pricepoints: ArcGIS Desktop, ArcGIS Explorer, ArcGIS Online, ArcGIS Mobile, ArcGIS Server
Attribute	Information about a geographic feature in a GIS, usually stored in a table and linked to the feature by a unique identifier. For example, attributes of a river might include its name, length, and sediment load at a gauging station.
Case Cluster Map	A map which uses symbols to represent diseases of cases as points in geographical space, potentially stratified by attributes
Choropleth Map	A map that uses graded differences in shading or color or the placing of symbols inside defined areas on the map in order to indicate the average values of some property or quantity in those areas.
Epi Info	Public domain statistical software for epidemiology developed by Centers for Disease Control and Prevention (CDC). Its latest release, Epi Info 7, contains several public health mapping tools.
Esri®	Software development and services company providing Geographic Information System (GIS) software and geodatabase management applications such as ArcGIS. This company has one-third of the global market share in this industry.
Geocoding	The process of assigning geographic coordinates (e.g. latitude-longitude) to street addresses, as well as other points and features. With geographic coordinates, the features can then be mapped and entered into Geographic Information Systems.
Georeference	To align data to a known geographic location so it can be viewed, queried, and analyzed with other data on a map.
GIS	A Geographic Information System, or GIS, integrates, data, hardware, software and GPS to assist in the analysis and display of geographically referenced information.
Shapefile	For ArcGIS software, a format for storing the location, shape, and attributes of geographic features. A shapefile is stored in a set of related files and contains one feature class.

