# Intro to ArcGIS Pro

What is "GIS"?

Geographic Information Systems (GIS) is a tool used to display, create, and analyze spatial information to help solve real world problems. It combines the graphics that make up a map with data tables of associated attributes. Based on a fictitious case of a flu outbreak in St. Catharines, we will use the GIS to map incidents, identify at-risk elementary schools and proximity to medical centres using network analysis. Download tutorial data ("Flu_Outbreak.zip") from https://github.com/BrockMDGL/Intro2ArcGIS-FluOutbreak Unzip the data before starting.

## Section 1: Introducing ArcGIS Pro

Before you begin, you must have an Esri account. Email maplib@brocku.ca to request an organizational account and ArcGIS Pro access.

1. Run **ArcGIS PRO**. HINT: Click the Windows button then start typing *ArcGIS*

2. When prompted, login using your ArcGIS Online credentials.

3. Select NEW > BLANK TEMPLATE, **MAP**.

4. At the prompt, enter a name for the project (i.e. Outbreak) and identify a folder in which to store the project file and all associated data files. This folder may be on a USB, in your student storage space or other storage device. Each project (.aprx) includes the associated toolboxes, databases, folder connections, styles and more.

5. Click OK.

The ArcGISPro interface is made up of ribbons, tabs, groups, panels, panes and window views.
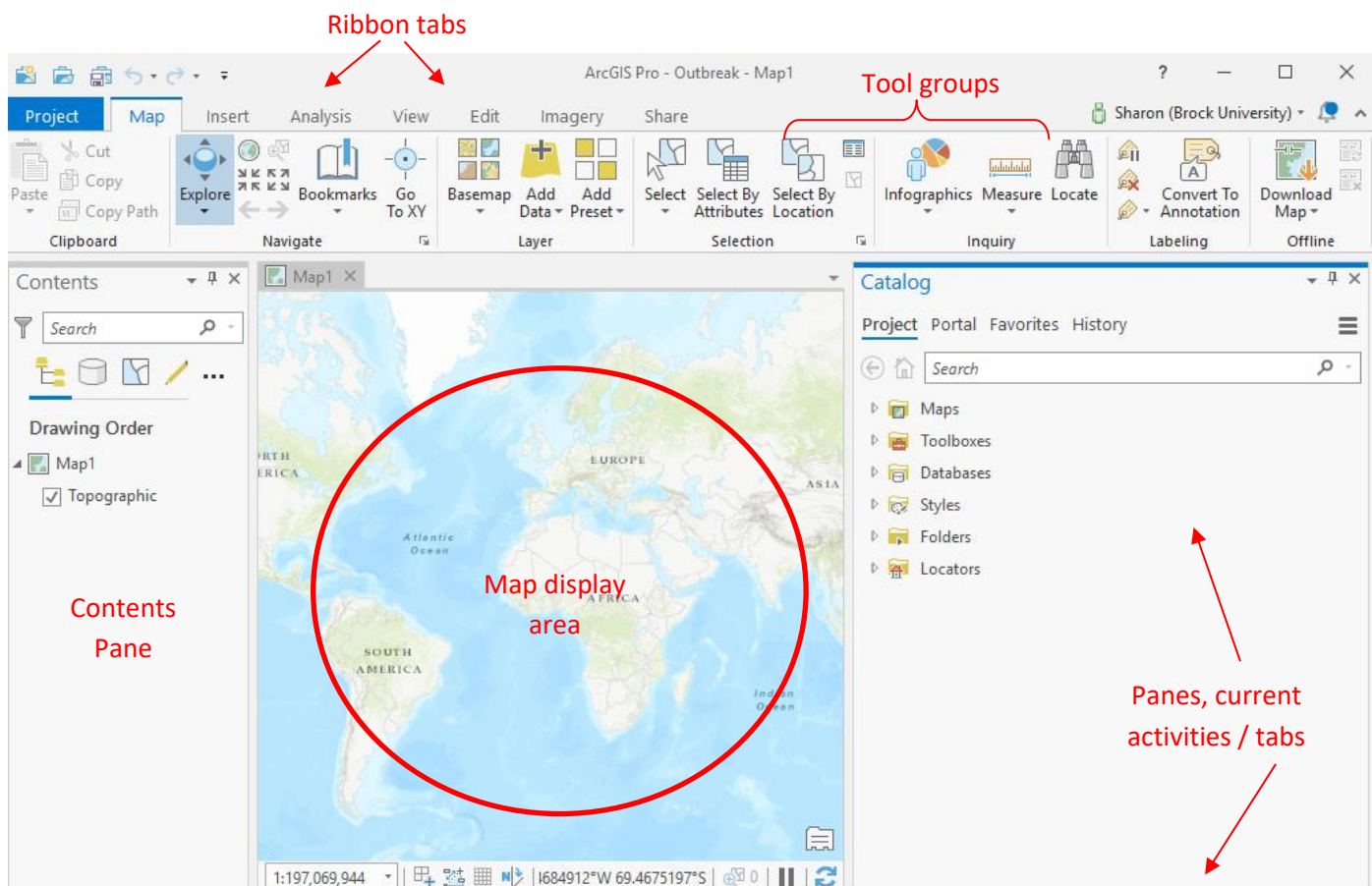
6. ArcGIS Pro is very intuitive and adjusts depending on the layer that is active or the last tool used.

7. From the **View** tab, click **Catalog Pane**.

8. From the **Catalog** window on the right, expand **Databases** and notice the new *geodatabase* (native data structure for ArcGIS) created for this project. All geoprocessing results will be created in this geodatabase.

9. To make a shortcut to the FOLDER holding the tutorial data, right-click **Folders > Add Folder Connection** and
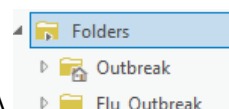

navigate to the location where you unzipped the data. …\Flu_Outbreak\

Creating a map and adding data

1. The map window is automatically populated with an Esri basemap to give context to your mapping project. To select a different basemap, go to the **Map** tab and click **Basemap**.

2. To find a location, click the **Map** tab then click **Locate** Locate . Enter a city or other location and select the appropriate result from the list. For example, enter **St. Catharines, Ontario, CAN**.

3. Close the Locate tool by clicking the X in the upper right corner of the pane. Be sure to click the X for the **tool pane, not the software!**

4. From the Catalog pane on the right, expand Folders, then expand Flu_Outbreak. You will see the geodatabase for this tutorial "IntroToArcGIS.gdb". Double-click to expand the geodatabase and browse the available layers.
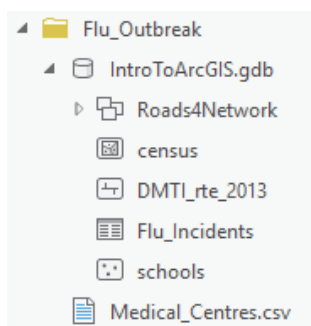

5. Click "schools" to select it and drag it to the map. Each school is represented by a dot on the map.

6. Likewise, add the tables "Flu_Incidents" and "Medical_Centres.csv". Because these are standalone tables, there aren't any points on the map.

7. Each table is added in the **Contents** pane listing to the left of the map window under the heading **Standalone Tables**. Right-click the "Medical_Centres" table and click **Open**. Each medical centre includes a street address. We will work through a process called "geocoding" to match each address against an authoritative database of addresses in order to visualize the distribution of medical centres in St. Catharines.

Clinic	Address	City	Phone
Ontario St Walk-in Clinic	318 Ontario Street	St. Catharines	905-682-0444
Glenridge Walk-in Clinic	209 Glenrdige Avenue	St. Catharines	289-362-5333
Geneva Street Walk-in Clinic	284 Geneva Street	St. Catharines	289-362-5525
Carlton Medical Centre	359 Carlton Street	St. Catharines	289-362-3949
Pelham Urgent Care Clinic	245 Pelham Road	St. Catharines	905-988-1933

8. Close the attribute table by clicking the X next to the table name.

9. Right-click the standalone table in the **Contents** pane and click **Geocode Table.** The geoprocessing window is activated with the **Geocode Addresses** tool. Click **Start** at the bottom of the pane.

10. Select **More than one field** (the default) and click **Next**.

11. From the dropdown list for **Input Address Locator**, select **ArcGIS World Geocoding Service**. Click Next.

12. The **Input Address Fields** are automatically populated. Click Next.

13. Note the output file name "Medical_Centres_Geocoded".

14. Click **Next**.

15. Select **Canada** from the country list and click **Next**.

16. Accept the default **Category** and click **Finish** then **Run**. The process may take a few minutes. You will be prompted when the tool has finished.

17. The map is automatically zoomed to the extent of the features.

18. When prompted to start the rematch process, click **No**.

The default symbol is a random point symbol. We will change the symbology after adding points for the flu patients.

19. Right-click the **Flu_Incidents** table and open it to explore the data. Again we see street addresses. Repeat the geocoding process as before.

HINTS: a) Right-click layer, select **Geocode Table**

b) Follow the prompts within the **geocoding wizard**
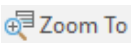
c) Click 'No' when prompted to rematch
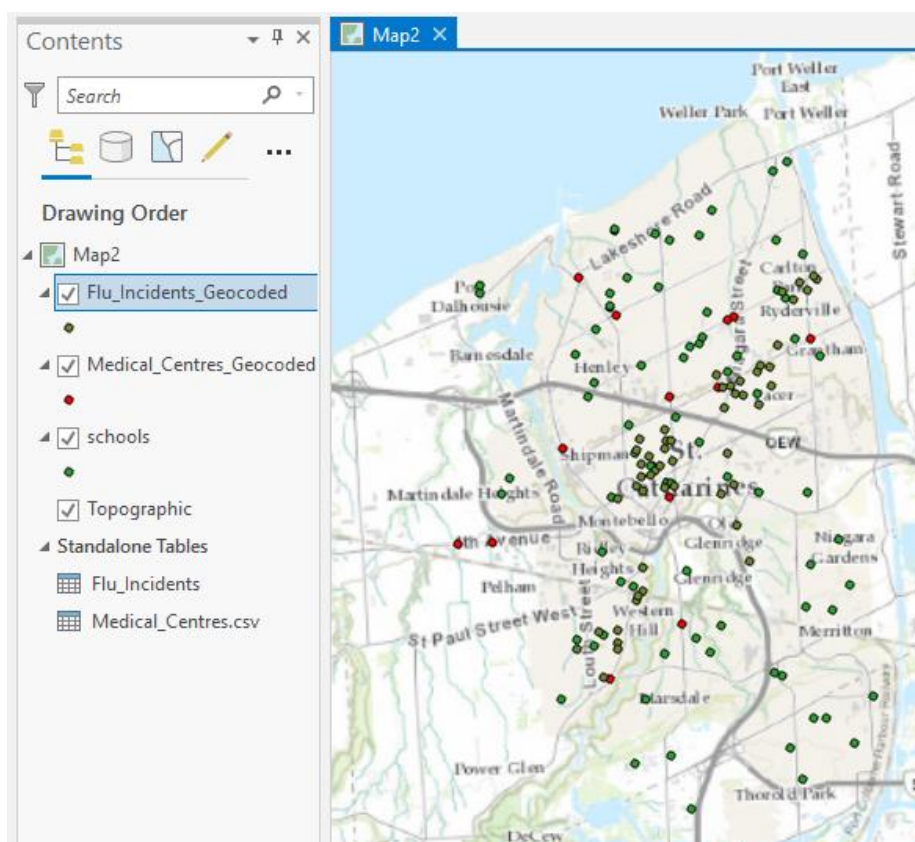
The resulting map is a mess of points. Let's symbolize the points to distinguish them better.

Symbolization

1. From the **Contents** pane, click the dot symbol below the schools layer to open the **Format Point Symbol** panel on the right. In the search box, type 'school' and hit enter.

2. Select the middle-sized symbol 🏛

3. Repeat the above steps to apply appropriate symbols for Medical centres (search "red cross") and flu incidents (your choice).
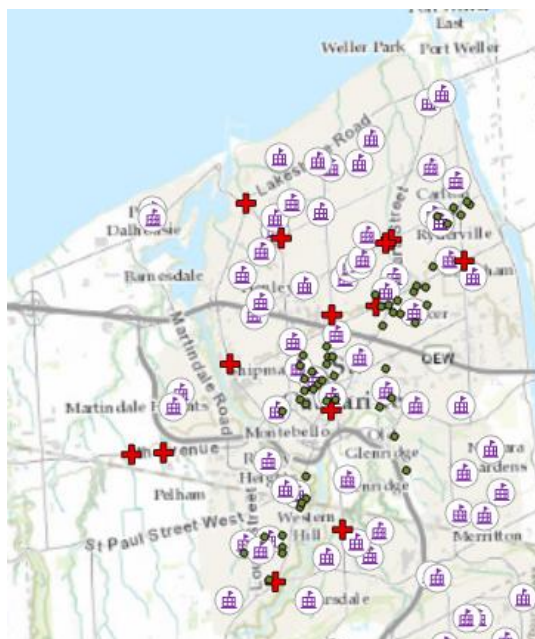
The Connection between attributes and features

1. From the **Contents** pane, right-click the medical centres layer name and click **Attribute Table**.

2. Click the gray box to the left of a row to select that medical centre and notice it is highlighted on the map. You may need to click ⊕ Zoom To

3. Likewise, you can select a feature on the map and see the record highlighted in the table. From the **Map** tab at the top, click Select, then click a medical centre on the map. Notice the connection between the features on the map and the attributes in the table.

4. Click **Clear** to clear the selection before moving on.

5. From the **Map** tab, click the **Explore** tool to activate it.

6. SAVE your map! HINT: click the save button. 💾

Creating a Buffer

Our next task is to identify schools in proximity to the flu cases. To do this we will create a buffer around the flu incidents then select the schools that fall within the buffer.

1. From the **Contents** panel on the left, select the layer "Flu_Incidents_Geocoded".

2. From the **Analysis** tab at the top, select **Tools** then click **Buffer** from the options on the right.
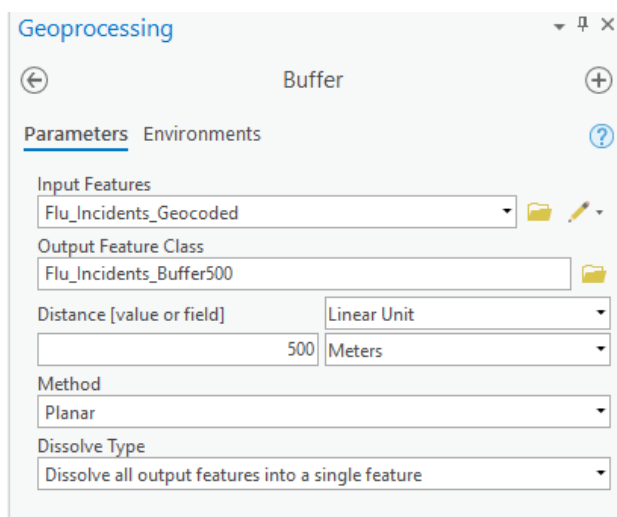
3. Fill in the dialogue box as follows:

> **Input Features**: Flu_Incidents_Geocoded
>
> **Output Feature Class**: Flu_Indicents_Buffer (the default storage location is the geodatabase created at the
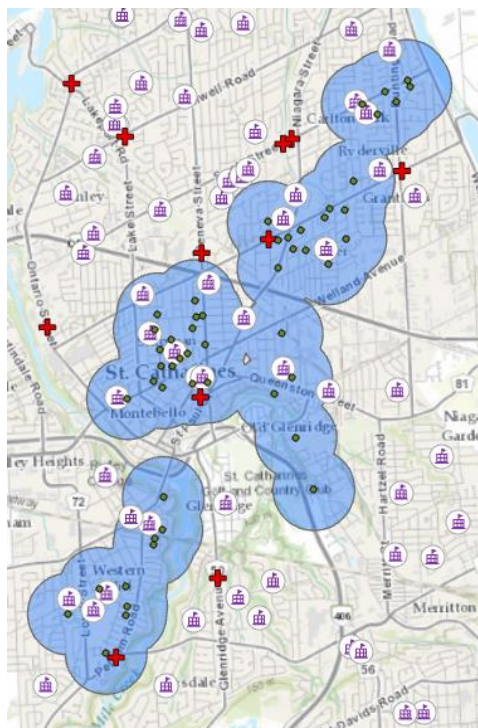>
> beginning of this tutorial)
>
> **Change the units to Meters** and enter the value 500
>
> **Dissolve Type**: select *Dissolve all output features into a single feature*
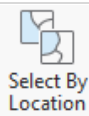>
> Click **Run**.

A new polygon feature is added to the map and the **Contents** listing on the left.


To select the schools in proximity to the flu cases, follow these steps:

1. From the **Contents** panel on the left, click schools layer name.

2. Click the **Map** tab at the top of the window, click [Select By Location] to activate the tool on the right.

   a. The input features should automatically reflect 'schools'.

   b. **Relationship:** Completely within

   c. **Selecting Features:** Flu_Incidents_Buffer

   d. **Run**.
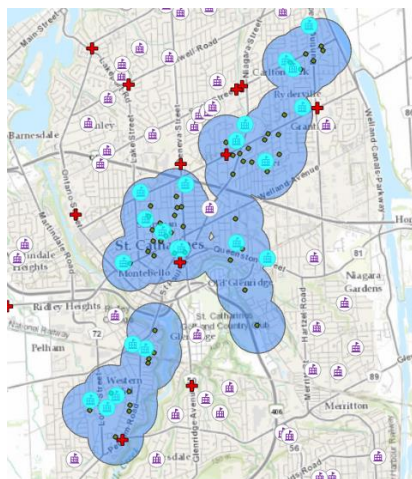
The schools that fall within the defined buffer are now highlighted on the map.
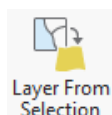
3. Click the **Data** tab at the top and click [Layer From Selection]. A new layer appears at the top of the **Contents** list called "schools selection".

4. Turn off the original schools layer and open the attribute table for the selected schools. HINT: R-click the layer and select Attribute Table. We now have a list of schools to contact regarding the outbreak.

5. Save your map!

Our final analysis involves identifying the nearest medical centre to each flu patient. Although the map gives us a nice visual, we will use network analysis to calculate the closest facility based on drive times.
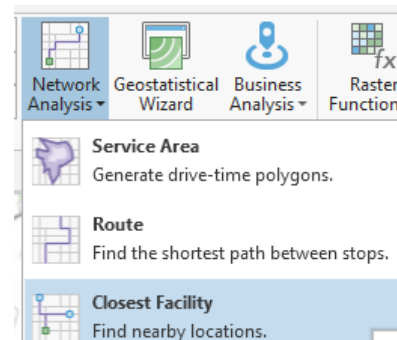
Network analysis

1. To add the Network Dataset for St. Catharines: In the Catalog tab on the right, go to the Flu_Outbreak folder connection. Add the following to your map:

   \Flu_Outbreak\IntroToArcGIS.gdb\Roads4Network\StCatharines_ND

   [StCatharines_ND] (this is the network dataset that will be used in the analysis).

2. In the Contents panel, select StCatharines_ND

3. From the **Analysis tab** at the top, select **Network Analysis** then **Closest Facility** (this tool generates all the parts needed for the analysis)
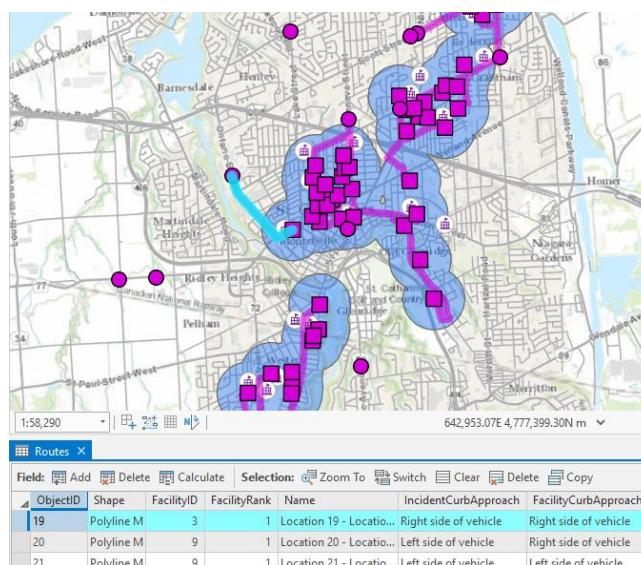
Network Analyst

Closest Facility

A new tab appears at the top of the screen

4. Click on the **Closest Facility** tab to activate the ribbon.

5. Click **Import facilities**. The tool opens on the right. Select Medical_Centres_Geocoded from the dropdown list.

6. Click **Run**.

7. From the **Closest Facility** ribbon, click **Import incidents**. Select Flu_Incidents_Geocoded from the dropdown list.

8. Click **Run**.

9. From the **Closest Facility** ribbon, click the **Run** button at the far left of the ribbon.
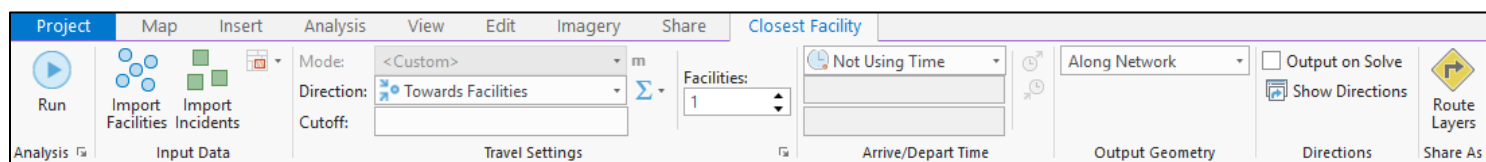

The process may take several seconds to complete. The final result will show the shortest travel time between flu patients and medical centres.

10. Open Routes attribute table and click on a record to select it in the table and on the map.


Alternate Network Analysis

Please see MDGL staff for access to an appropriate Network Dataset for your project. Alternately, you can run the analysis using the Esri Cloud Network Dataset, however, be advised that this method consumes credits in ArcGIS Online and will be reflected on your user account. For more information, contact maplib@brocku.ca
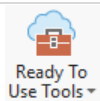
1. Click the **Analysis** tab at the top and select ![Ready To Use Tools] (uses CLOUD network, costs credits) then click
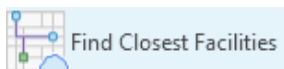
   ![Find Closest Facilities] . The geoprocessing tool dialogue box appears on the right. Fill in the dialogue box as follows:
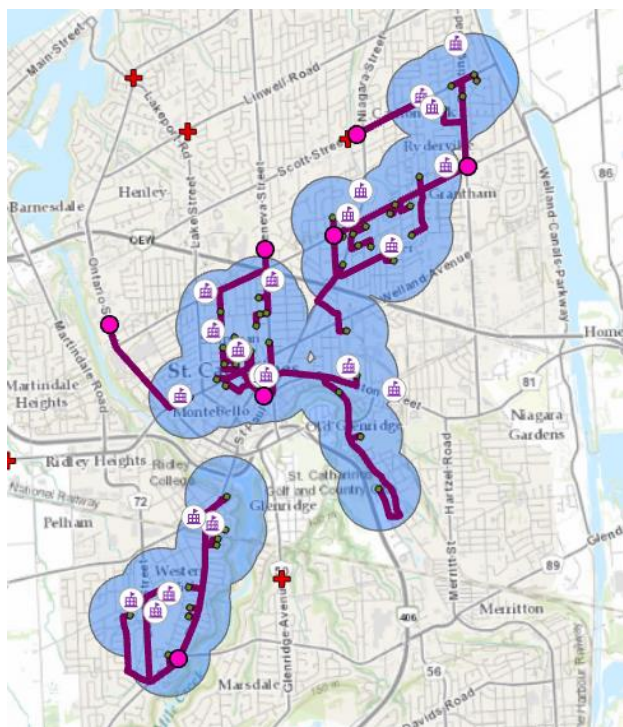
   > **Incidents**: Flu_Incidents_Geocoded
   >
   > **Facilities**: Medical_Centres_Geocoded
   >
   > Accept the rest as defaults.
   >
   > Click **Run**.

Notice the new layers added to the **Contents** panel on the left. **Output Closest Facilities** indicates the closest medical centres to each flu incident. **Output Routes** gives driving routes from each flu incident to the nearest medical facility.
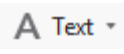

Creating a Layout and Sharing

Let's clean up the Contents panel.

1. To change a layer name, slowly click twice on the name which will activate the edit tool. Type a new name and hit enter.
2. Rename the other layers as you wish.
3. Turn off layers you don't want displayed in your final layout.
4. Click the **Insert** tab and select **New Layout**.
5. Select **ANSI Landscape Letter**. A new blank layout is added to the project views.
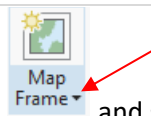
6. Click the dropdown arrow beside **Map Frame** and select the option that reflects your map. Drag a box on the layout to place the map frame.

7. Click and drag the window to reposition it.

8. Click and drag a corner handle to resize the map. Leave room for other layout elements such as the legend.

9. To change the zoom level of the map, right click the map and select **Activate**. When the map element is active you can use the **Explore** tool and other zoom and pan tools to customize the display.

10. When you are finished setting the zoom, click **Layout** ribbon at the top of the display and click .

11. From the **Insert** ribbon in the **Map Surrounds** group, add a **North Arrow** and **Scale bar**. Reposition and resize the elements as you see fit.

12. From the **Map Surrounds** group, click **Legend** then draw a box on the map where you want the legend to sit.

13. **Double-click** the legend to activate the **Format Legend** panel to the right of the Layout view. Options are also available in the Contents panel to the left (turn layers off if you don't want them to appear in the Legend).

14. Click the **Text** tool to add customized text including a title and source statement. Explore the text options on the **Format** ribbon.

15. Save your map!

Our map is complete and ready to share!

16. Click the **Share** ribbon at the top of the window. To make a PDF or JPEG, click **Layout**

17. Change the **Save As** type to the format of choice and navigate to your storage space on X:\ drive.

18. Click **Export**.

Additional Resources:

- *Going Pro: ArcGIS Pro Essentials for ArcMap Users* (1 hour training video)
  https://www.esri.com/training/catalog/590901ecdb250232197d2326/going-pro%3A-arcgis-pro-essentials-for-arcmap-users/

- *Getting Started with ArcGIS Pro* (5 hours, web course)
  https://www.esri.com/training/catalog/57630435851d31e02a43f007/getting-started-with-arcgis-pro/

- *ArcGIS Pro Help* http://pro.arcgis.com/en/pro-app/help/main/welcome-to-the-arcgis-pro-app-help.htm