Creating thematic maps in ArcGIS Online

In the previous tutorial, we learned how to create an account in ArcGIS Online, and upload a shape file containing City of Toronto neighbourhoods and populate it with demographic data to determine which areas had the highest number of people at the highest risk of COVID-19 infection: the elderly.

In this tutorial, we will learn how to add even more content to those neighbourhoods: COVID-19 infections and create a colour code which helps to visually pinpoint the most vulnerable areas in Toronto.

What you will learn

1. Label the neighbourhoods in the shape file in ArcGIS.
2. Find the spreadsheet that contains the COVID-19 infection data.
3. Uploading the COVID-19 data to ArcGIS Online.
4. Colour coding our new layer.
5. Obtaining the embed code in order to display your map in a story or blog post.

So, lets get started.

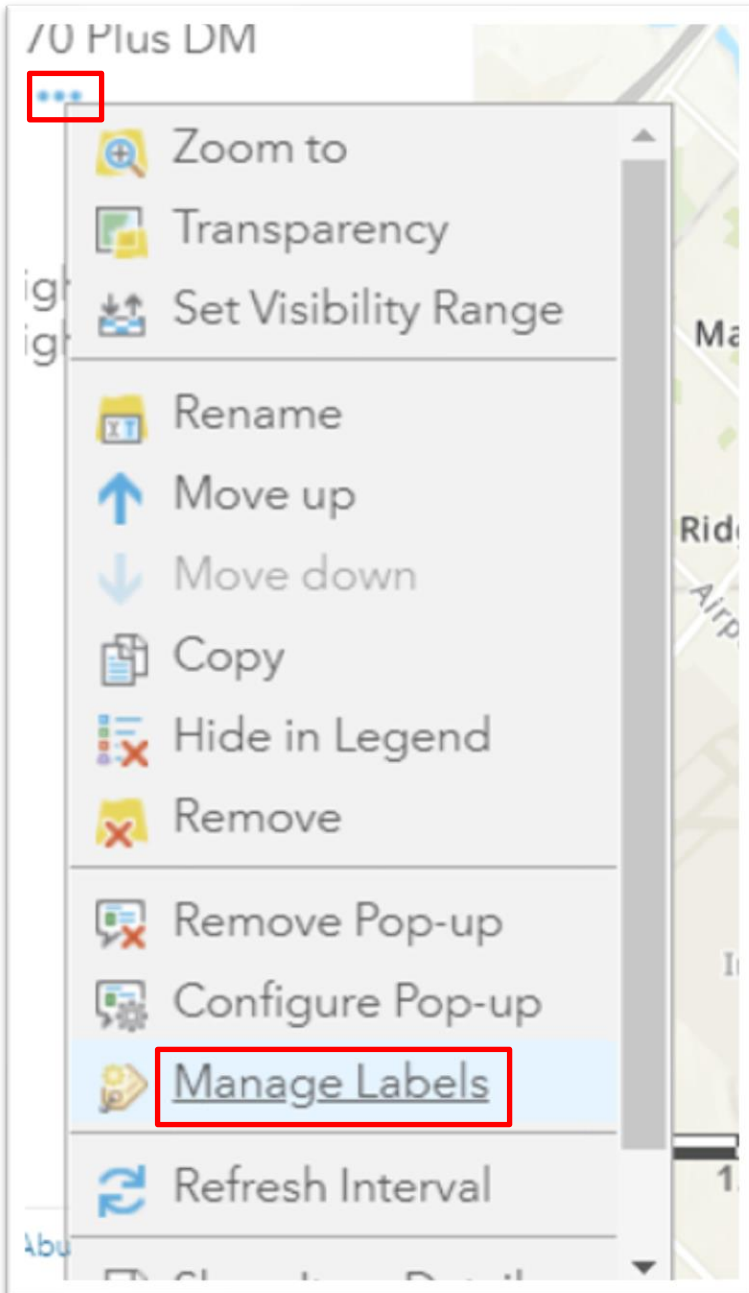## Label the neighbourhoods in the shape file in ArcGIS

The last layer we created in the last tutorial was populated with demographic data updated from the 2016 census.
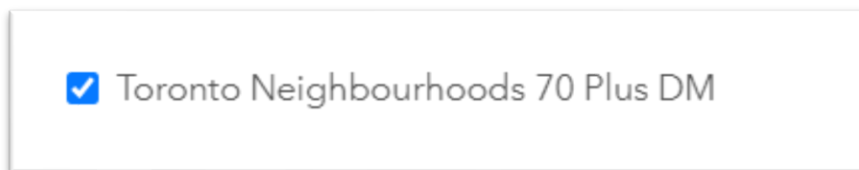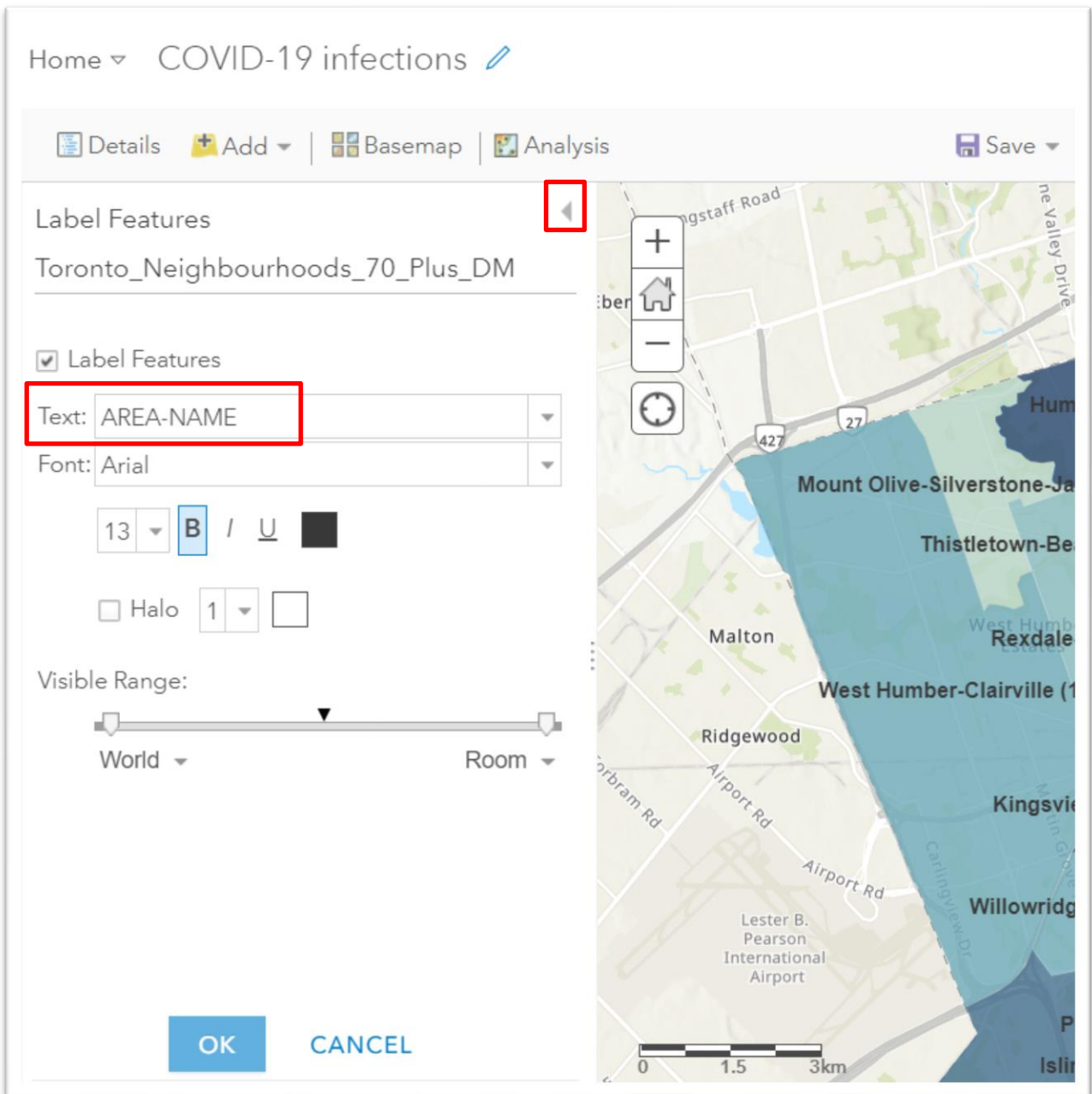

Let's begin by putting labels on the neighbourhoods.

Place your cursor over the layer until the three dots appear to the right.

Click the dots to obtain a drop-down menu.

Select the "Manage Labels" option.

In the text box under "Label Features" select the field that contains the neighbourhood names and adjust the font size and type if necessary. If you're unsure of which column title to use, return to your layer, hover the mouse over its name once again and select the "show table" icon.

To close the table, click the "X" at its top right-hand corner.

Once you have the correct name, close the label features section from the screen grab in the previous page by clicking the caret at the top right corner.
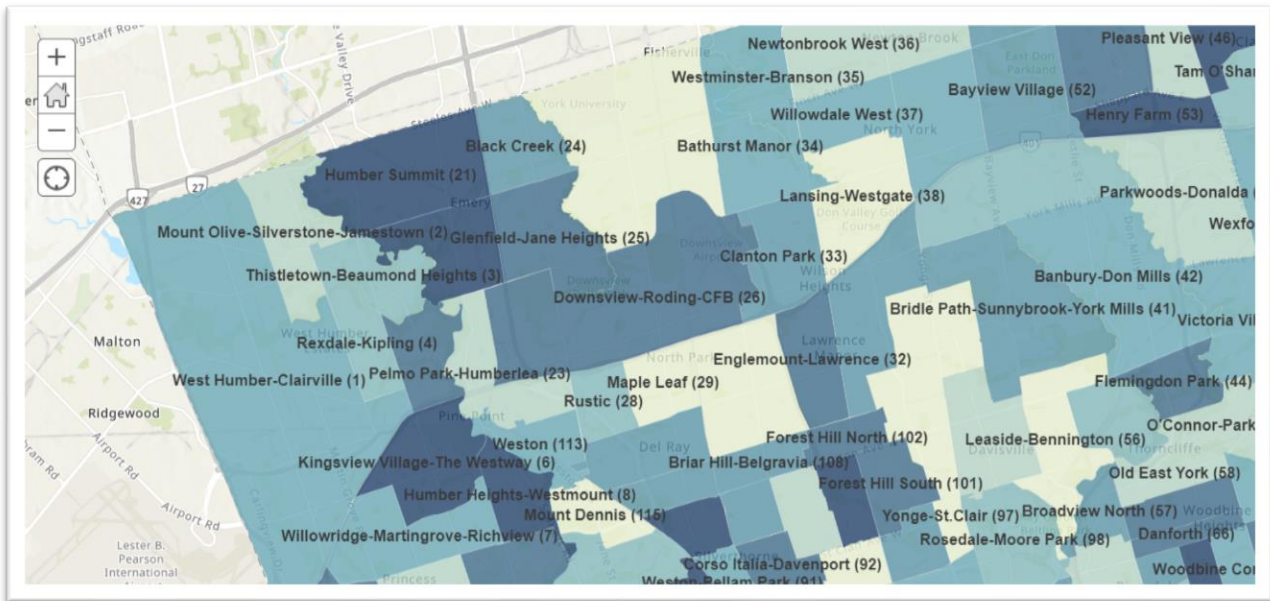
Now it's time to bring in another layer, this time the csv file that contains the up to date COVID-19 infections broken down by neighbourhood.

Find the spreadsheet that contains the COVID-19 infection data

You'll find the data at Toronto Public Health's [COVID-19 website](#).

Select the second tab "COVID-19 Toronto Neighbourhood Maps."

The text above explains the map's content with a few caveats to prevent anyone from jumping to conclusions. So, take the time to read it before going any further.

COVID-19: Status of Cases in Toronto

If you think you have COVID-19 symptoms or have been in close contact with someone who has it, find out if you should visit an assessment centre and where to go.

Summary of COVID-19 Cases in Toronto	COVID-19 Toronto Neighbourhood Maps	Toronto COVID-19 Monitoring Dashboard	Active COVID-19 Outbreaks in Toronto	Additional Information

These maps illustrate the distribution of COVID-19 cases across our city, as suggested by their home address. The maps do not necessarily reflect risk of acquiring COVID-19 nor where cases were exposed to the disease.
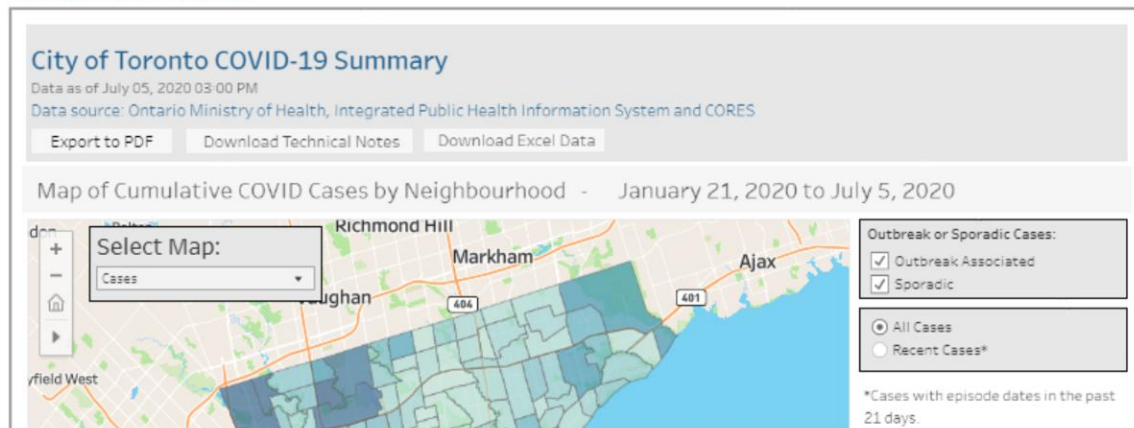
These maps are intended to provide information to help prevention strategies reach those people most affected. COVID-19 is circulating in all parts of our city and all residents should follow public health advice to reduce the spread of this virus.

Maps include cases from outbreaks in long-term care and other institutional settings. These can be removed by using the filter on the map (remove the OB Associated cases). When using the maps below, hover over the neighbourhoods to view numbers (counts) and other relevant information. Learn more about Toronto neighbourhoods, including what neighbourhood you live in.
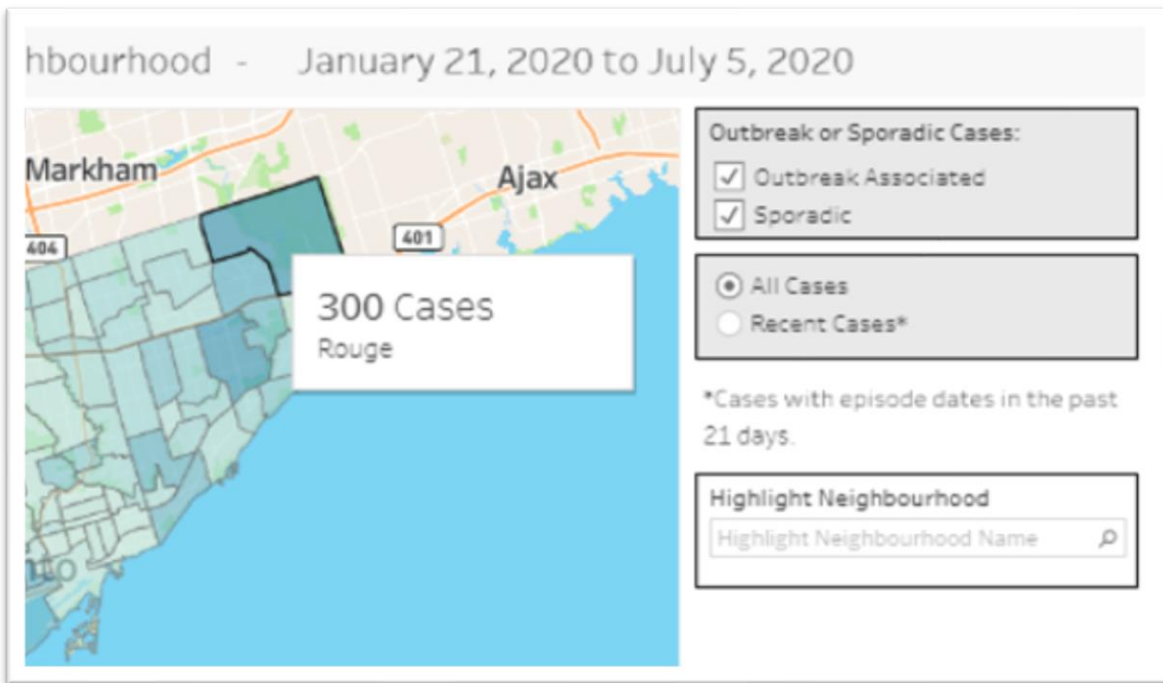
Please note that the data shown here may differ from other sources, as data are extracted at different times. The data in the maps are subject to change as the public health investigation into reported cases is currently ongoing. Additionally, data definitions are subject to change as the pandemic evolves.

This information is updated three times per week on Monday, Wednesday and Friday.

View the mobile version.

City of Toronto COVID-19 Summary

Data as of July 05, 2020 03:00 PM
Data source: Ontario Ministry of Health, Integrated Public Health Information System and CORES

Export to PDF	Download Technical Notes	Download Excel Data

Map of Cumulative COVID Cases by Neighbourhood - January 21, 2020 to July 5, 2020

Richmond Hill
Markham
Ajax
Vaughan
404
401

Select Map:
Cases

Outbreak or Sporadic Cases:
☑ Outbreak Associated
☑ Sporadic

⦿ All Cases
○ Recent Cases*

*Cases with episode dates in the past 21 days.

Hovering your mouse over a neighbourhood boundary produces a pop-up box with COVID-19 cases.

Our first mapping tutorial explained that an integral part of a map is the ".dbf" or database file, which in this case contains the case numbers displayed in the pop-up box.

Since we already have the neighbourhood shape file in ArcGIS Online, we only need the COVID-19 data, which we will download from this site as an Excel file.

To do this, select the "Download Excel Data" tab.

Download the Excel workbook to this tutorial's hard drive folder.

Open the file and go to the second tab.

As we do with any file opened in a spreadsheet, take a few minutes to study the contents. The first colunn contains the "Neighbourhood ID", which is important because it will be joined to the colunm in our shape file in ArcGIS with the generic title of "Field 5" or "Field 6", which you may have renamed in

the previous tutorial.

Toronto Neighbourhoods 70 Plus DM (Features: 140, Selected: 0)

AREA_ID	FIELD_2	FIELD_3	FIELD_4	FIELD_5	FIELD_6	A
6,089.00	25,886,590.00	25,926,730.00	49,885.00	51.00	51.00	V
6,060.00	25,886,929.00	25,926,701.00	49,885.00	72.00	72.00	R
6,071.00	25,886,620.00	25,926,712.00	49,885.00	40.00	40.00	S
6,067.00	25,886,704.00	25,926,708.00	49,885.00	28.00	28.00	R
6,043.00	25,886,818.00	25,926,684.00	49,885.00	104.00	104.00	N
6,155.00	25,886,386.00	25,926,796.00	49,885.00	110.00	110.00	K

You'll notice the the numbers in the Excel file are right justified whereas the numbers in our shape file are left-justified. Under normally circumstances, columns with differently formatted numbers can not be joined. ArcGIS allows you bypass this problem, though the discrepency is still worth noting.

You'll also notice that the neighbourhood ID numbers above have two decimal places, whereas the ID numbers in our Excel file do not have decimal places. The difference is worth noting, but will not affect the join.

As we have noted several times during this tutorials it's important to pay attention to seemingly small details like formatting when working with data.

Copy the table on the "All Cases and Rates by Neighbourhood" worksheet paste it into a new file.

	A	B	C	D
1	Neighbourhood ID	Neighbourhood Name	Case Count	Rate per 100,000 people
2	129	Agincourt North	79	271.3564387
3	128	Agincourt South-Malvern West	51	214.6735699
4	20	Alderwood	38	315.2480504
5	95	Annex	85	278.4511564
6	42	Banbury-Don Mills	35	126.3766023
7	34	Bathurst Manor	125	787.5007875
8	76	Bay Street Corridor	51	197.6974067
9	52	Bayview Village	32	149.5606655
10	49	Bayview Woods-Steeles	116	881.8610309
11	39	Bedford Park-Nortown	81	348.5970046
12	112	Beechborough-Greenbrook	90	1368.405048
13	127	Bendale	116	387.1829105
14	122	Birchcliffe-Cliffside	181	811.9869005
15	24	Black Creek	290	1334.130745
16	69	Blake-Jones	11	142.3579656
17	108	Briar Hill-Belgravia	90	631.2688504
18	41	Bridle Path-Sunnybrook-York Mills	21	226.6350097
19	57	Broadview North	27	234.8030264
20	30	Brookhaven-Amesbury	146	822.2109591
21	71	Cabbagetown-South St. James Town	37	317.0794413
22	109	Caledonia-Fairbank	33	331.4917127
23	96	Casa Loma	27	246.1706783
24	133	Centennial Scarborough	34	254.4529262

Data Note | **All Cases and Rates by Neighbou** | Sporadic Cases and Rates by Nei

Save this table as a csv file.

Toronto COVID-19 infections by neighbourhood.csv

CSV (Comma delimited) (*.csv)

Now we're ready to bring this csv file into ArcGIS Online.
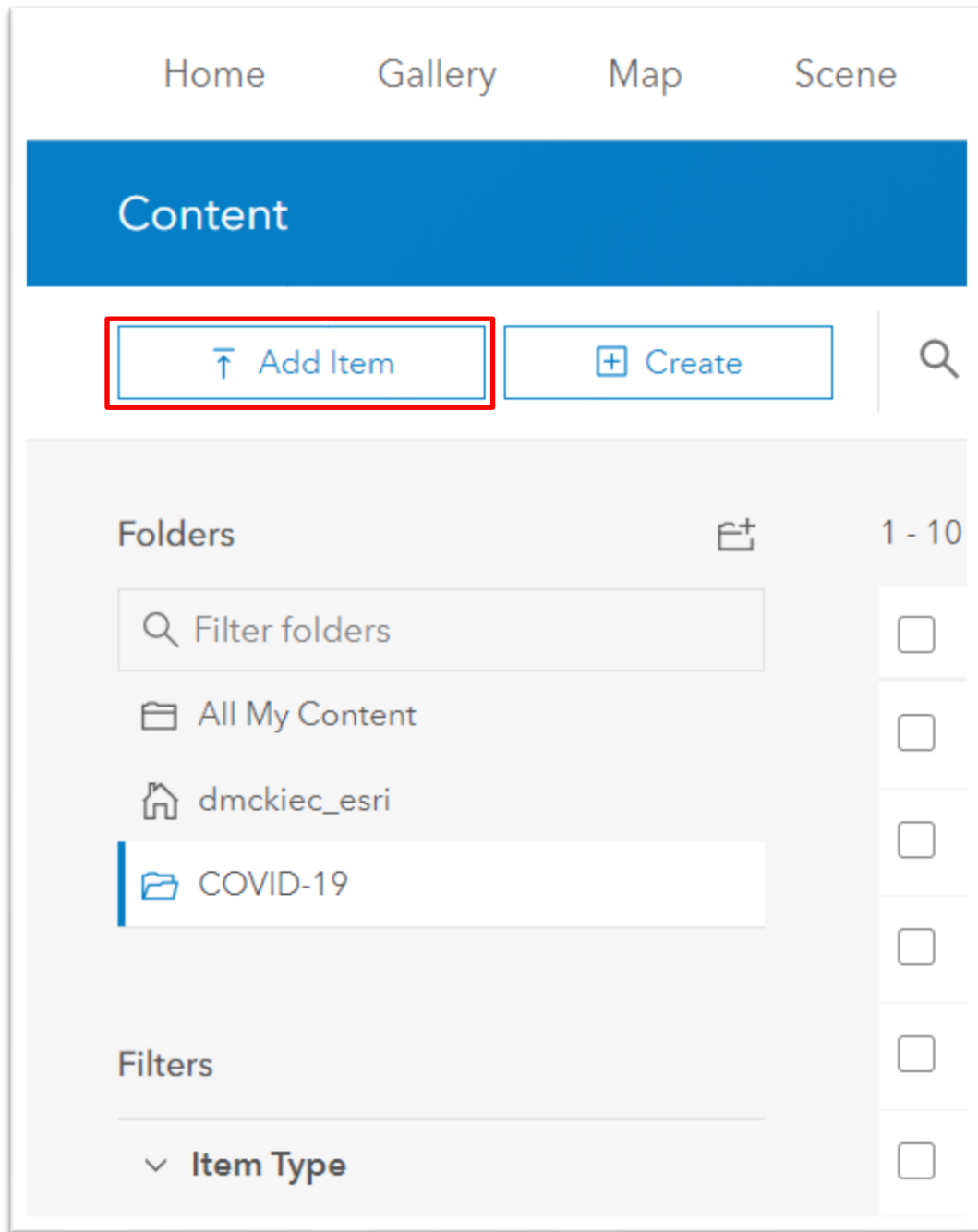
Uploading the COVID-19 data to ArcGIS Online

We will NOT import the data using the "Add" icon, because doing so will not actually save the layer in the cloud, which is a step that must be fulfilled before executing our join.
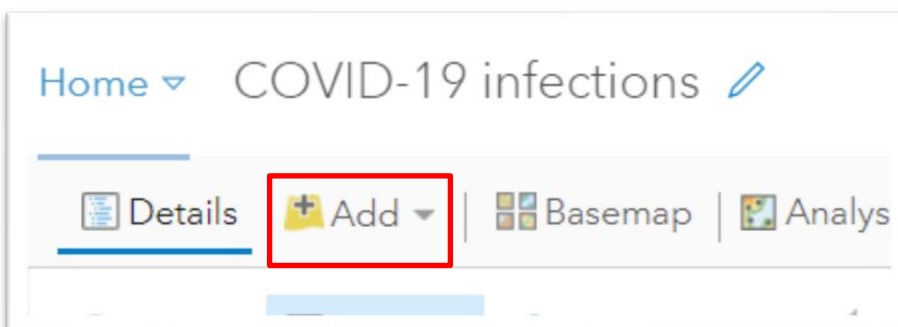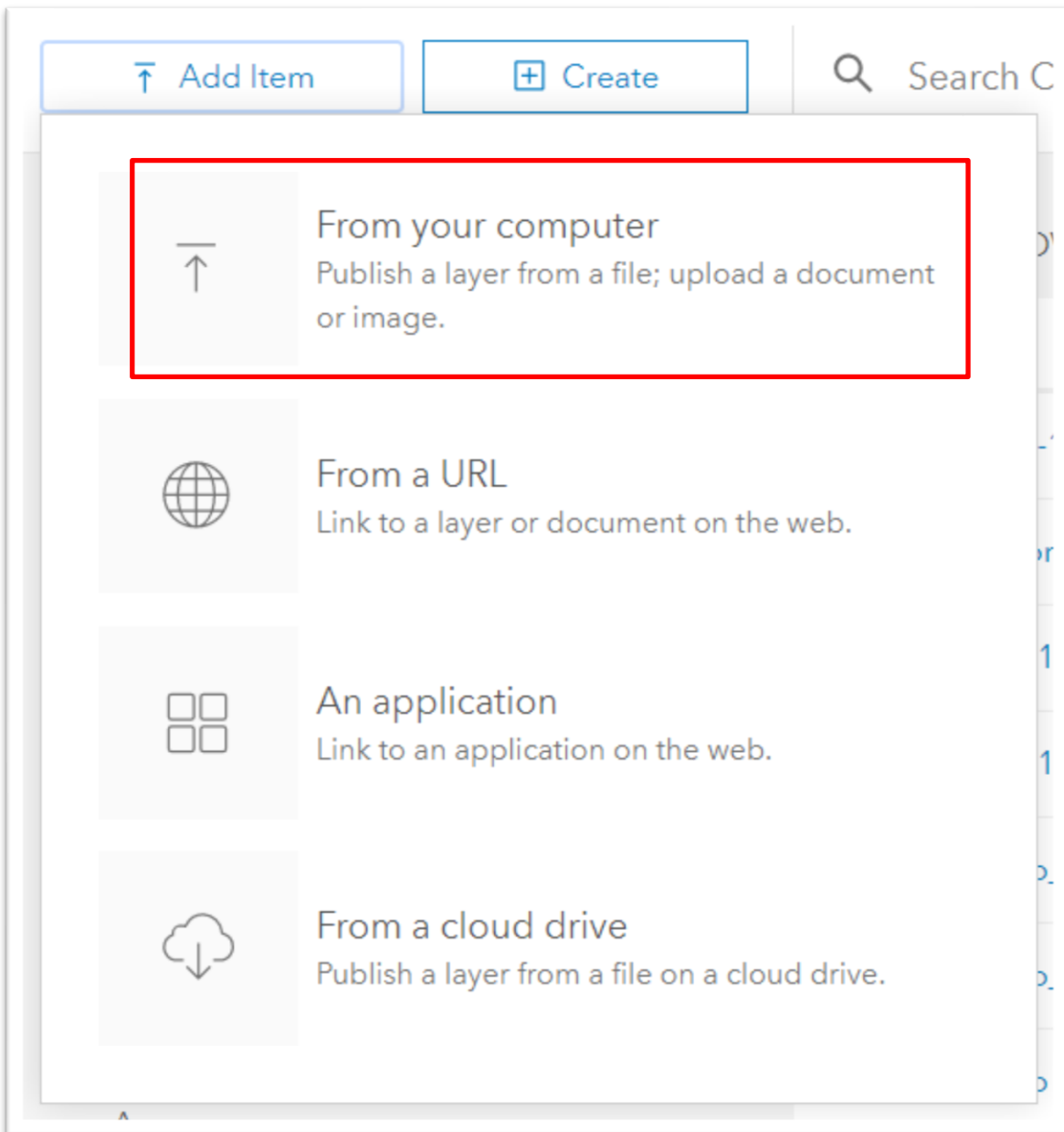
Instead, we will perform the import through the "Content" section, which we can obtain from the menu to your left.
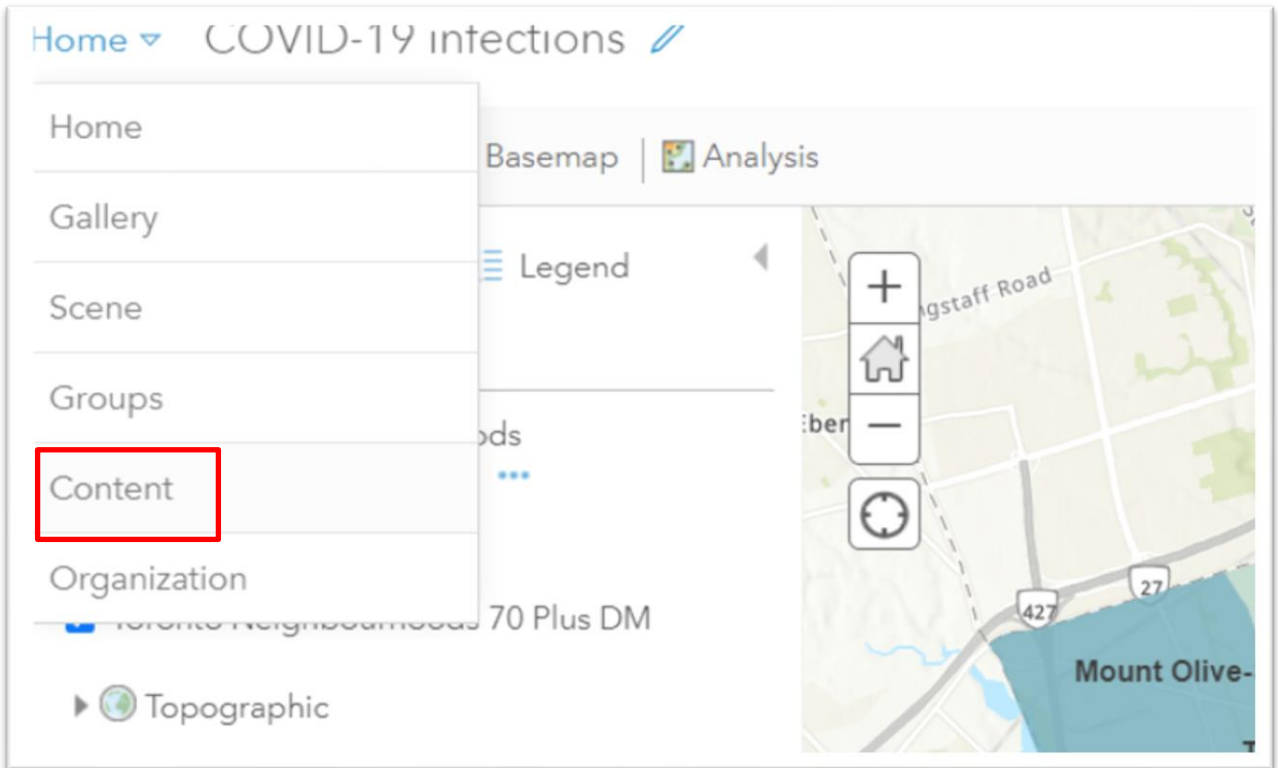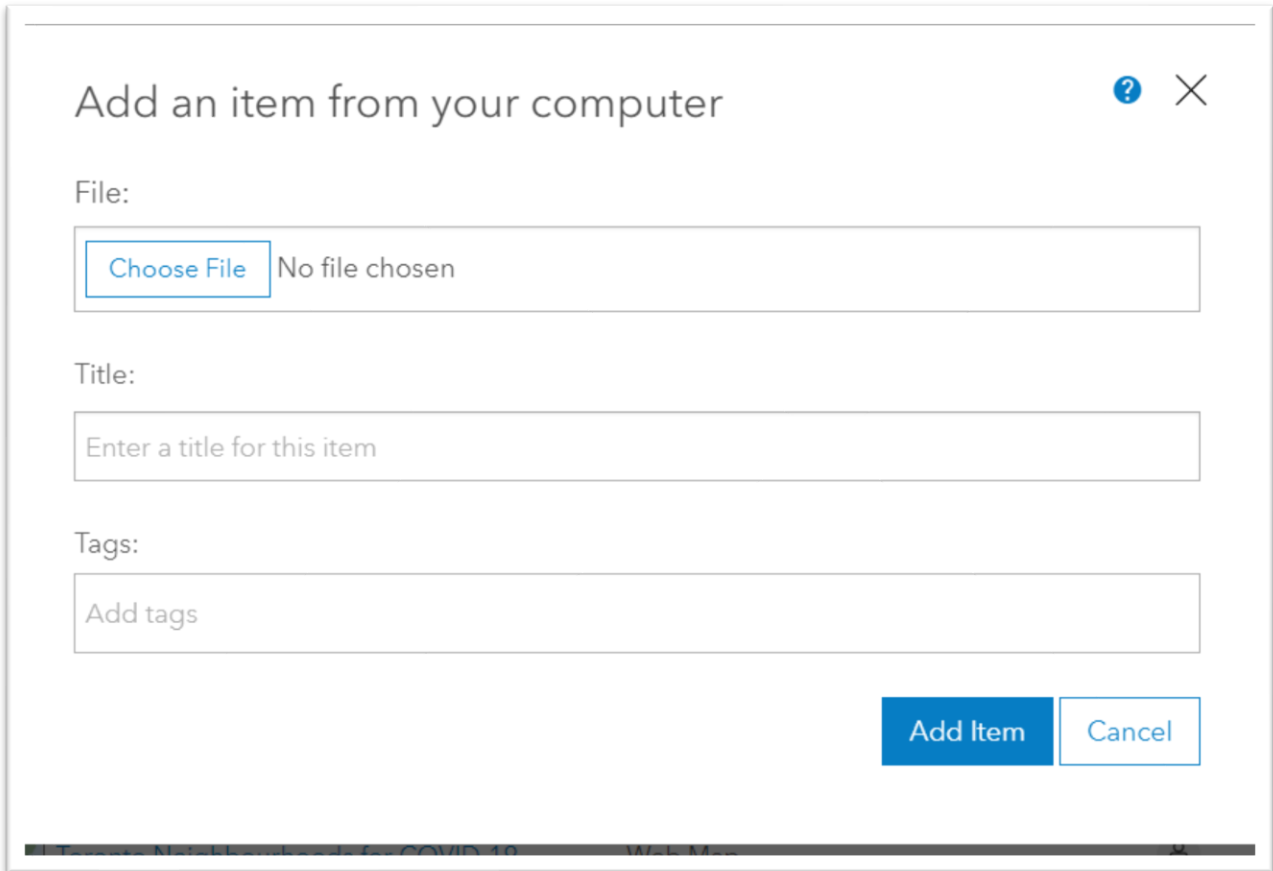
Select "Content".

We'll use the "Add Item" tab to import our data.
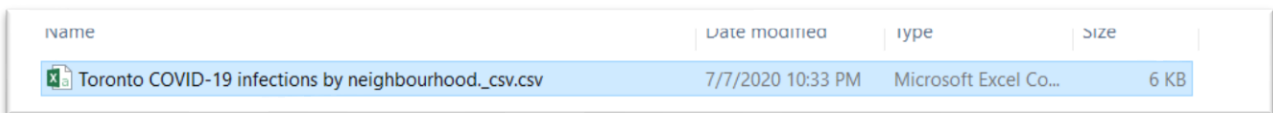
Import from your computer.

Choose the csv file we've just created.

Click the "Open" tab at the bottom right.

Add an item from your computer

File:

[Choose File] Toronto COVID-19 infections by neighbourhood._csv.csv

Title:

Toronto COVID-19 infections by neighbourhood__csv

Tags:

Add tags

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

Locate features by:

○ Coordinates ◉ Addresses or Places ○ None, add as table

In:

I have written a shorter title without the hyphen between "COVID" and "19", provided a tag, and specified that this file is to be added as a table ("None, add as table") Importing the csv file this way ensures it goes to the cloud, a criterion that MUST be fulfilled before we can execute the join.

Add an item from your computer

File:

| Choose File | Toronto COVID-19 infections by neighbourhood._csv.csv |

Title:

Toronto COVID19 infections

Tags:

COVID-19 ✕

Add tags

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

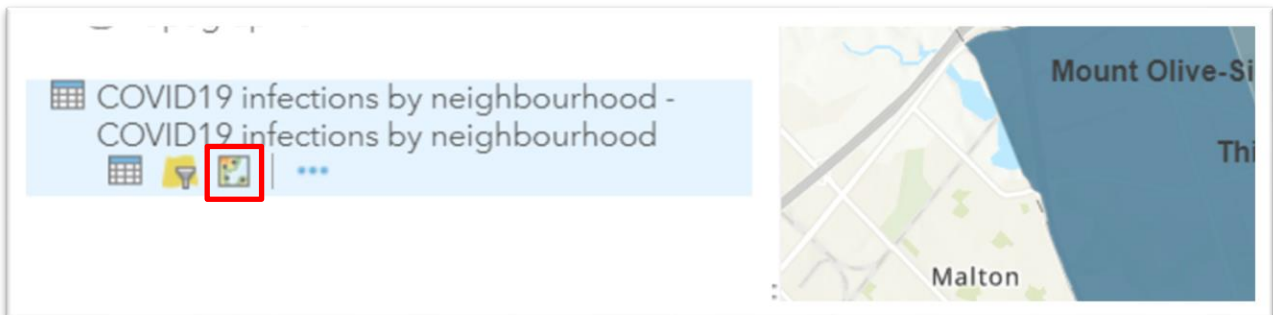Locate features by:

○ Coordinates   ○ Addresses or Places   ● None, add as table

Before selecting the "Add Item" tab, make sure your selections are the same in the screen grabs above.
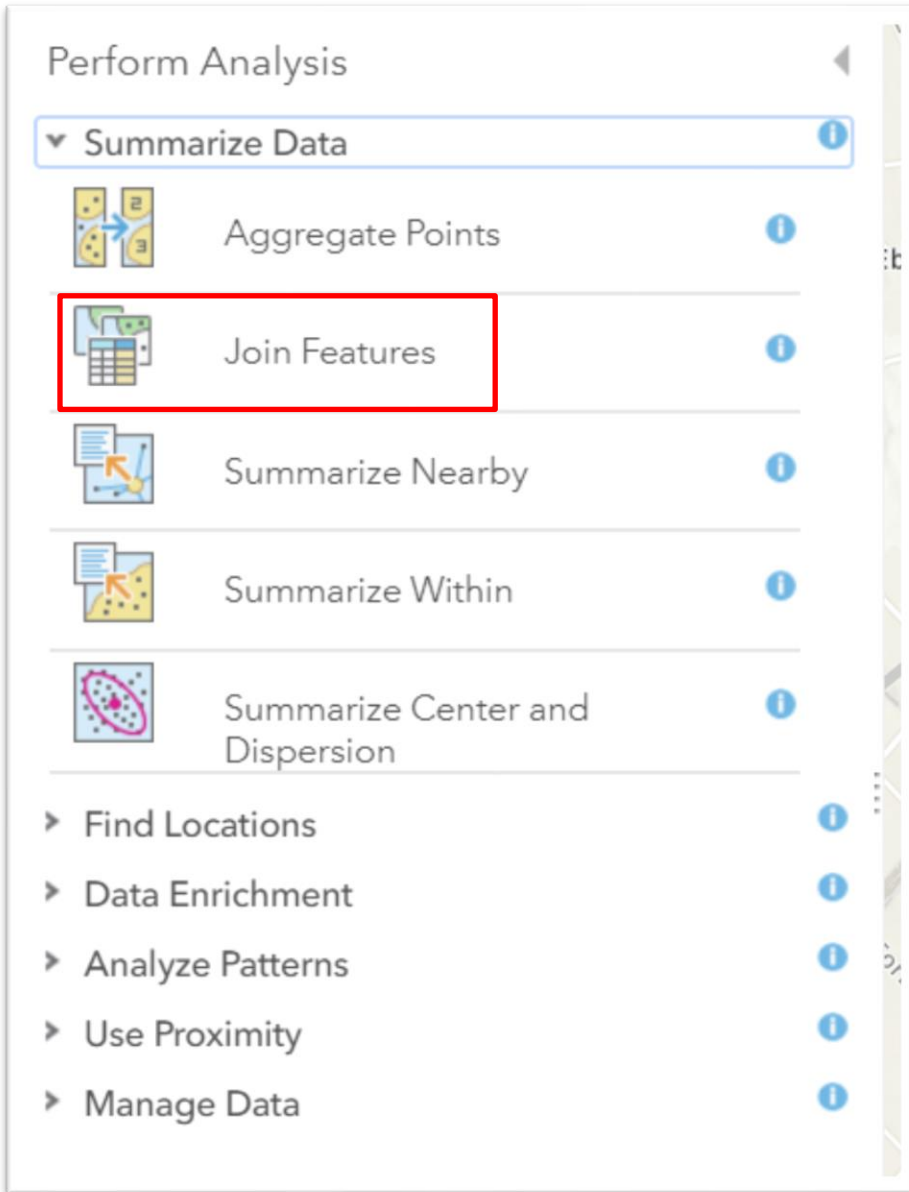
Your csv file will be added as a new layer.
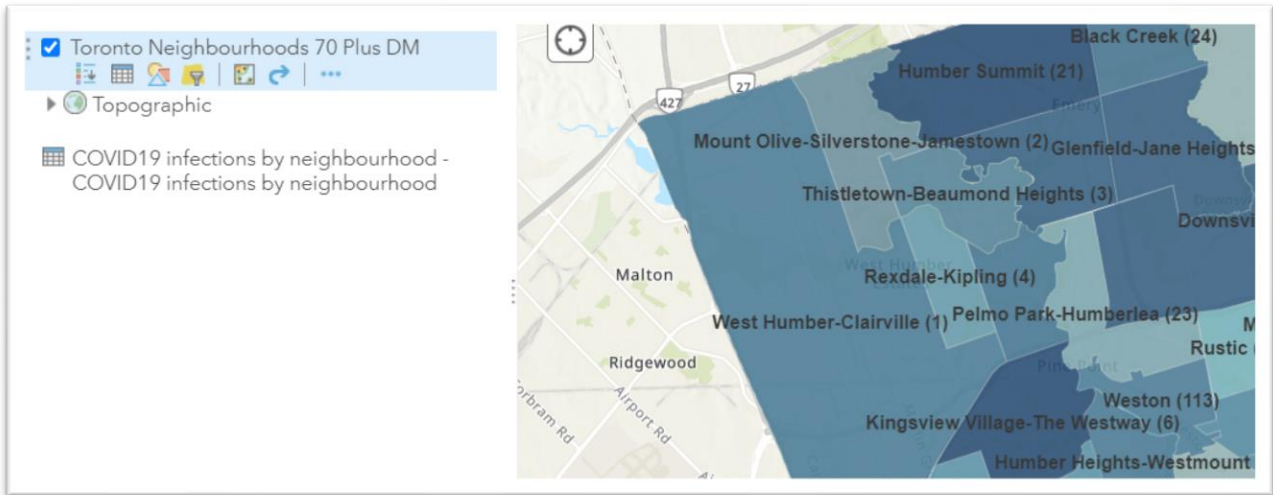
To join this layer to the previous one we created with the demographic information, hover your mouse over the csv layer.

Select the "Perform analysis" icon.

Perform Analysis

> Summarize Data

> Find Locations

> Data Enrichment

> Analyze Patterns

> Use Proximity

> Manage Data

Select "Summarize Data".

Select "Join Features."

Your "target layer" is the original shapefile that contains the neighbourhood boundaries and the age data from the first ArcGIS tutorial.

The layer we will join to the target layer – the csv file from Toronto Public Health"
will be in the second box.

In step three, we want the second choice.

Here, ArcGIS is asking us which columns we want to join, which as we learned earlier in this tutorial are the columns what contain the neighourhood identifiers, columns "FIELD 5" and "Neighbourhood ID", respectively.
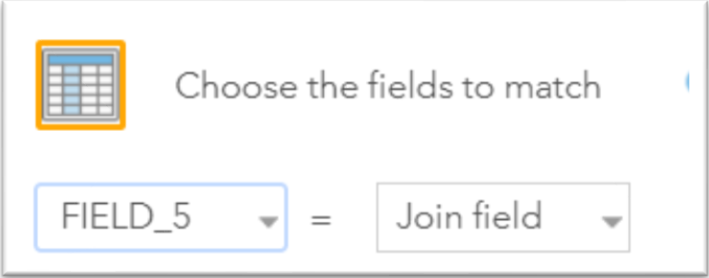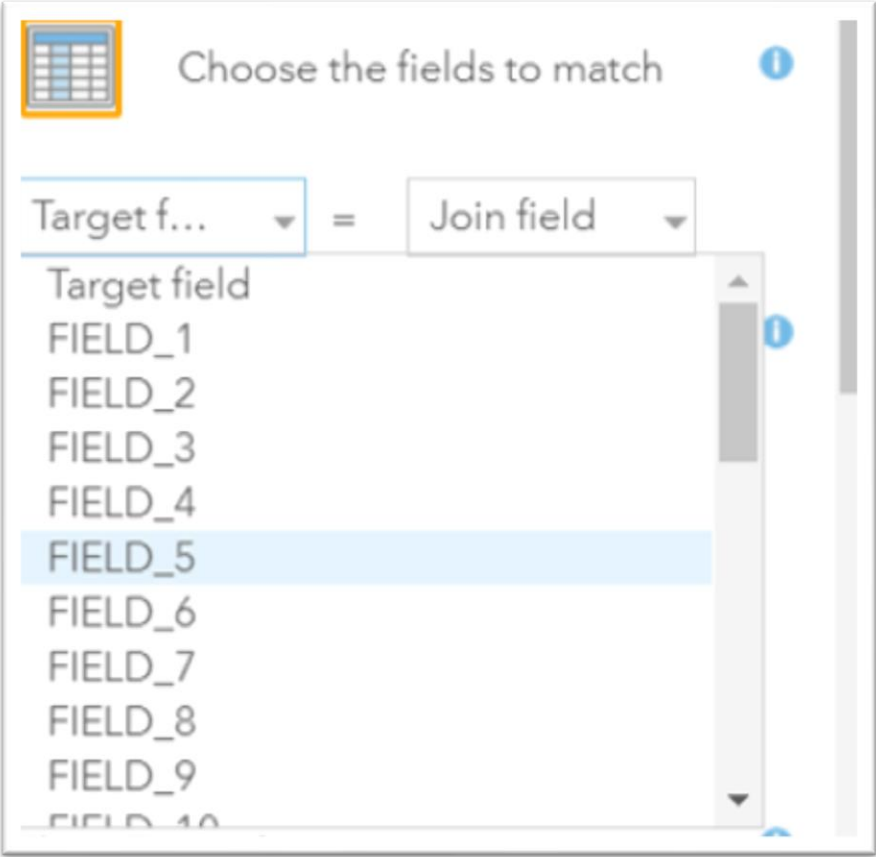
The type of join in step four is one-to-one, meaning the columns containing the neighbourhood identifiers.

In step five, you will want to rename the layer, check the box to create a new layer and run the analysis.

5 **Result layer name** ⓘ

Join Features to Toronto_Neighbourl

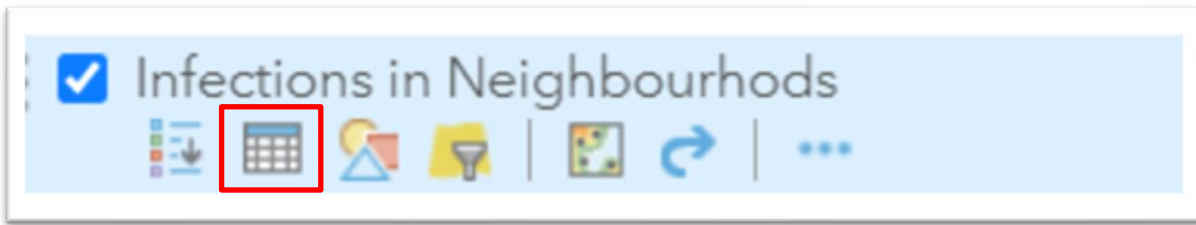Save result in COVID-19 ▾

☐ Use current map extent   Show Credits

☑ Create results as hosted feature layer view ⓘ

RUN ANALYSIS

You now have a new layer.

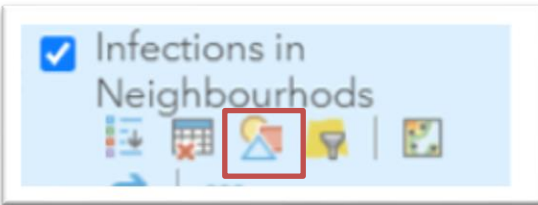Select the "show table" icon to see what you've got.

Use the horizontal scroll bar to navigate to the far right to see the new columns that have been added,.

Colour coding our new layer

Now we can use a colour ramp to show neighbourhoods with the highest number of elderly residents, or the highest number of COVID-19 cases. We can also duplicate the lawyers, which can use different numbers. For instance, one layer might use colours to show the neighbourhoods with the highest number of deaths. A second layer might show neighbourhoods with the highest concentration of older residents. And a third might show the ratios of COVID-19 infections. It the ability to create multiple layers that give maps their power and advantage over data visualization programs.

So, let's colour code our layer according to ratio.

Hover your cursor over the layer and choose the "change style" icon.

In step one, the attribute you want to show is the "Rate per 100,000 people."
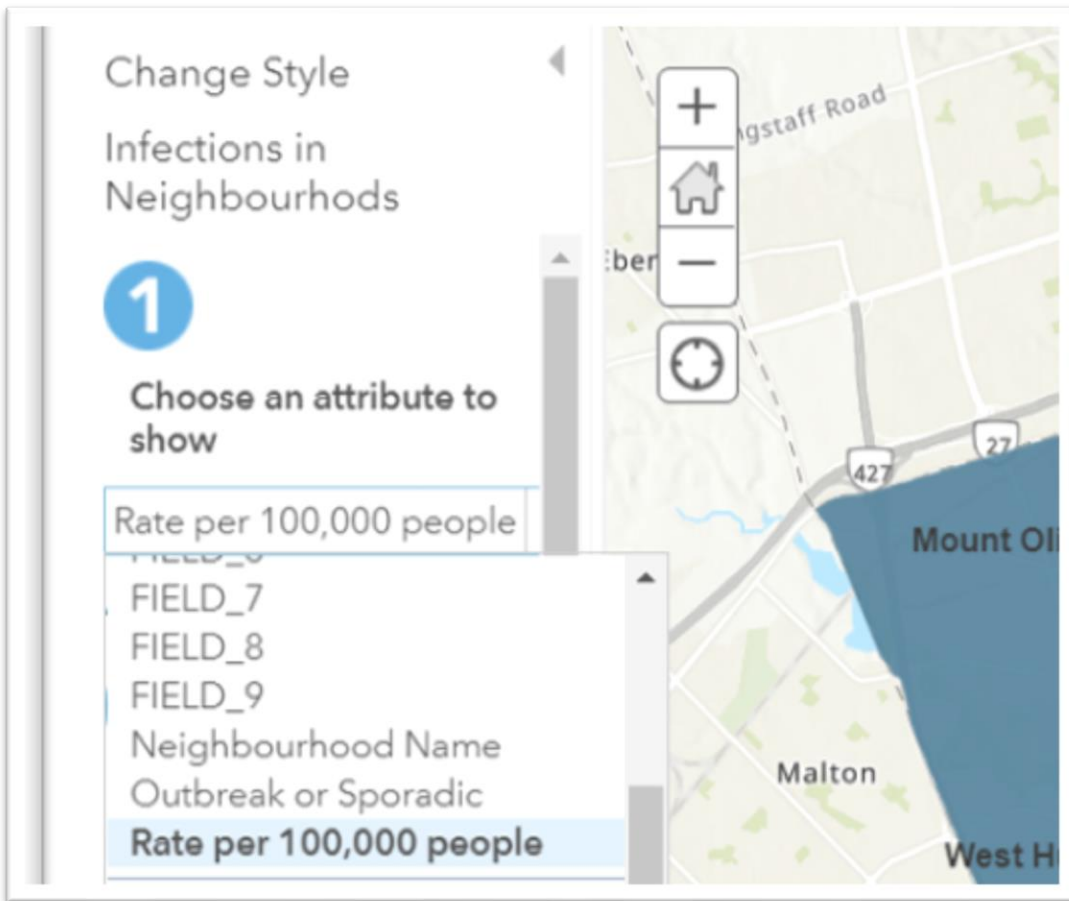
The "drawing style" in step two is the one that is already selected. ArcGIS guessed correctly that we want to build a colour ramp.
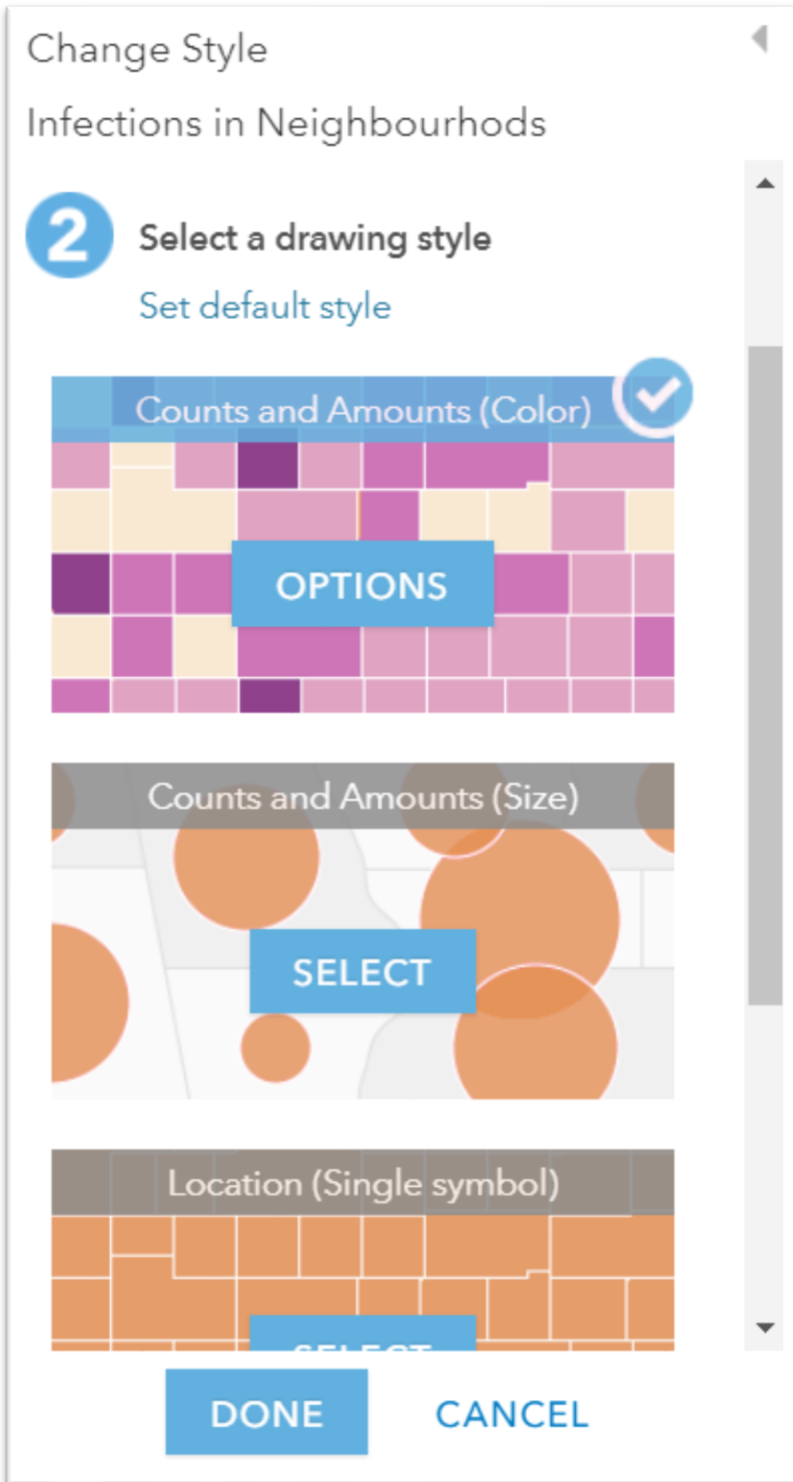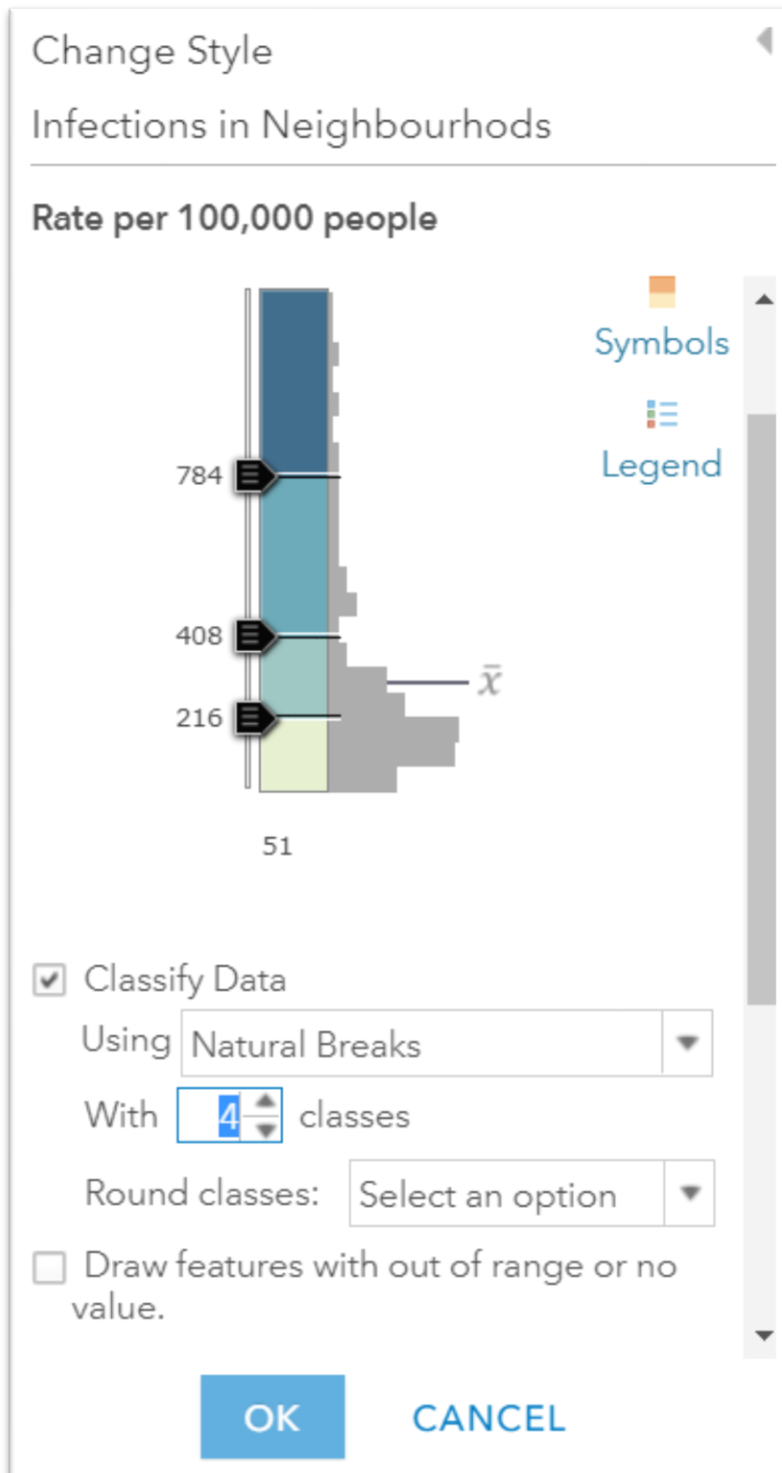
Click that option.
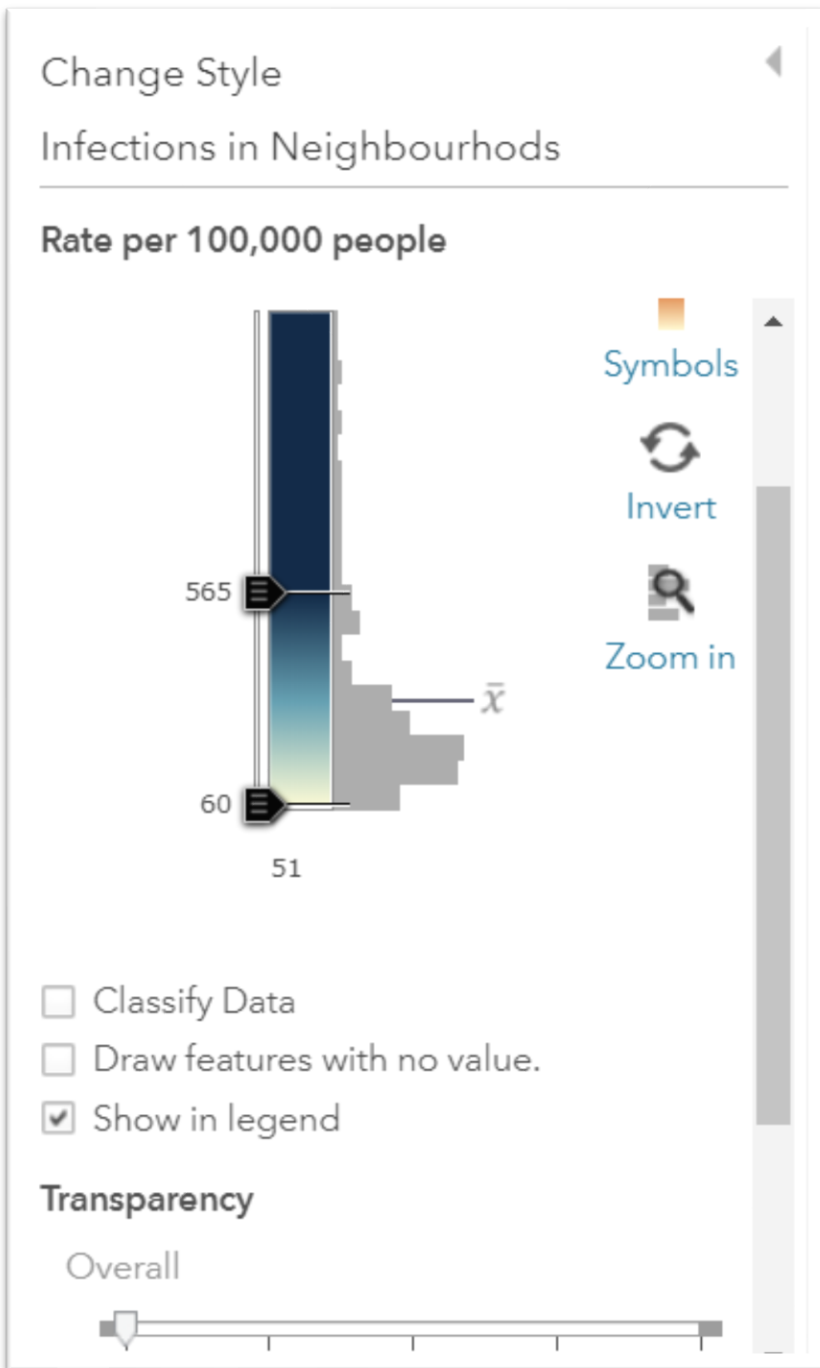
The attribute we want to show is labeled across the top.

Now, we want to "Classify" our data, meaning divid it into ranges.

Select "Classify Data".

You can change increase the defaul to as many ranges as you want.

Let's choose six.
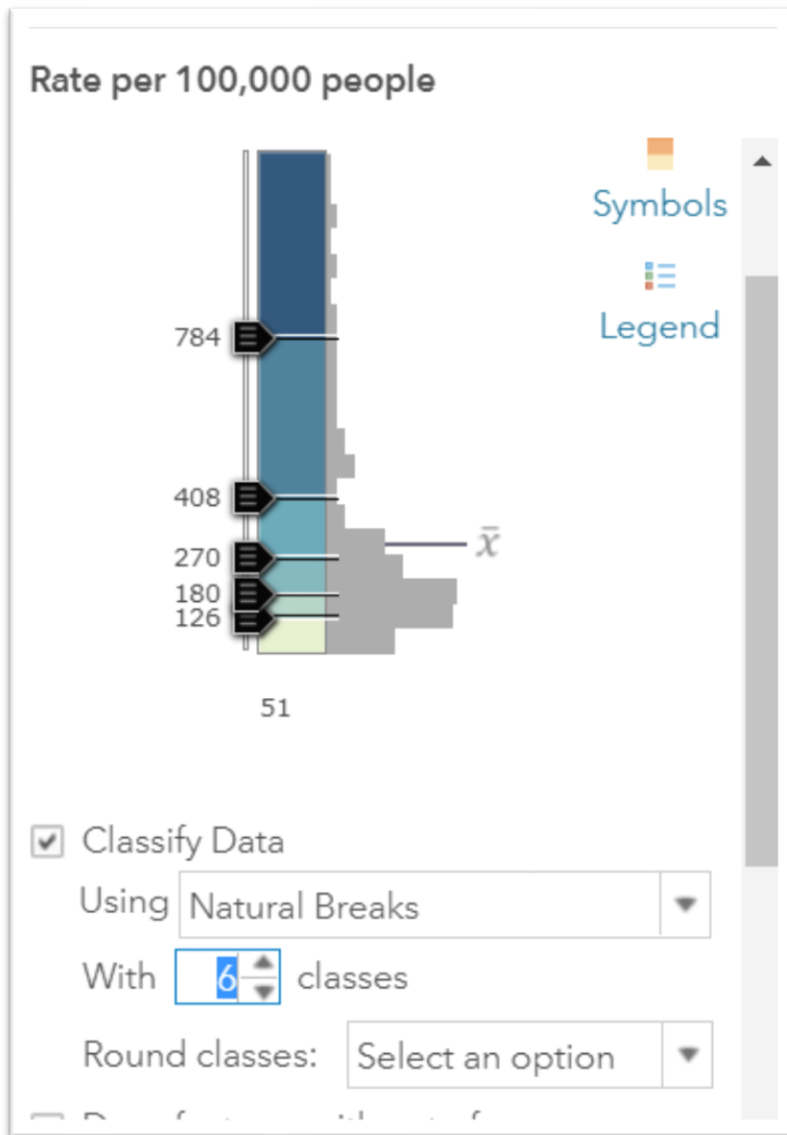
We can ue the sliders to adjust the categories to make the intervals more even, or reflective of the data at hand. For instance, it may make more sense have more of the intervals at the higher or lower end, depending on the distribution of your numbers. The chice is yours.

For the purposes of this exercise let's even out the intervals.
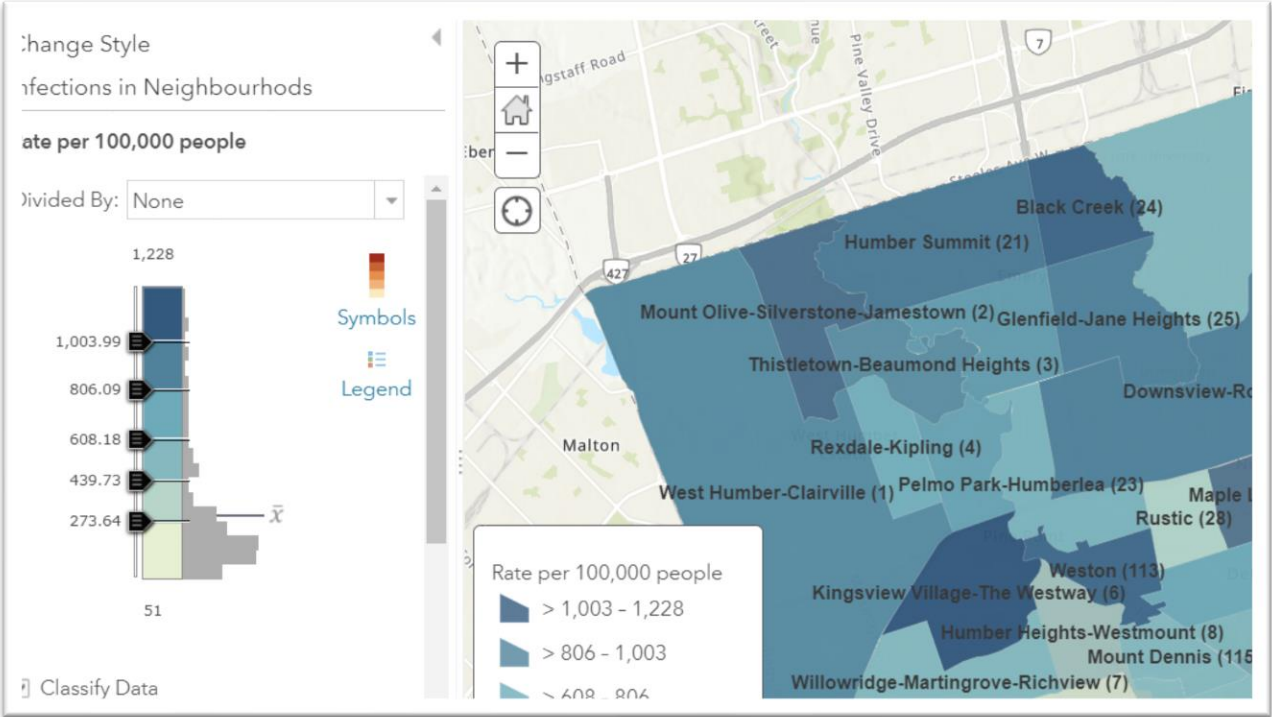
Adjusting the categories produces a result in your map as well as the legend.

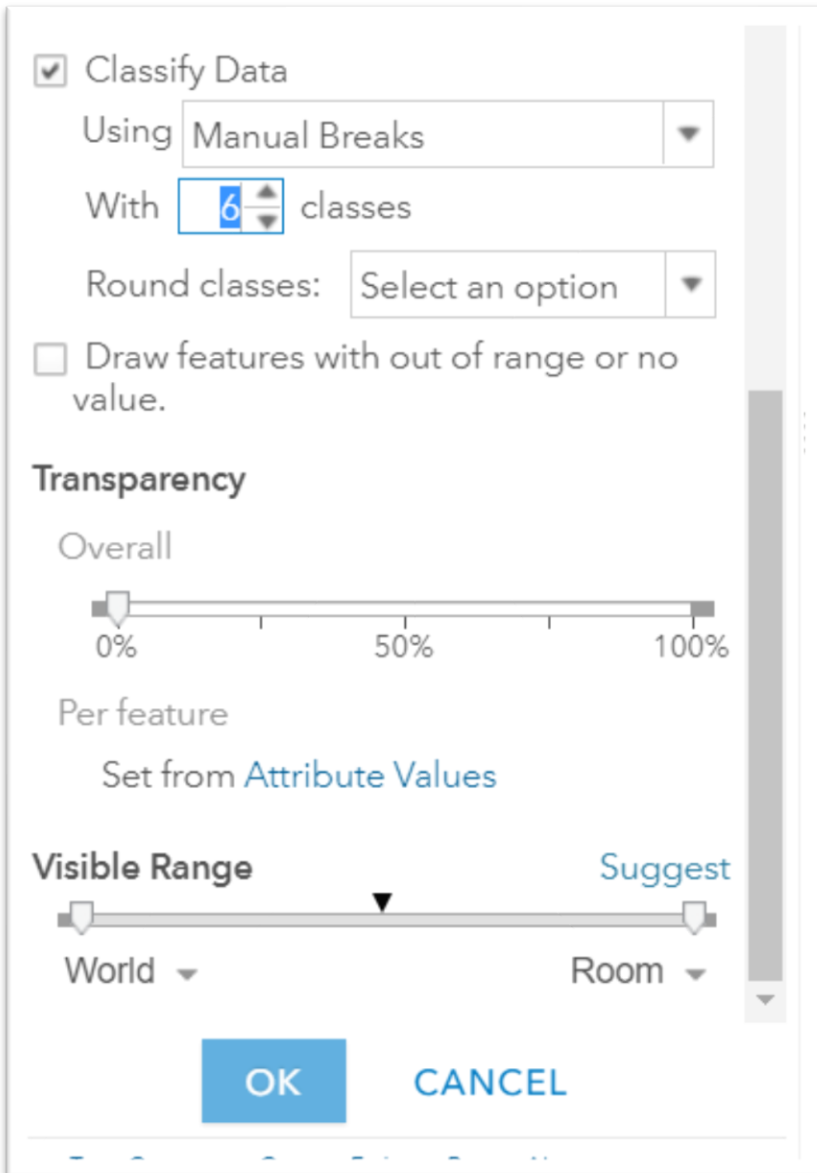You can also adjust the transparency which allows viewers to see more of the basemap, which comes in handy if you want a better idea of the part of town where the higher rates are located.

If you're happy with the result, press okay.
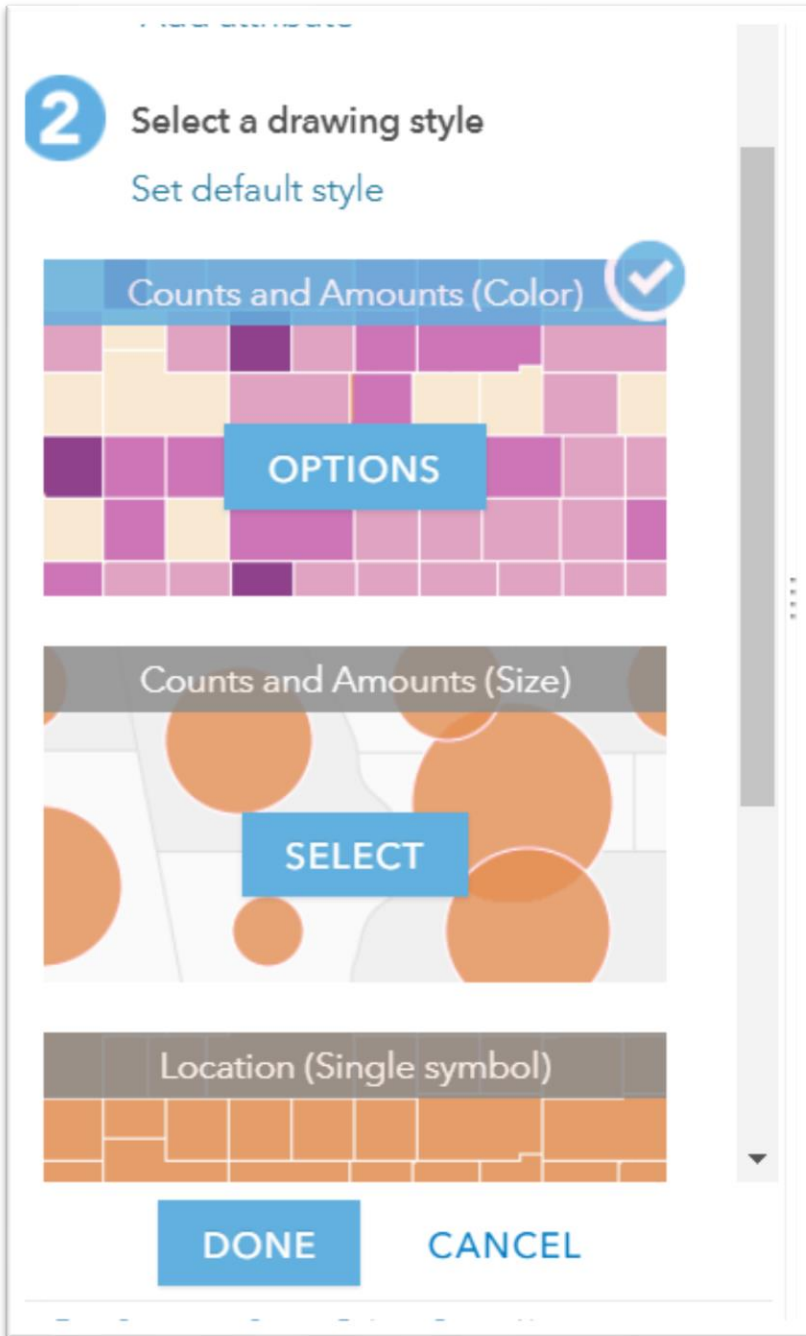
And "Done."

Add neighbourho
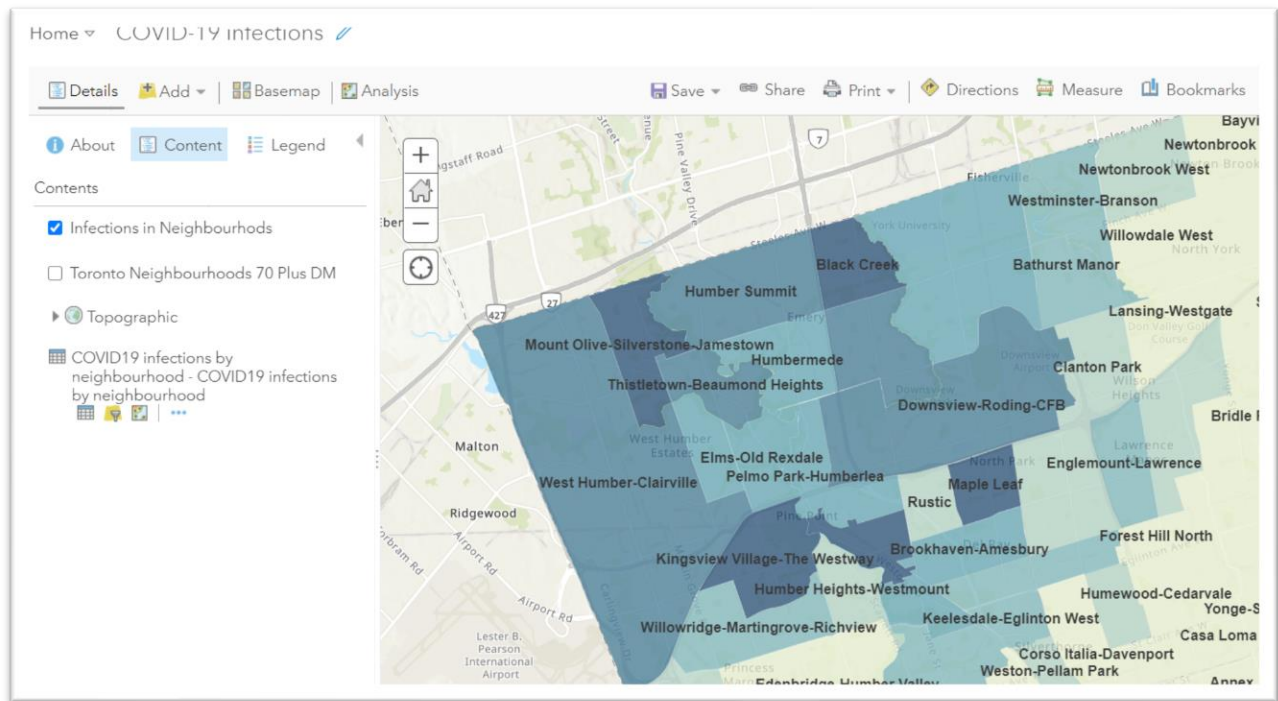
od labels to your layer and make sure that it is the only one selected.

Black Creek has one of the highest rates.

Now it's time to create a second layer.

Select "Copy."
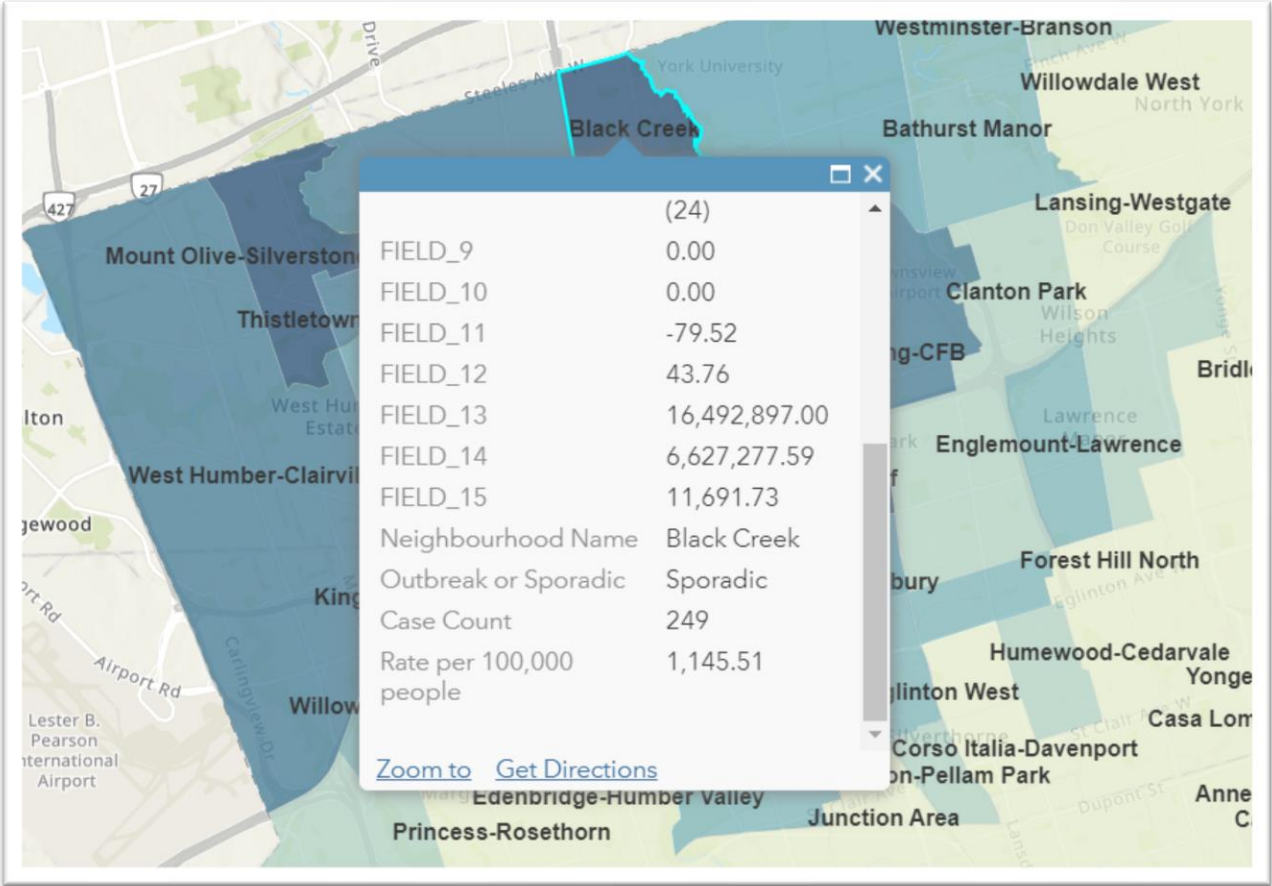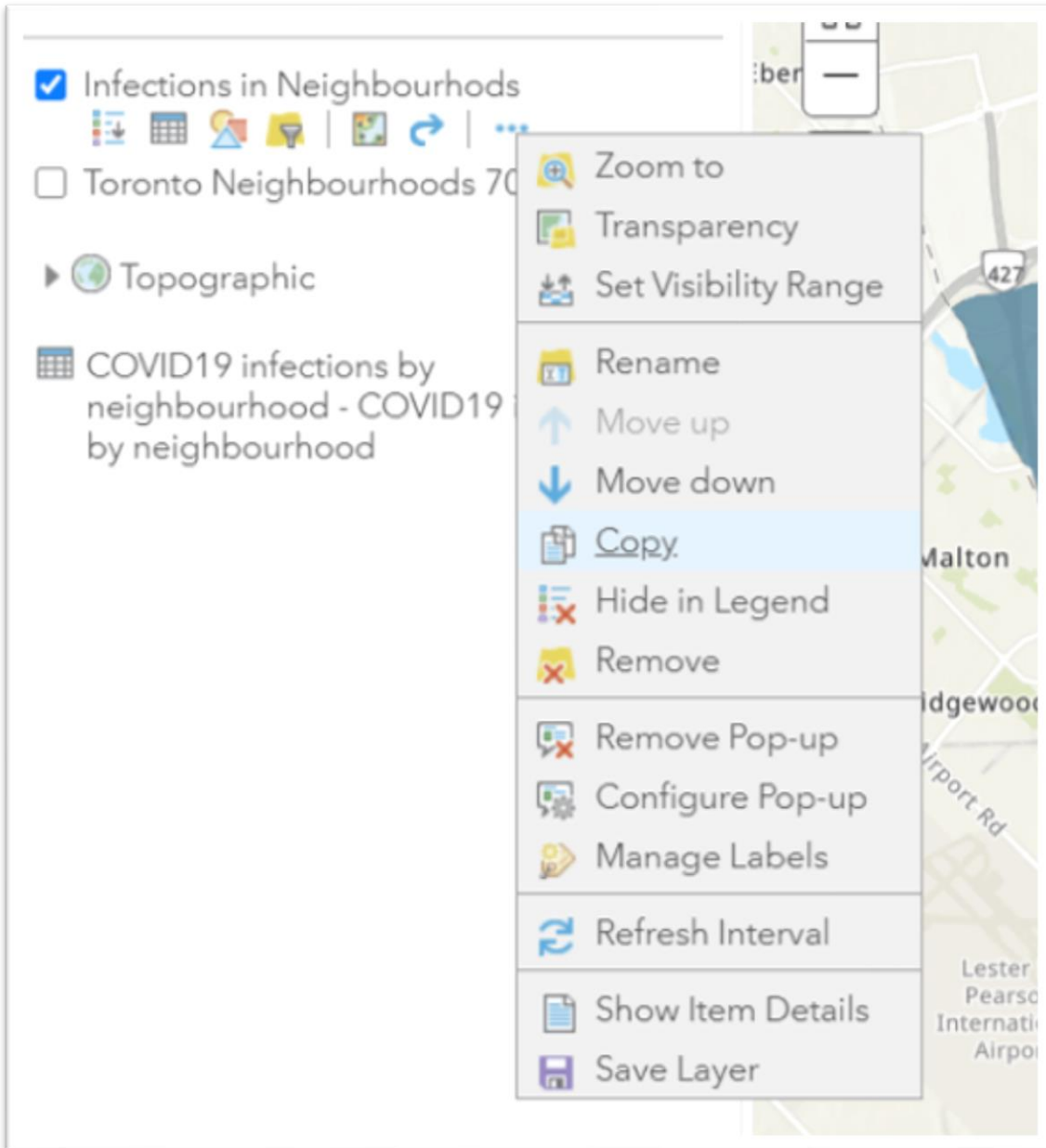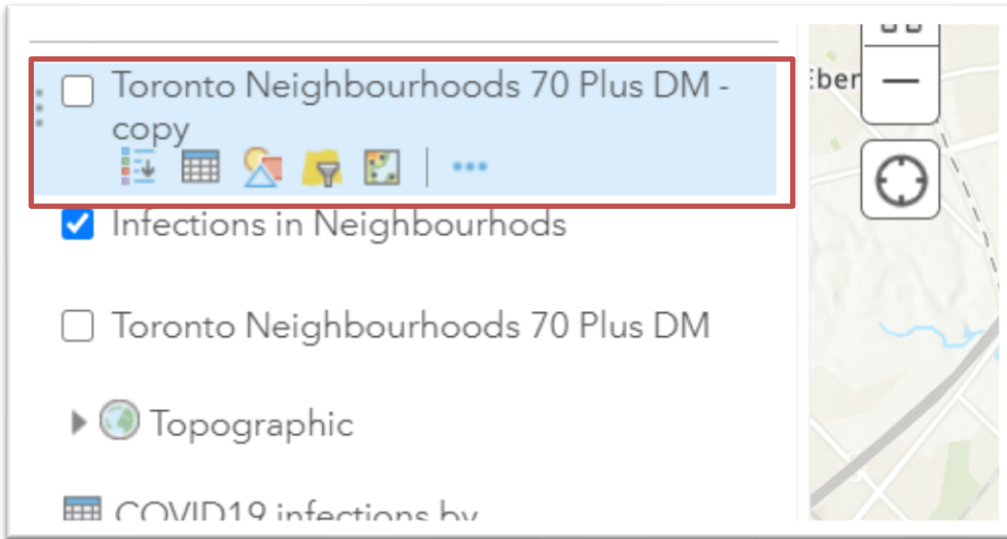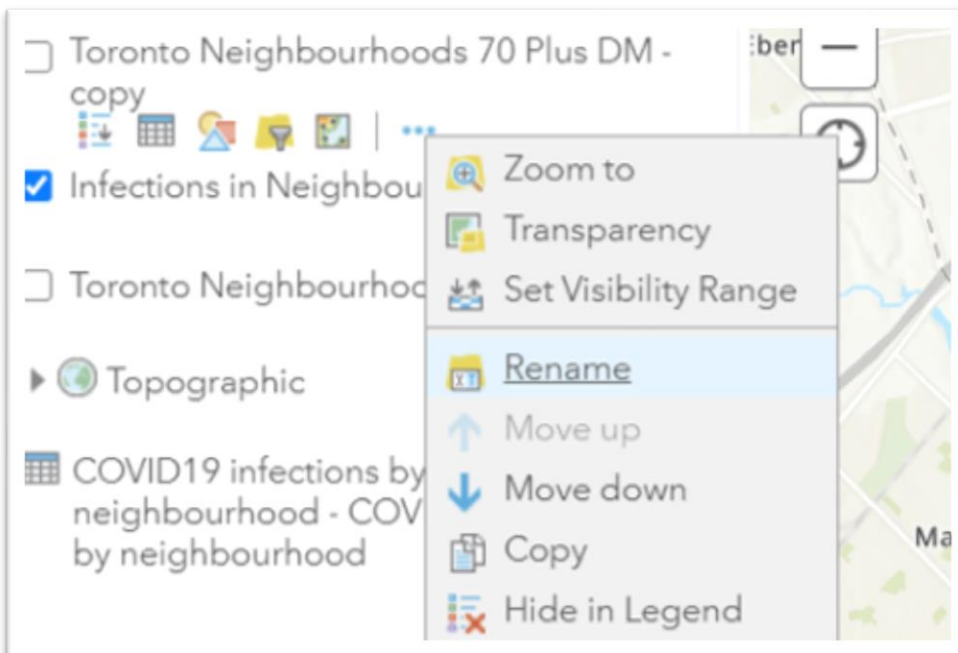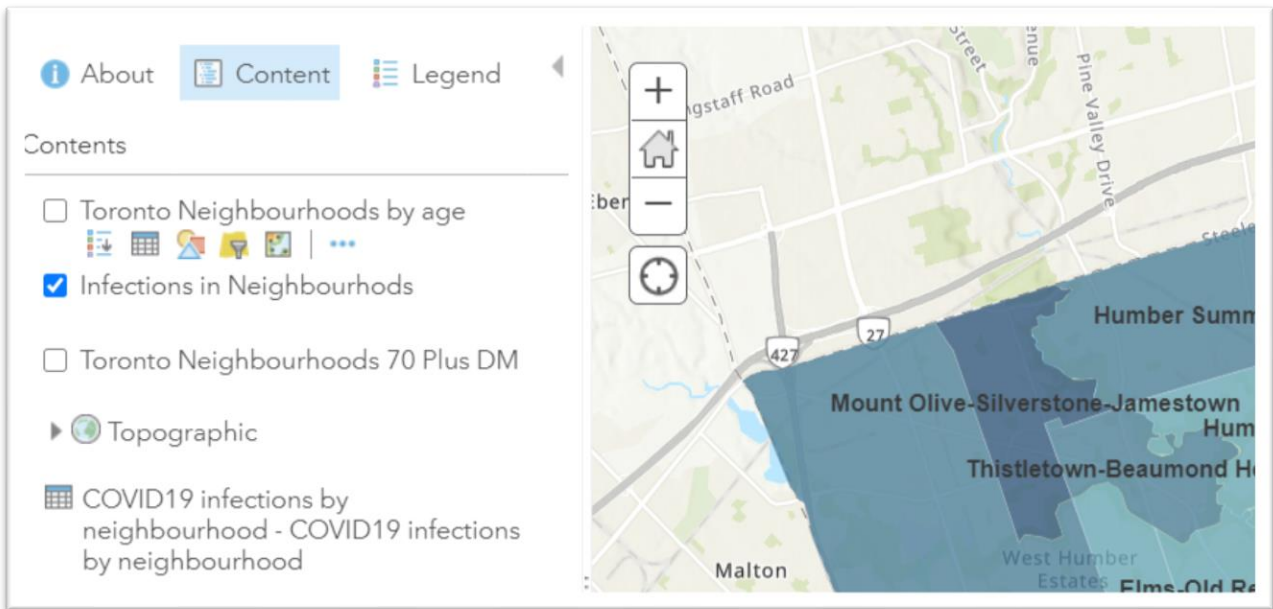

Rename the layer.

Top screenshot:

About Content Legend

Contents

☐ Toronto Neighbourhoods 70 Plus DM - copy

☑ Infections in Neighbourhods

☐ Toronto Neighbourhoods 70 Plus DM

▶ 🌐 Topographic

▦ COVID19 infections by neighbourhood - COVID19 infections by neighbourhood

Rename   ×

Layer Name: Toronto Neighbourhoods by age

OK   CANCEL

Map labels (top): Newtonbrook, Westminster-Branson, Willowdale, Bathurst Manor, Black Creek, Humber Summit, Mount Olive-Sil..., Thi..., Malton, West Humber, Ridgewood, Rustic, Forest Hill, Lansing-W

Bottom screenshot:

About Content Legend

Contents

☐ Toronto Neighbourhoods by age

☑ Infections in Neighbourhods

☐ Toronto Neighbourhoods 70 Plus DM

▶ 🌐 Topographic

▦ COVID19 infections by neighbourhood - COVID19 infections by neighbourhood

Map labels (bottom): gstaff Road, Pine Valley Drive, Humber Summ, Mount Olive-Silverstone-Jamestown, Hum, Thistletown-Beaumond He, Malton, West Humber Estates, Elms-Old Re
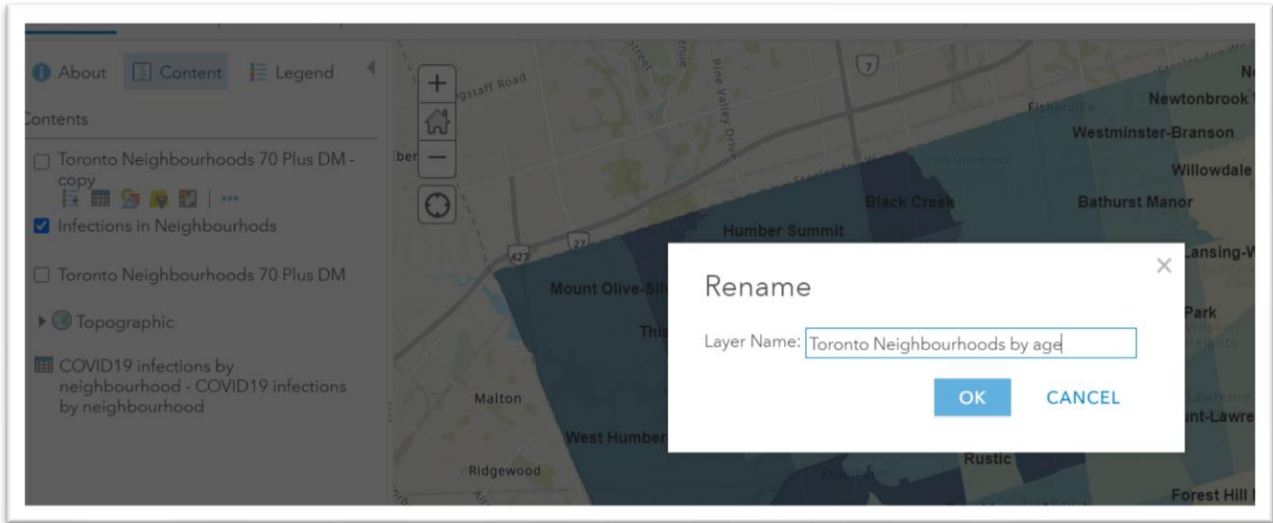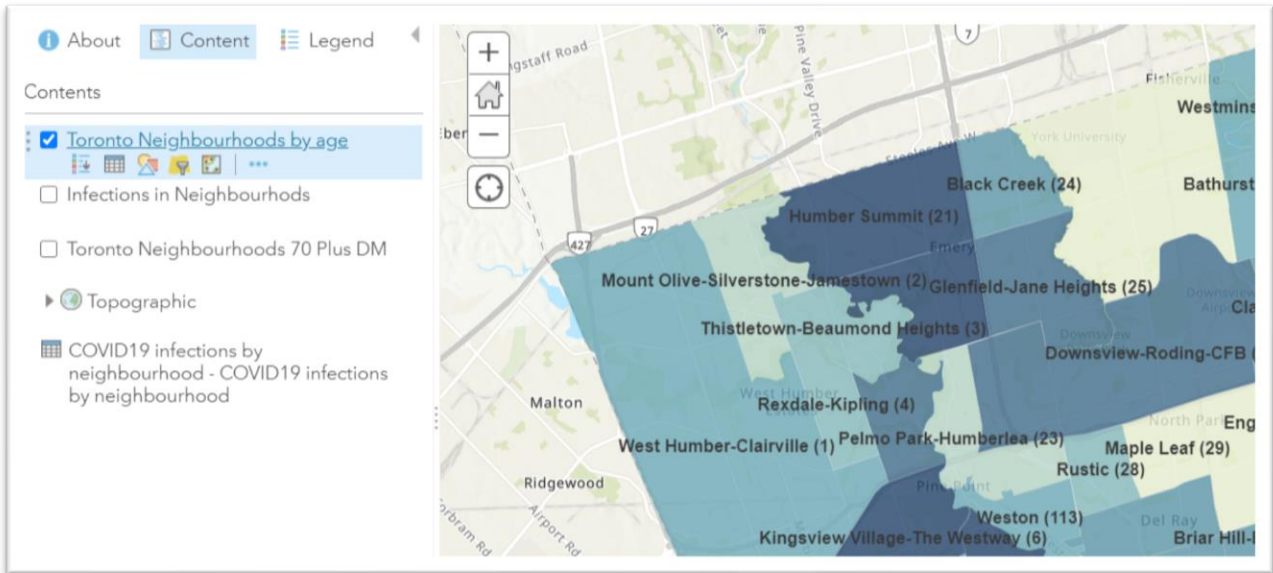
Turn off the previous layer and turn this one one.

Now we can use a different attribute for this layer.

Let's choose 80 and over.

Repeat the steps for the previous layer to create six ranges or intervals for this one.

Now you can toggle between the recently created layers to see if there patterns worth noting.

You could also create many other layers for different age groups, or COVID-19 case numbers.

While it may take time to master some of basic functinalities of ArcGIS, it is worth the effort, especially if you are serious about mapping.

From here, you can also create dashboards and story maps.

We have not covered sharing your map by obtaining the embed code.

You'll find embedding information on page 11 of this tutorial, which will also be posted on our syllabus.

Esri Canada's website is full of examples.

And there are many social media discussion groups where people swap ideas and help trouble shoot.