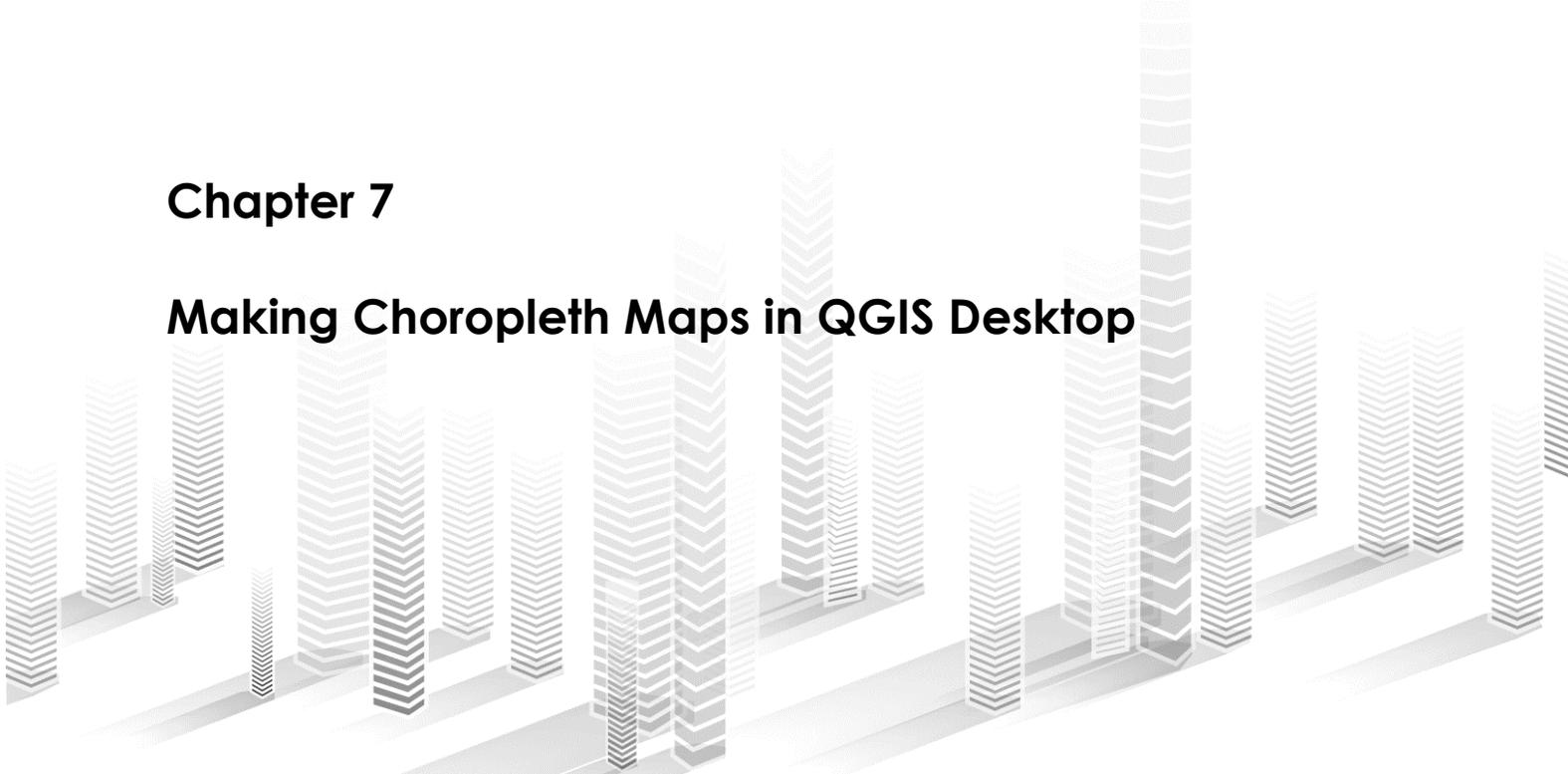


Chapter 7

Making Choropleth Maps in QGIS Desktop



Summary: As we learned in Chapters 6 and 7, choropleth maps apply colours to polygons in order to demonstrate variations in the values that we want to convey in our stories. A range of colours could indicate municipal wards or police districts with highest break-and-enter rates, the electoral boundaries that receive the highest per capita spending on social programs or, in the case of this tutorial, the areas in Winnipeg with the highest average household incomes. So, we will simply pick up where we left off in the “[7.4 JoiningMapstoOtherDatasetsQGIS](#)” tutorial, which used that city’s shapefile census tracts.

Skills you will learn:

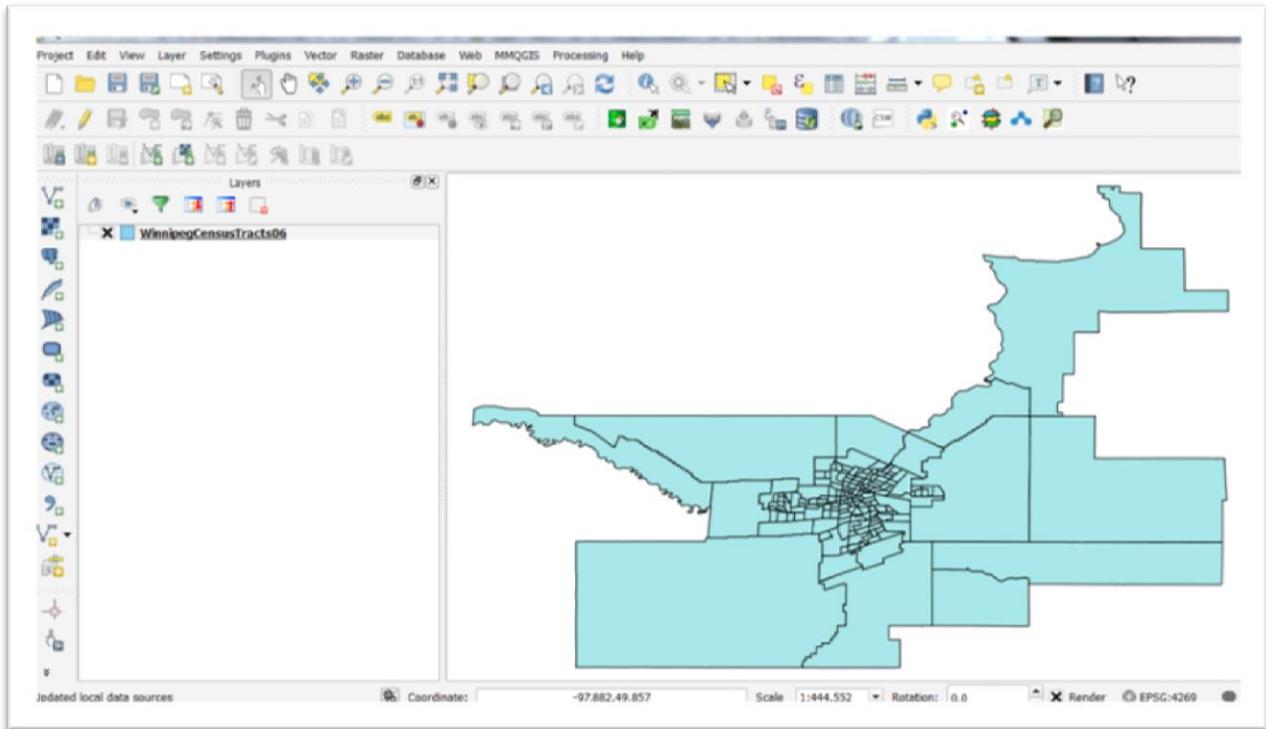
1. How to create a choropleth maps using QGIS.
2. How to add a base map.
3. How to create a map layout that can be exported as a PDF.

If you are unsure about how to use the QGIS user interface, you should read the tutorial “A Quick Tour of QGIS Desktop” before using this tutorial.

Task 1: How to create a choropleth map using QGIS

Before creating a choropleth map, we must join the shape file to the table that contains the values we want to display. In the last step of the joining maps tutorial, we completed this task. This tutorial will pick up where we left off by returning to the project.

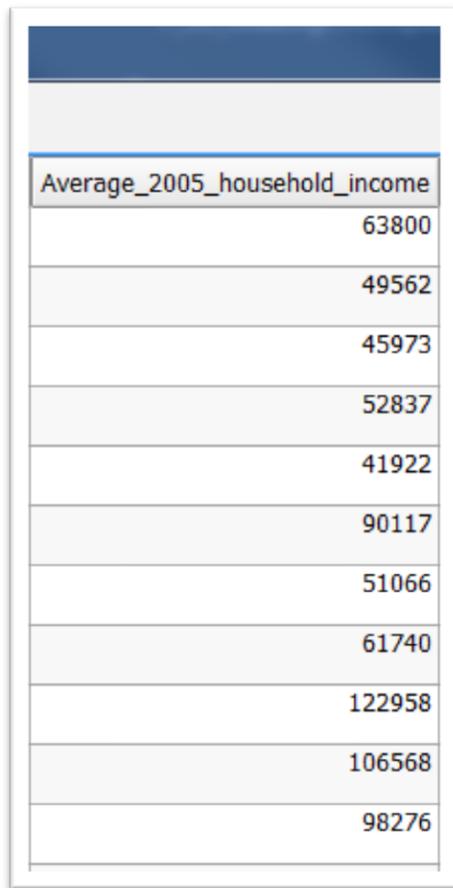
In the joining maps tutorial, we joined [Winnipeg's census tracts...](#)



...to the non-geographic [household income table.](#)

CUID	Total_Private_households	Median_2005_household_income	Median_2005_aftertax_household_income	Average_2005_household_income	Standard_error_of_average_household_income	Average_2005_after_tax_household_income	Standard_error_of_average_aftertax_household_income
6020001.00	1850	53436	45133	63900	2099	52357	1590
6020002.00	2400	41184	36694	49562	2438	41537	1538
6020003.00	2630	39250	34345	45973	1417	38835	1068
6020004.01	2305	45270	39247	52837	1530	44227	1157
6020004.02	1700	58537	33134	41922	1313	36009	1025
6020005.00	2335	75475	60342	90117	3634	70788	2386
6020006.00	2630	43816	37830	51068	1496	42711	1114
6020007.00	1595	53045	43546	61740	2291	50829	1719
6020008.00	1140	92369	70830	122958	8591	90696	5103
6020009.00	1225	90350	71015	106568	5024	81378	2566
6020010.00	2410	62892	51968	98278	5363	74343	3530
6020011.00	4025	47899	39792	62896	2944	49839	1754
6020012.00	2975	28865	25643	34264	1025	29543	775
6020013.00	915	19108	17299	26686	1599	23288	1266
6020014.00	3855	30029	27143	36575	1043	31176	797
6020015.00	3395	20486	18965	28371	1001	25096	784
6020016.00	1070	33861	27868	47162	3436	39182	2438
6020017.00	1450	53400	44786	62636	2551	51178	1968
6020018.00	1260	46877	41392	57152	2622	47889	1911
6020019.00	1285	47457	40948	52778	1808	44766	1405
6020020.00	1020	43881	37465	49440	1895	42561	1499
6020021.00	2350	53446	29331	39619	1315	35140	1119
6020022.00	1845	20374	19670	26080	1122	24745	950
6020023.00	2663	21520	19748	27351	858	24463	702
6020024.00	200	53509	51461	74120	11129	58100	7854
6020025.00	1115	19096	18577	29812	2211	26679	1626
6020026.00	725	18760	18251	28753	2103	26293	1885
6020027.00	580	36011	36347	43366	3156	37844	1886

We used the average household income column.



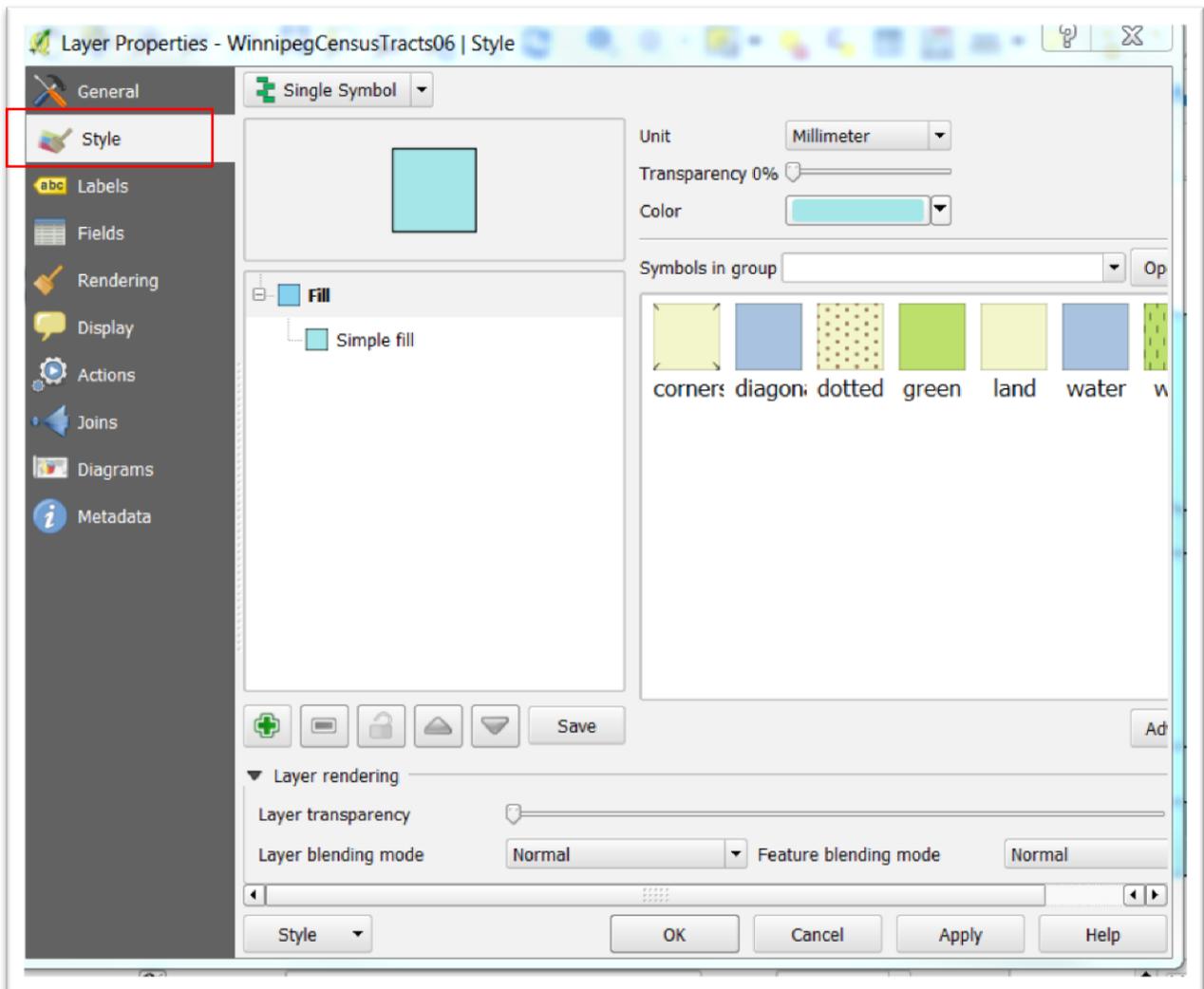
A screenshot of a data table with a blue header bar at the top. The table has two columns: the first column contains the text 'Average_2005_household_income' and the second column contains numerical values. The rows are alternating light gray and white. The values in the second column are: 63800, 49562, 45973, 52837, 41922, 90117, 51066, 61740, 122958, 106568, and 98276.

Average_2005_household_income	
	63800
	49562
	45973
	52837
	41922
	90117
	51066
	61740
	122958
	106568
	98276

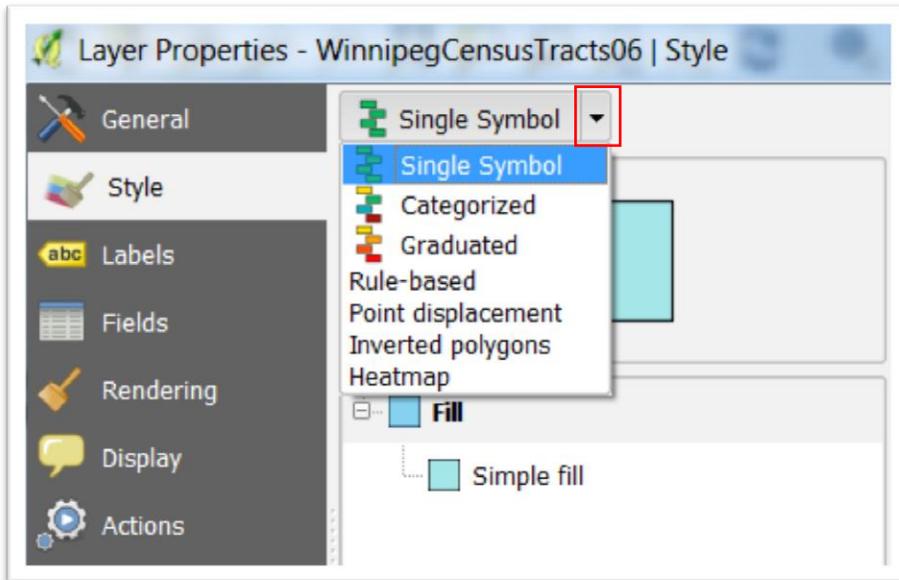
We used the join option in the properties dialogue box by right-clicking on the census tract layer to obtain the shortcut menu, the “Layer Properties” dialogue box, and then the “Joins” option.

Now we have a new layer that is ready to be colour-coded.

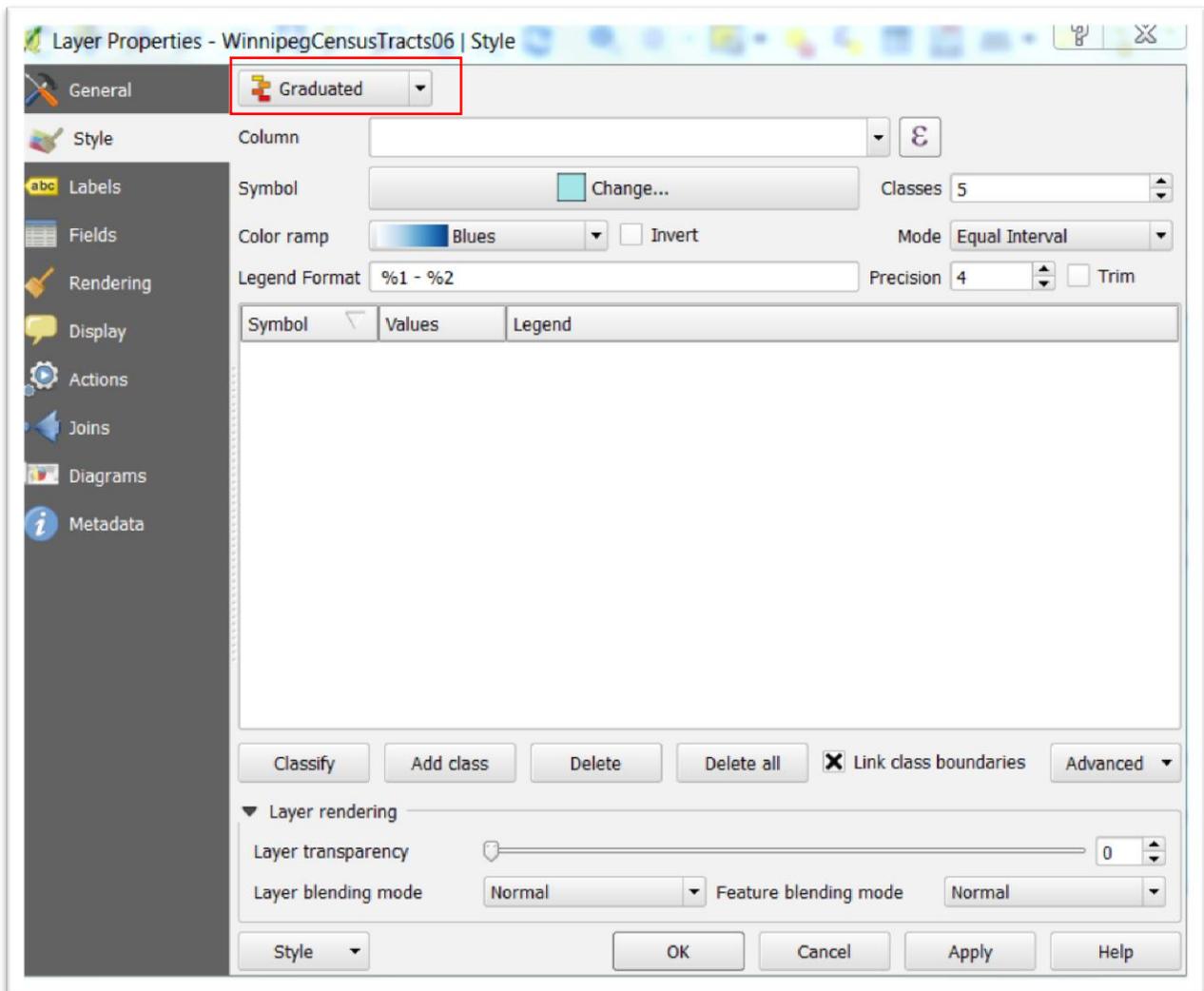
Select the “Style” icon.



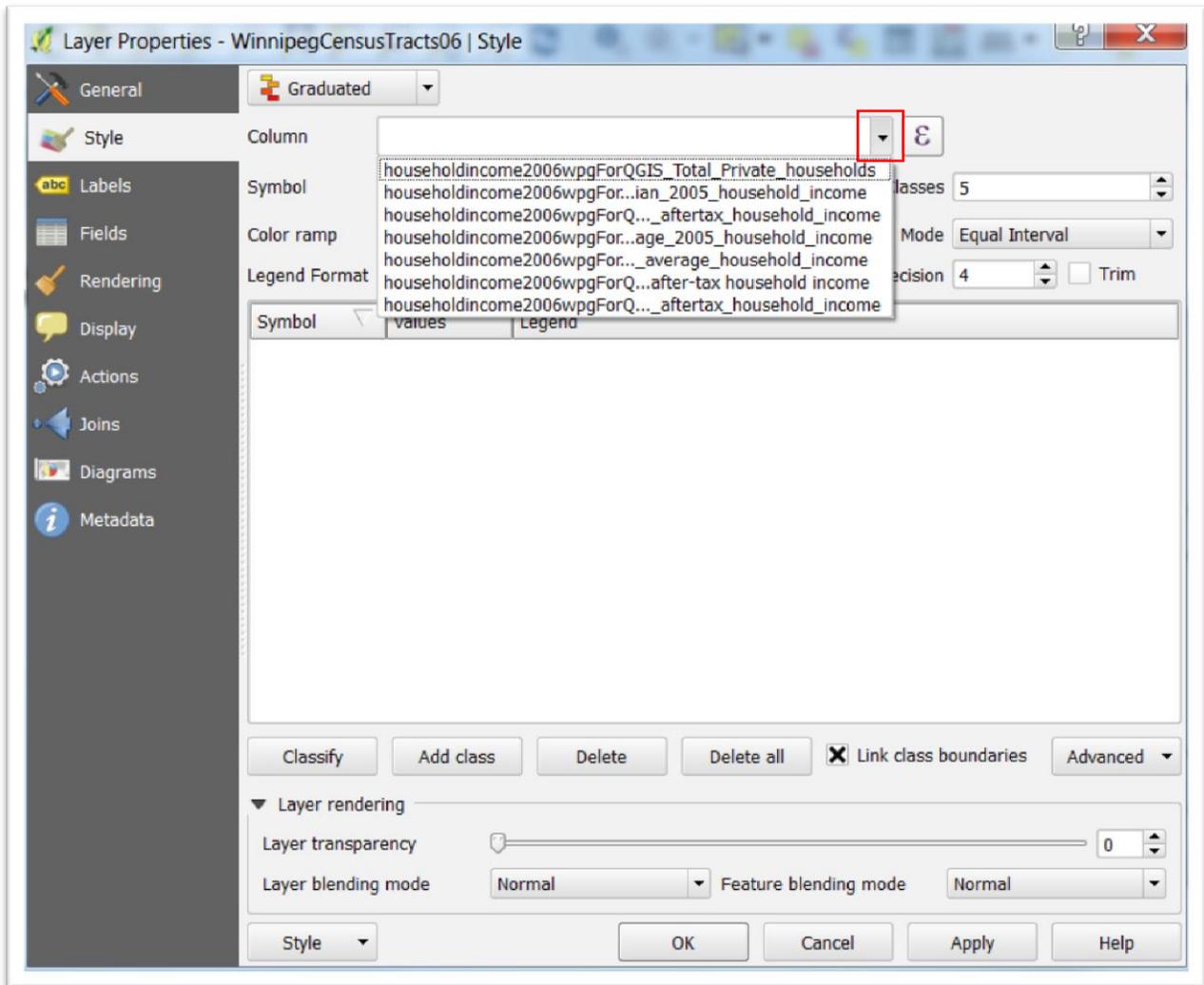
The arrow to the right of “Single Symbol” produces a drop-down menu.



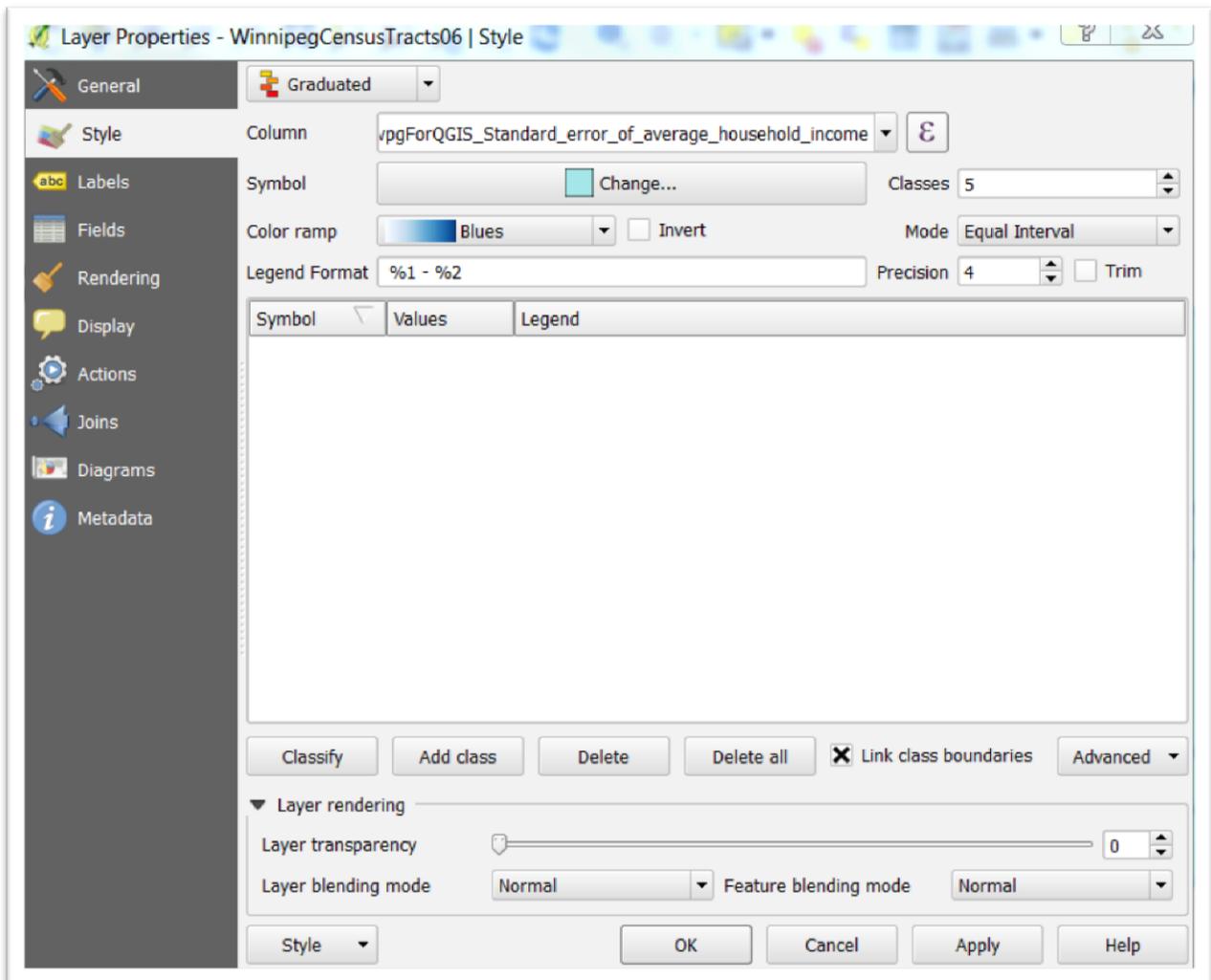
Select the “Graduated” option.



Now we have to decide which value to display. Click on the arrow to the far right of the space next to the “Column” label to obtain the drop-down menu.



Select “average_household_income.”.



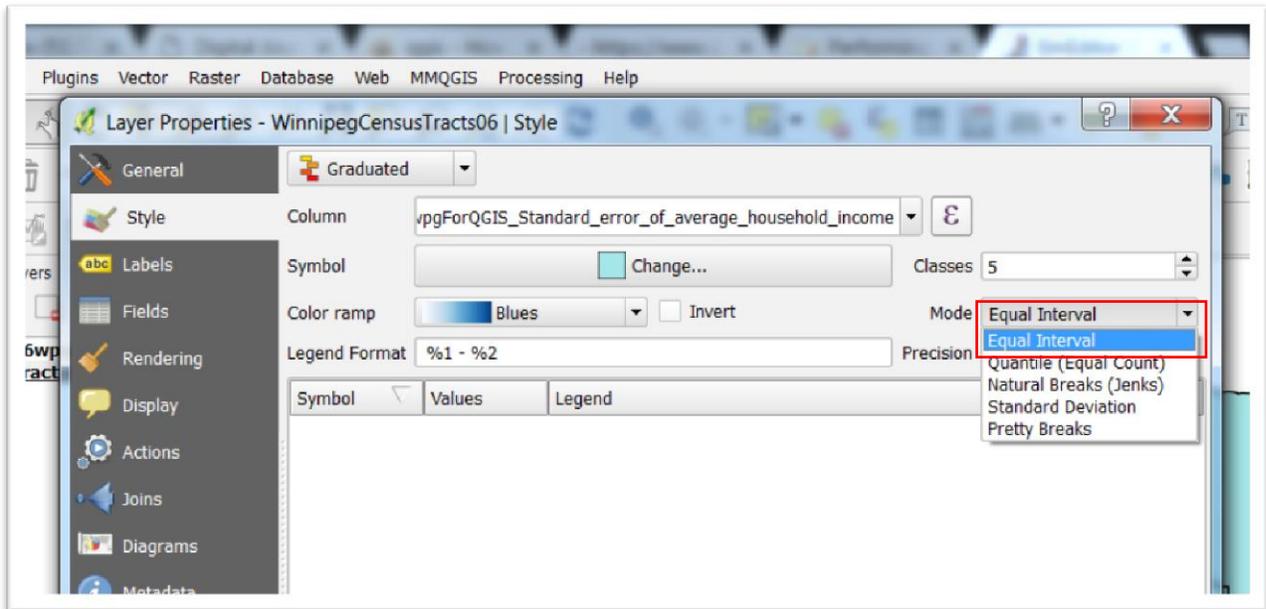
You’ll notice that QGIS defaults to 5 “Classes”, which divide the values into five equal parts. Like ArcMap, QGIS defaults to classifying the data in five groupings.

If you want to alter the classes, select the “Advanced” tab to exercise the different options.

For our demonstration map, we will use the five equal classes.

Click Classify.

Depending on the values in your dataset, this categorization may make little sense. If it doesn’t, you make changes by selecting different options from the short-cut menu obtained by clicking the arrow to the right of the “Mode” tab.



For the purposes of this exercise, let's stick with the five equal intervals. To make the intervals appear, select the "Classify" tab, which produces your values.

To find out more about the modes QGIS uses to break data into classes, check out the "Modes" section of the ["Tutorial: QGIS Basics for Journalists"](#).

And for more general information about classification systems, please consult [GIS Data Classifications in Cartographica](#).

Layer Properties - WinnipegCensusTracts06 | Style

General | **Style** | Graduated

Column: vpgForQGIS_Standard_error_of_average_household_income

Symbol: [Change...]

Color ramp: Blues [Invert]

Classes: 5

Mode: Equal Interval

Legend Format: %1 - %2

Precision: 4 [Trim]

Symbol	Values	Legend
--------	--------	--------

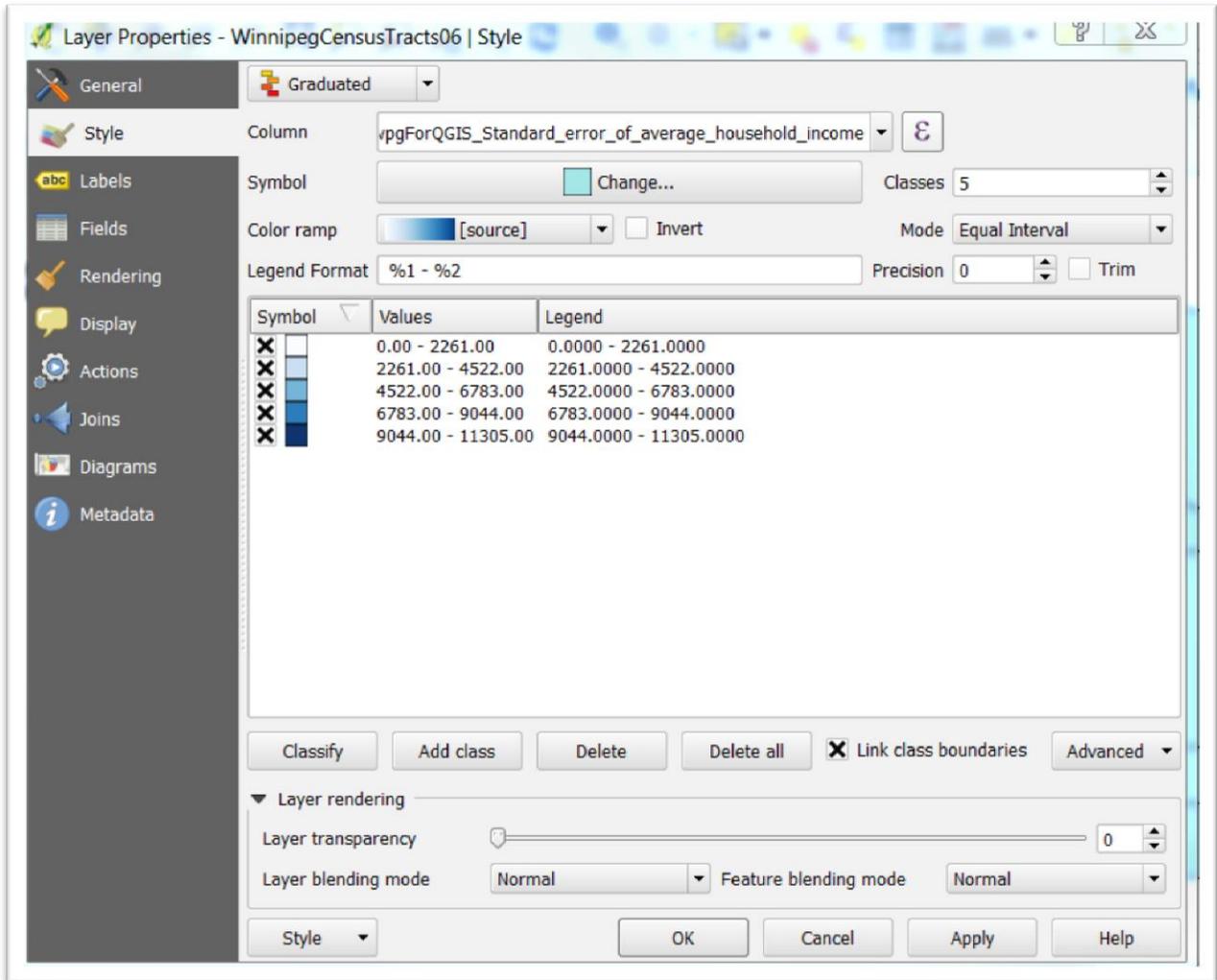
Classify | Add class | Delete | Delete all | Link class boundaries | Advanced

Layer rendering

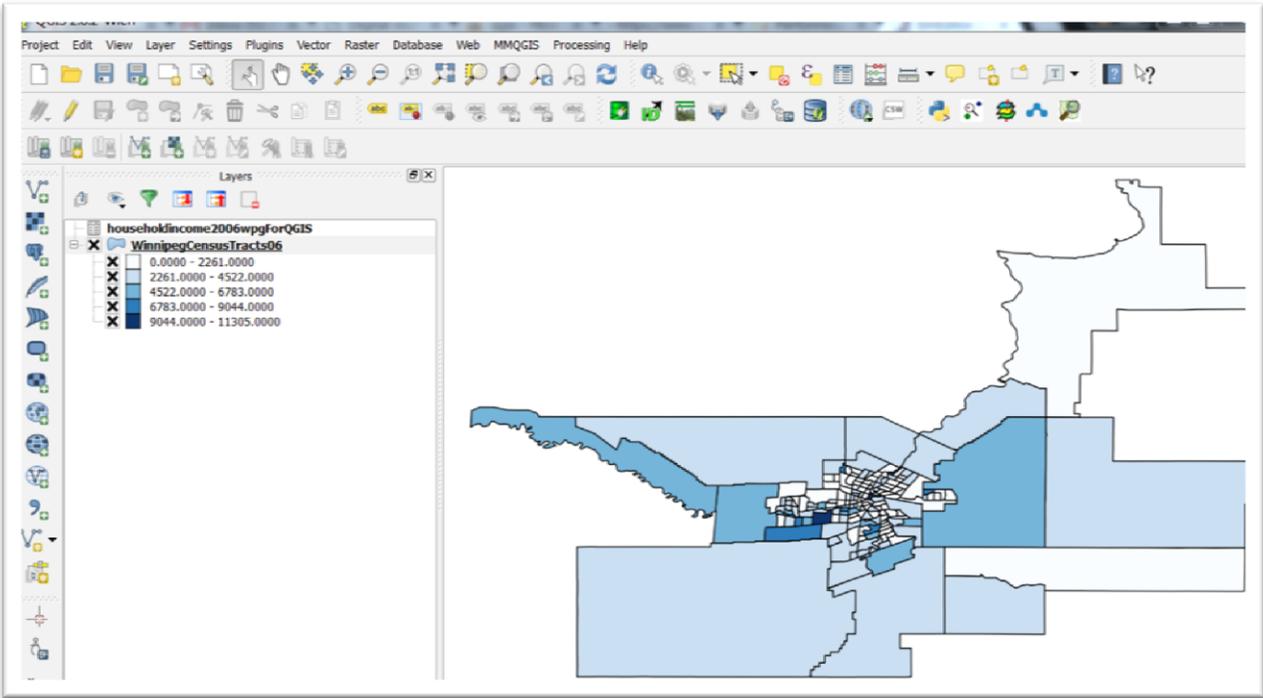
Layer transparency: 0

Layer blending mode: Normal | Feature blending mode: Normal

Style | OK | Cancel | Apply | Help



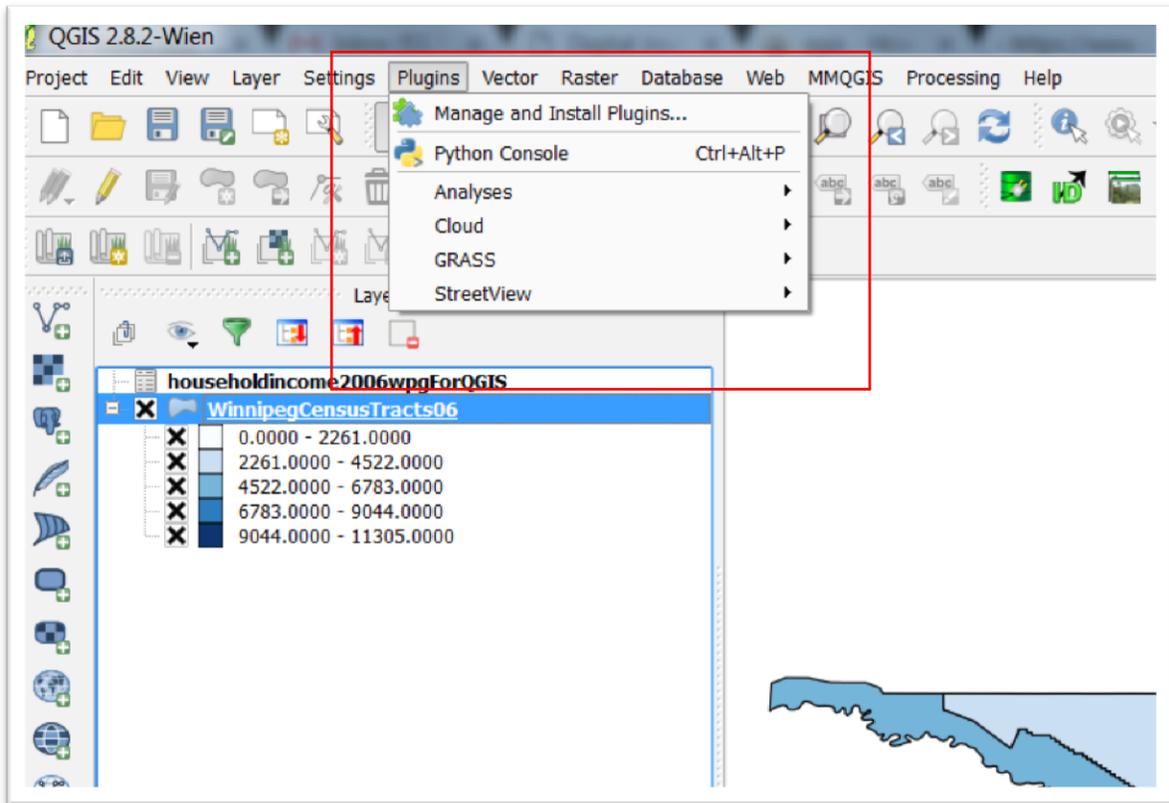
You can get rid of the decimal places by double-clicking on the values to produce a small dialogue box. However, let's just stick with these numbers. Select the "Apply" and then "OK" tabs.



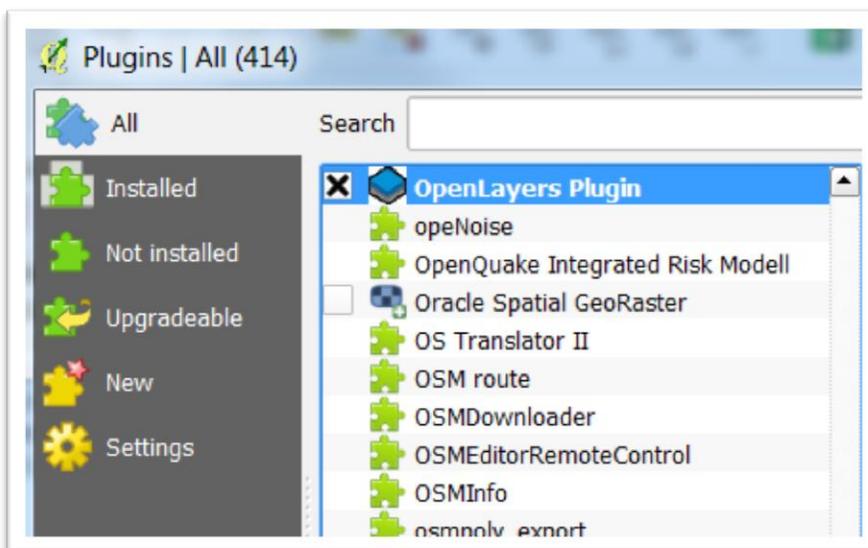
Our legend appears on the menu to the left, and our map is colour coded with the darker colours representing areas with the higher incomes. If these tracts had names that make sense, say federal ridings, or municipal boundaries, then we could activate the labels on the map.

Task 2: How to add a base map.

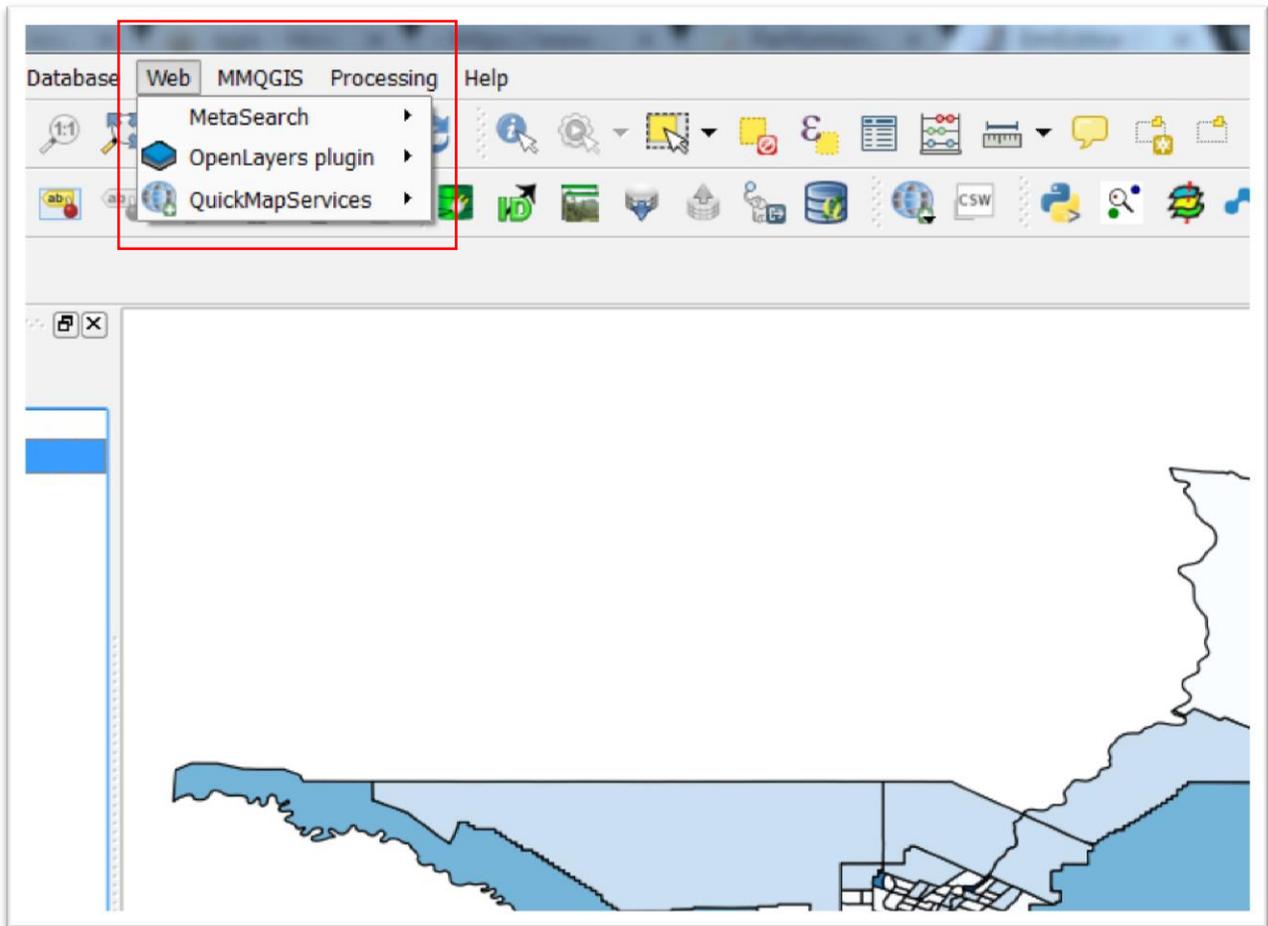
We should also import a map in order to give the boundaries a better sense of place.

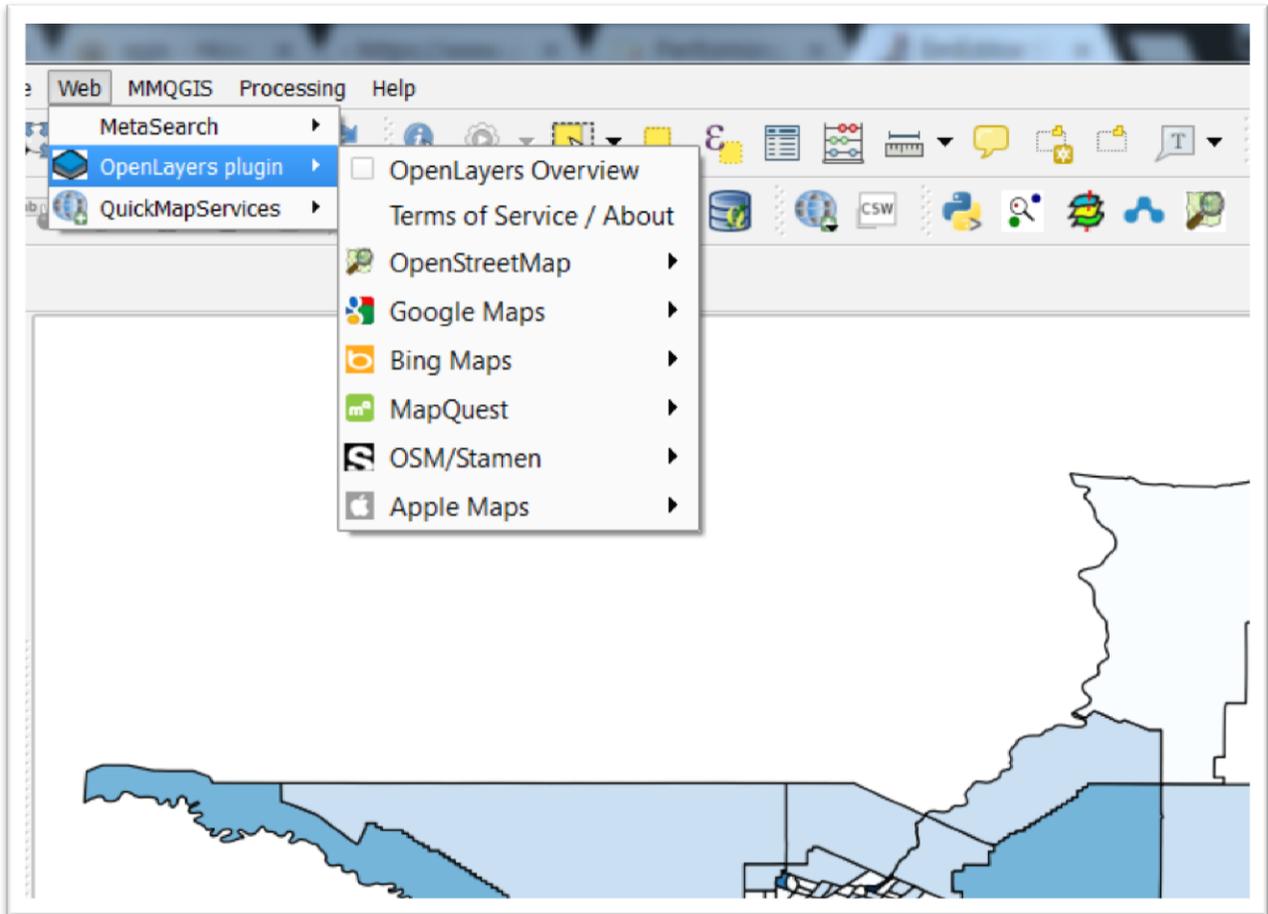


Select the first option, “Manage and Install Plugins” and then the “OpenLayers Plugin”.

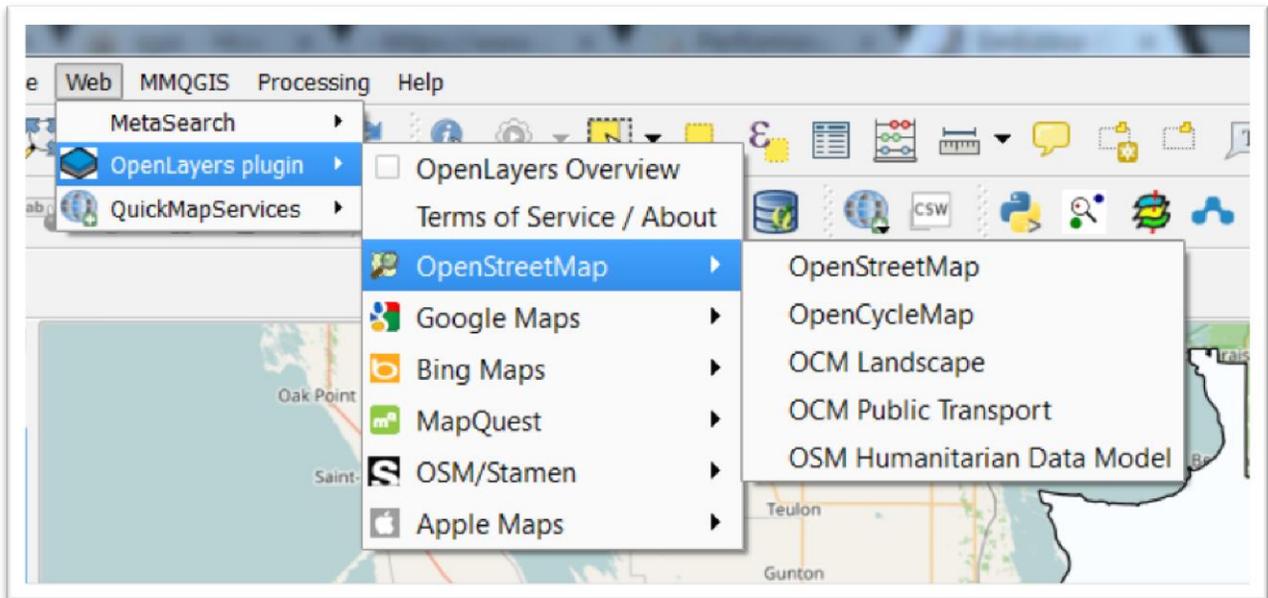


Once installed, the “OpenLayers plugin” will appear in the “Web” section of your menu.



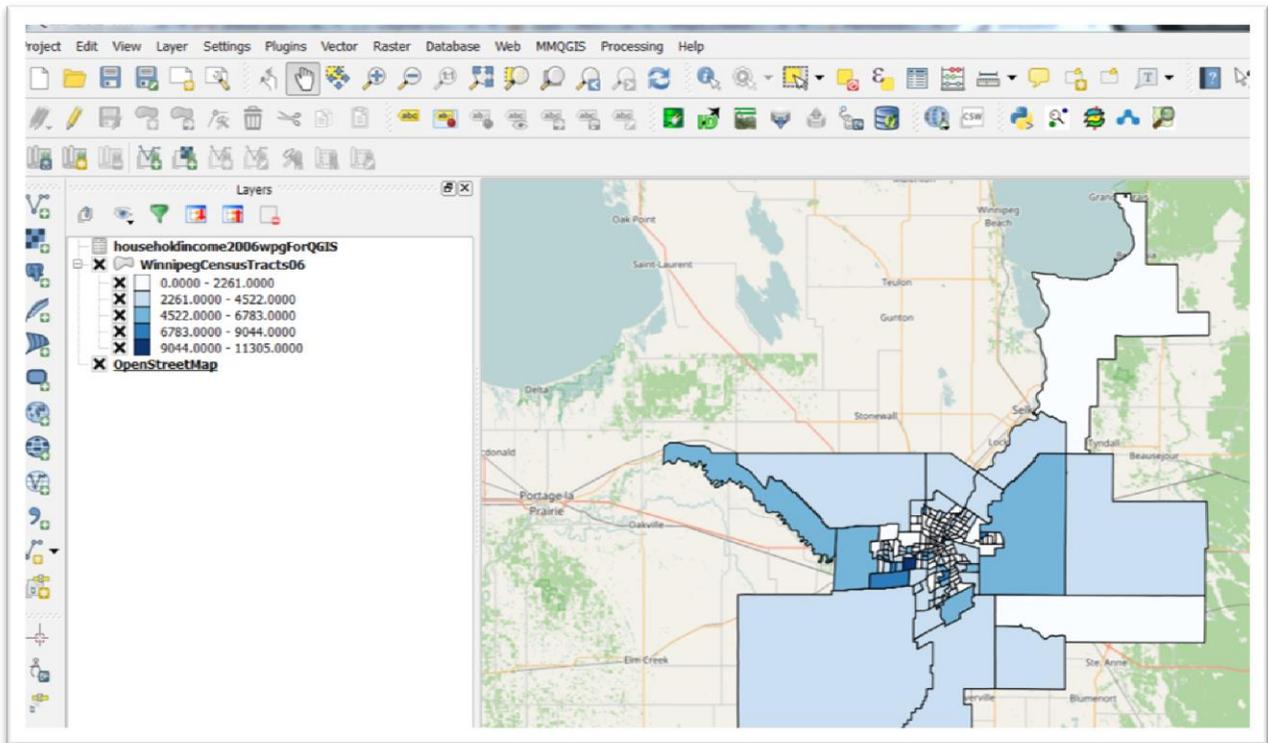


Choose OpenStreetMap.



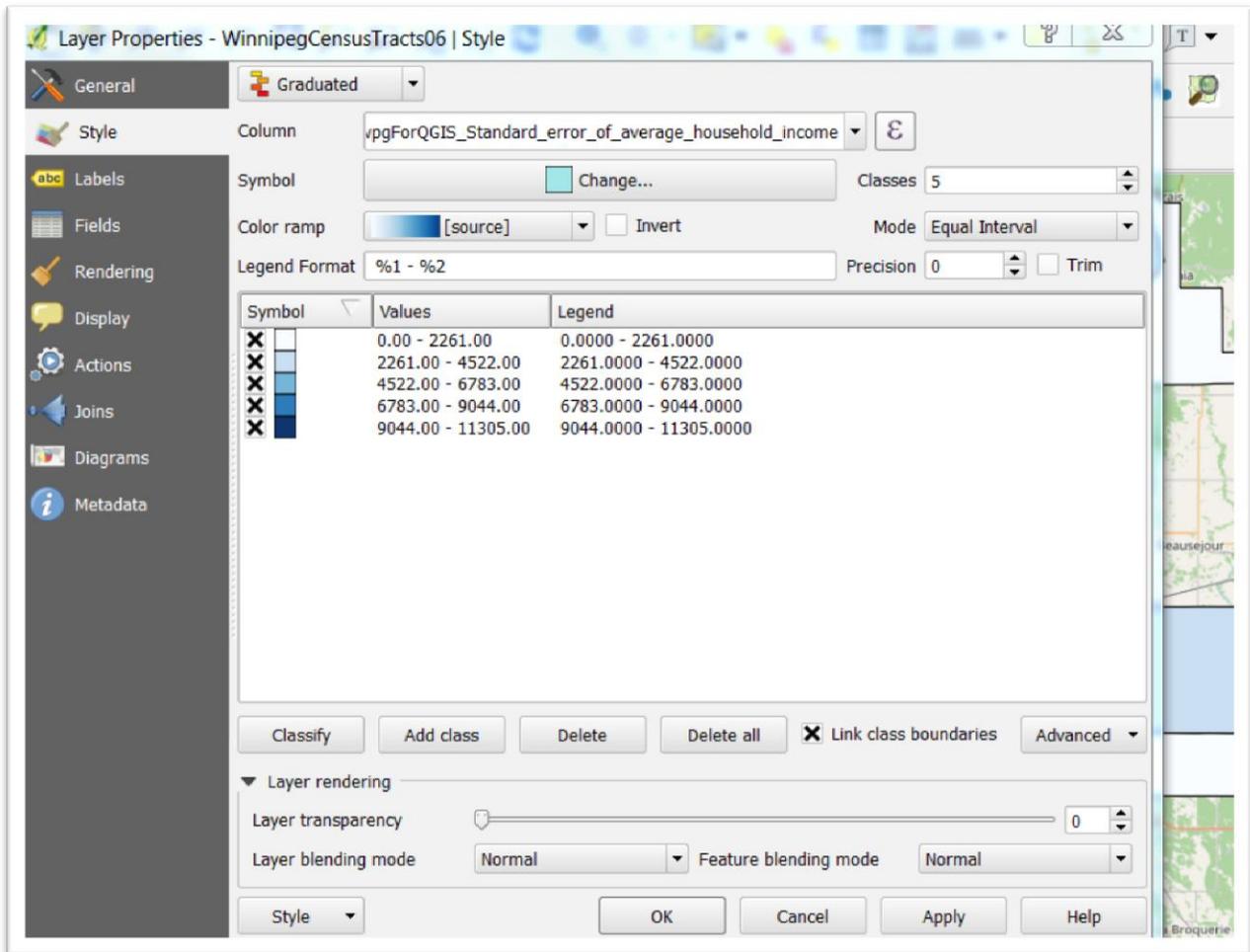
Select the first option from the drop-down menu, “OpenStreetMap”.

It takes a few seconds for QGIS to retrieve the map, which it will place at the top of your layer menu to the left, thereby hiding the census tracts. To make them appear, drag the “OpenStreetMap” layer to the bottom of the menu. Right click on your census tract menu and select the “zoom to layer” option to see the census tracts on the map.

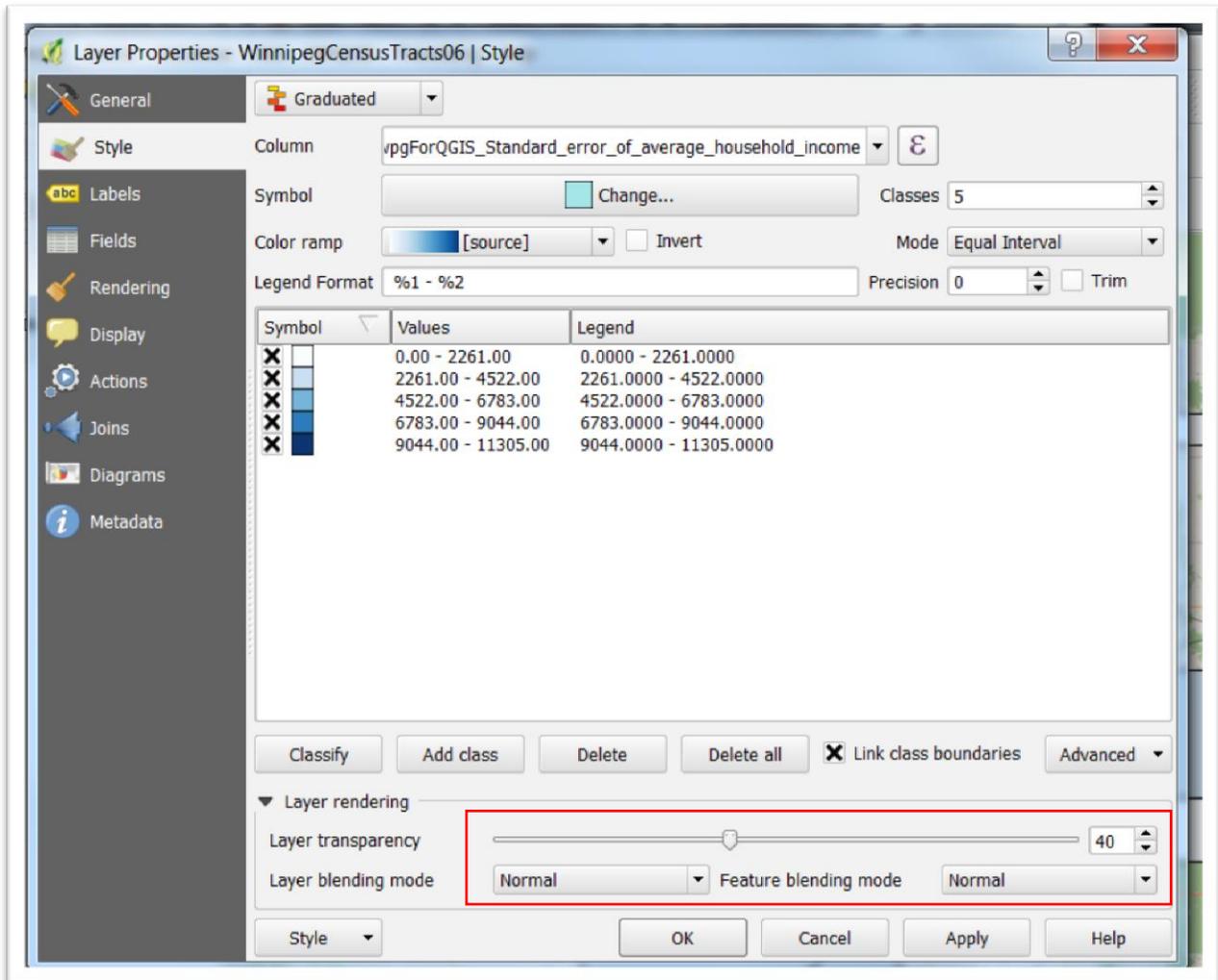


This gives us a better sense of place.

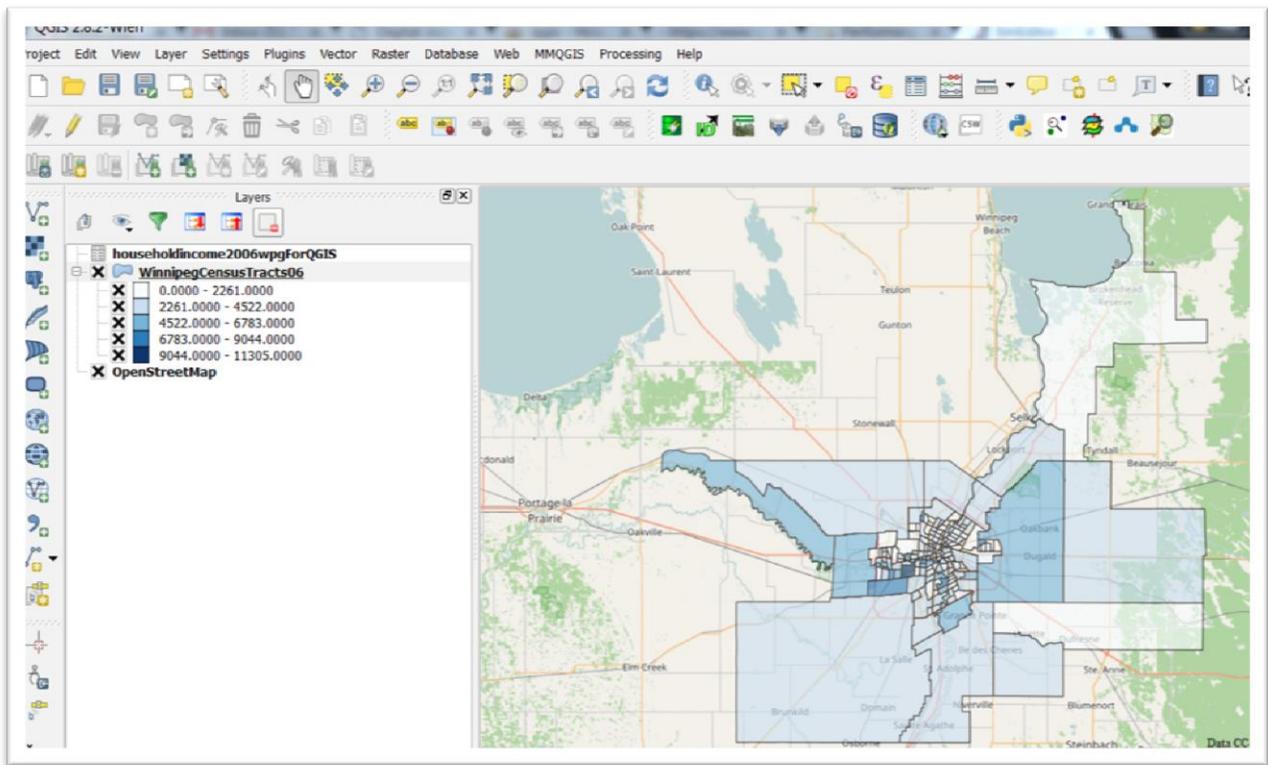
In order to see the streets underneath the census tracts, we can return to the properties menu.



At the bottom, you'll notice a "Layer transparency" option.



Move the setting to the the halfway mark, select “Apply” and then “OK”.



The streets are now easier to see, allowing us to better locate some of the city’s more well-to-do areas so we know where to send our cameras, or what neighborhoods to visit.

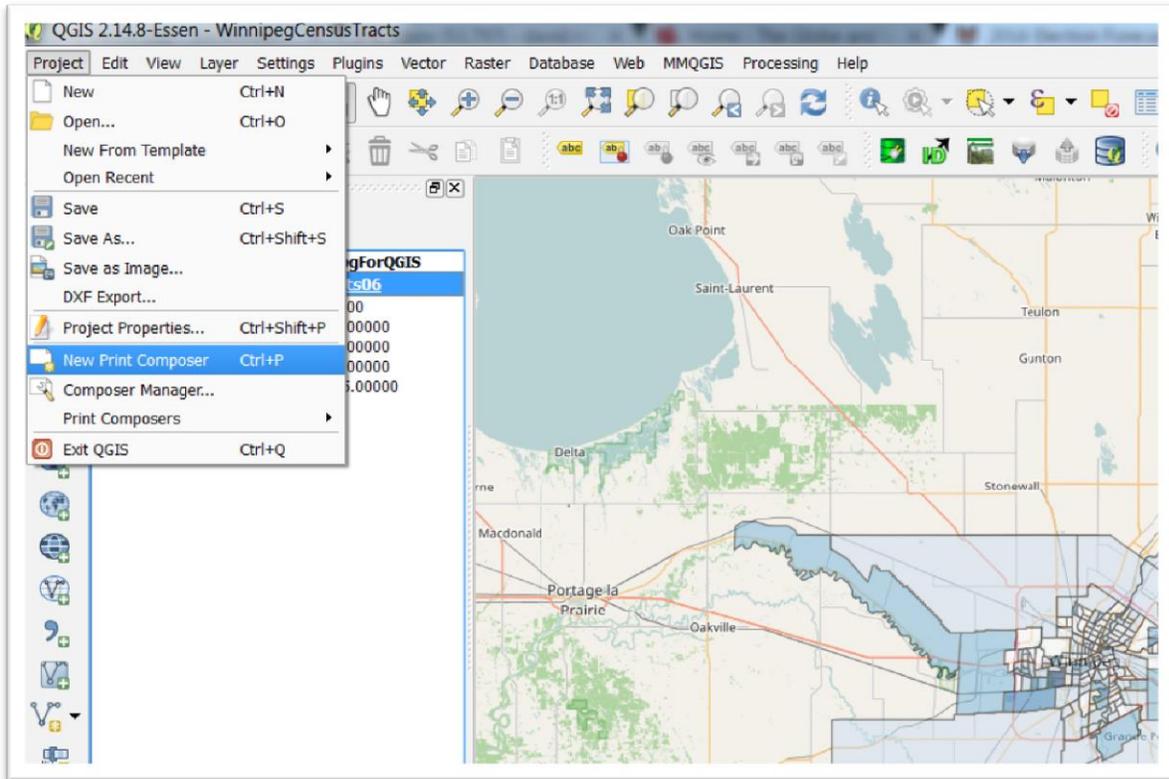
Save your QGIS file, something that you should always be doing at regular intervals.

Task 3: How to create a map layout that can be exported as a PDF.

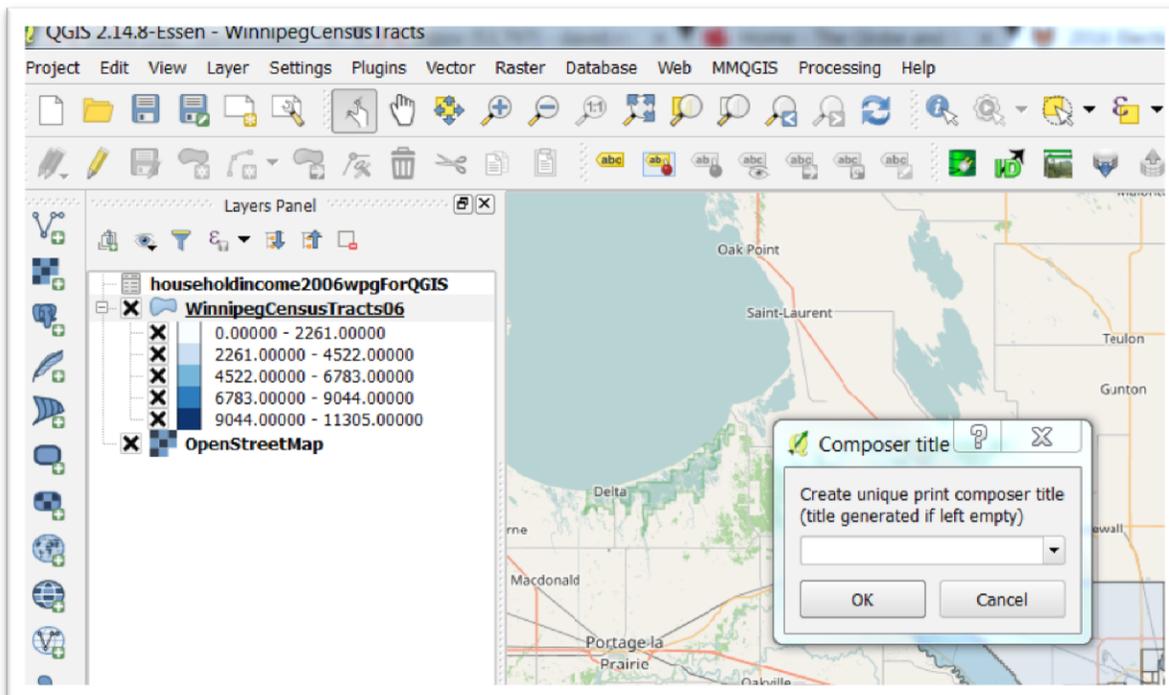
We have the map we want. One option would be to save the layer and export it to Google Fusion Tables, or ArcGIS Online, as we learned in the Chapter 6 tutorials. Another option is creating a map layout in QGIS, complete with a legend scale bar and title.

Right-click the layer for which you want to create the layer and select the “Zoom to layer” option from the drop-down menu.

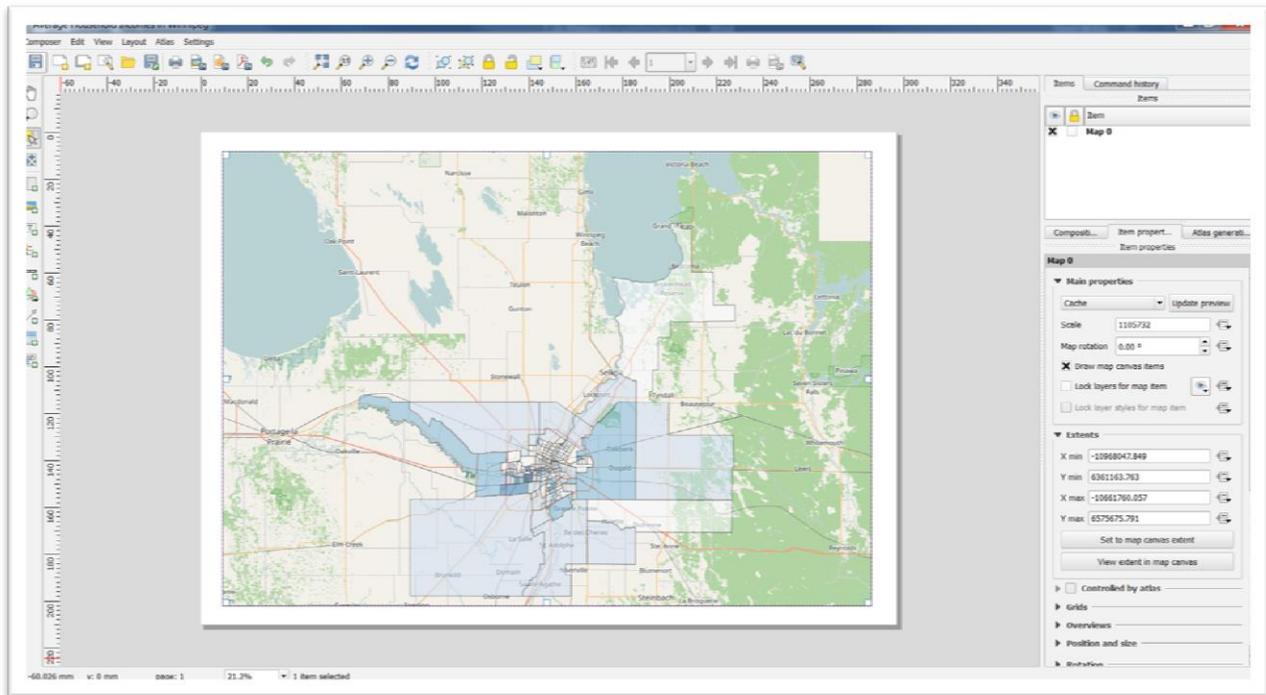
Go to the “Project” section on the menu up top, and select “New Print Composer”.



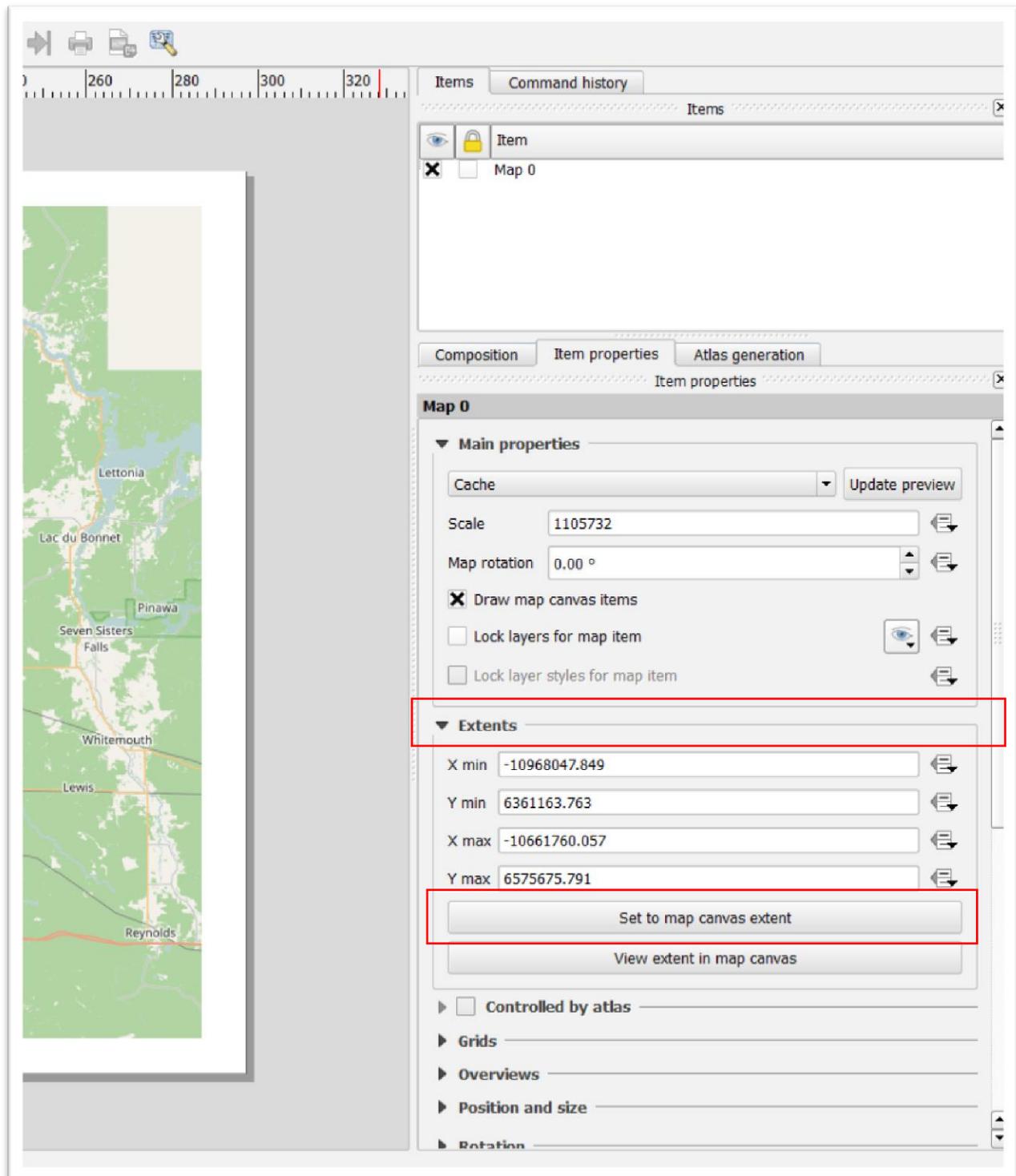
In the composer dialogue box, give the composition a name, and then click OK.



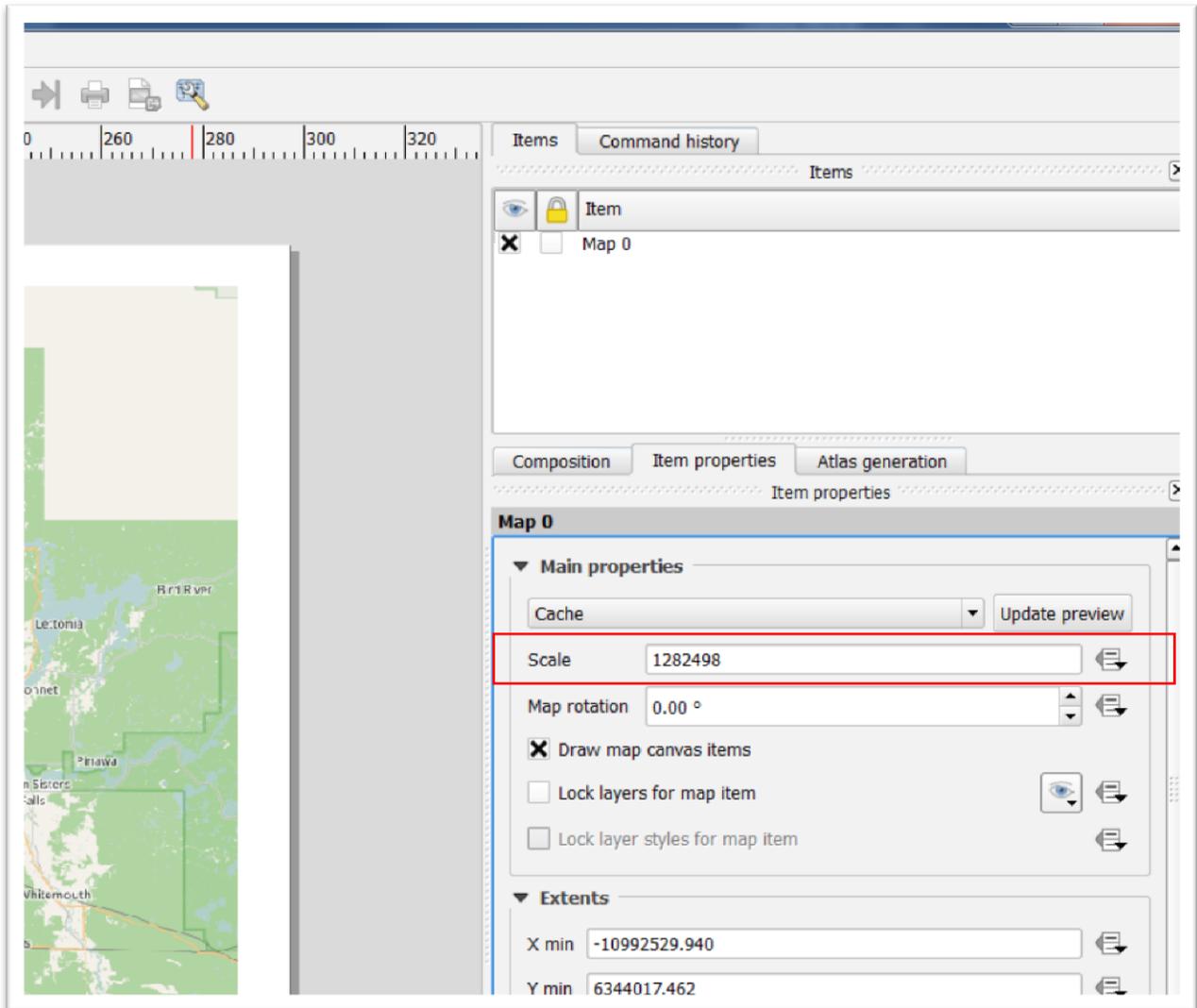
A new composer window will appear. To add your map of Winnipeg, click “Layout”, “Add Map”, and then draw a box just inside the perimeter of the page.



Under Extents, click the “Set to map canvas extent” button to centre the layer.



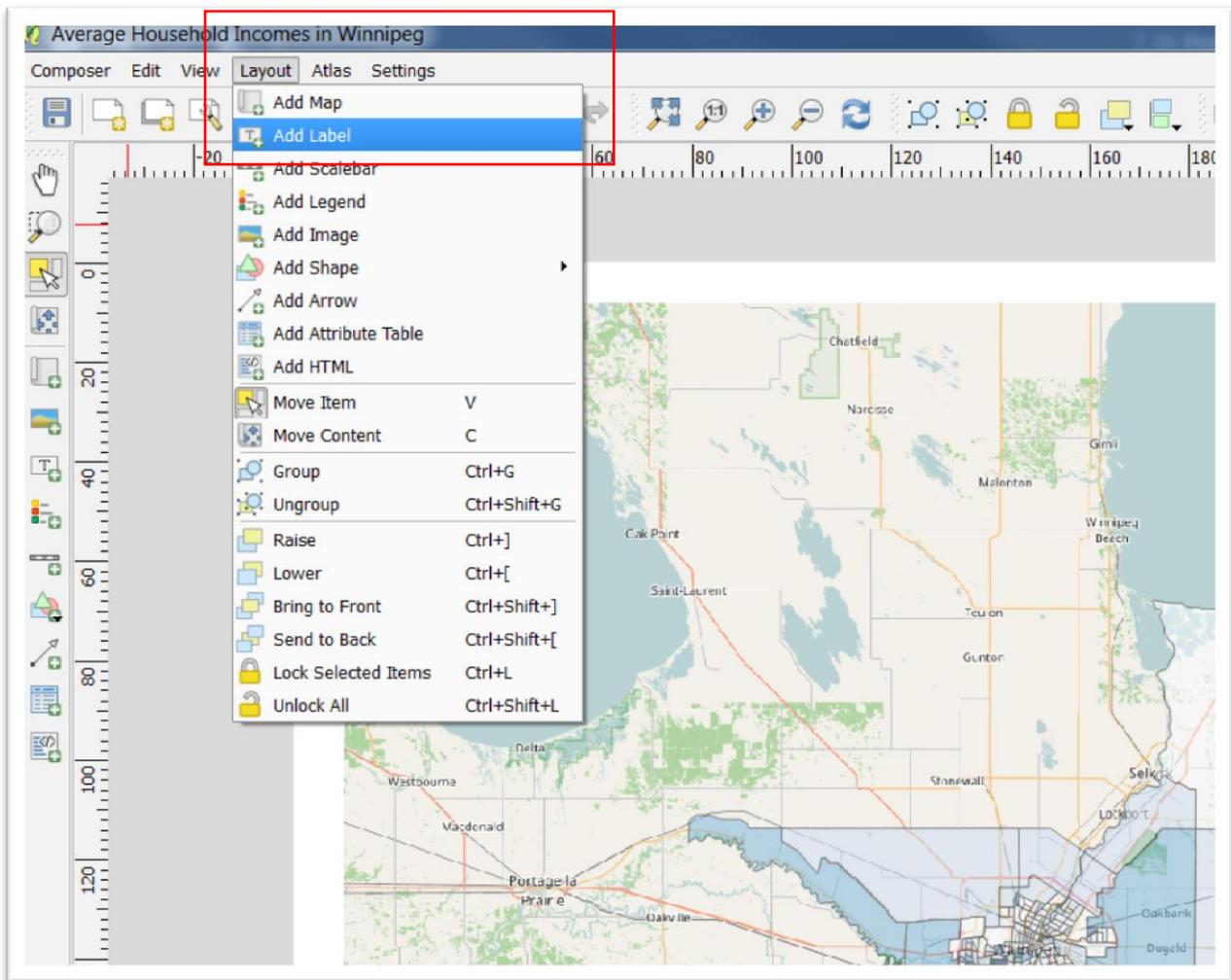
If the map is too large or too small, you can adjust the “Scale” option under “Item properties” on the right.



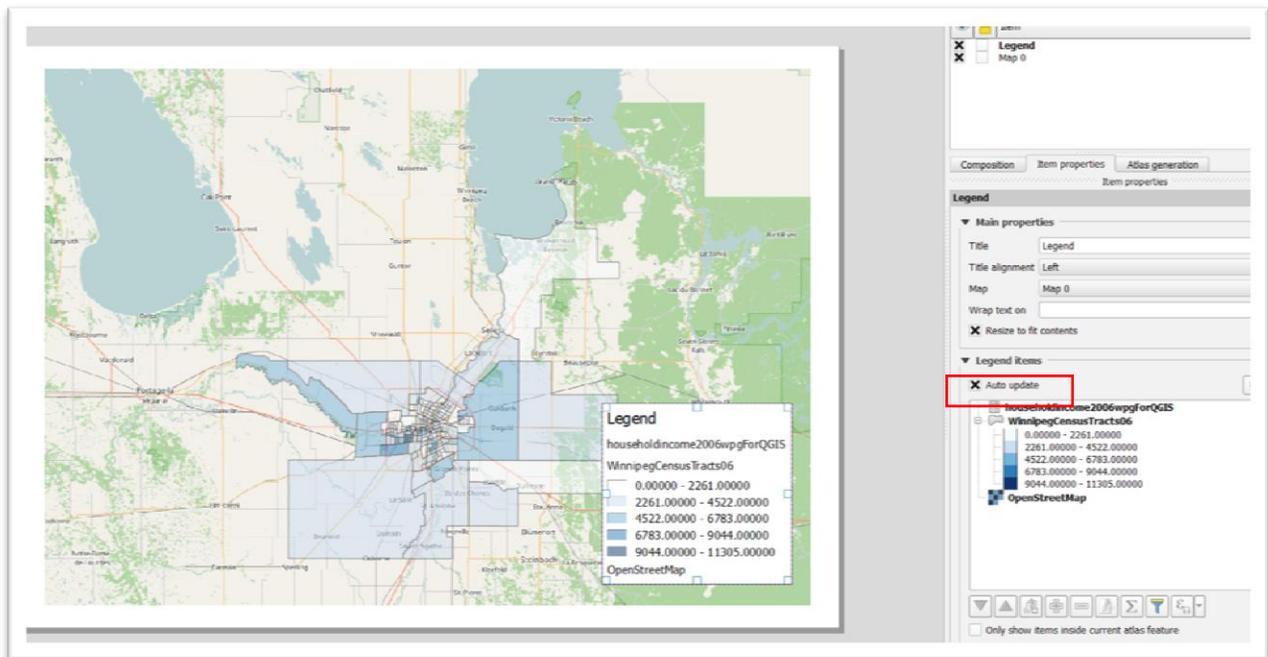
A larger number will make the map smaller. A smaller number will make the map larger.

Now we can add additional elements such as a legend.

In the menu, select “Layout”, and “Add Legend.”

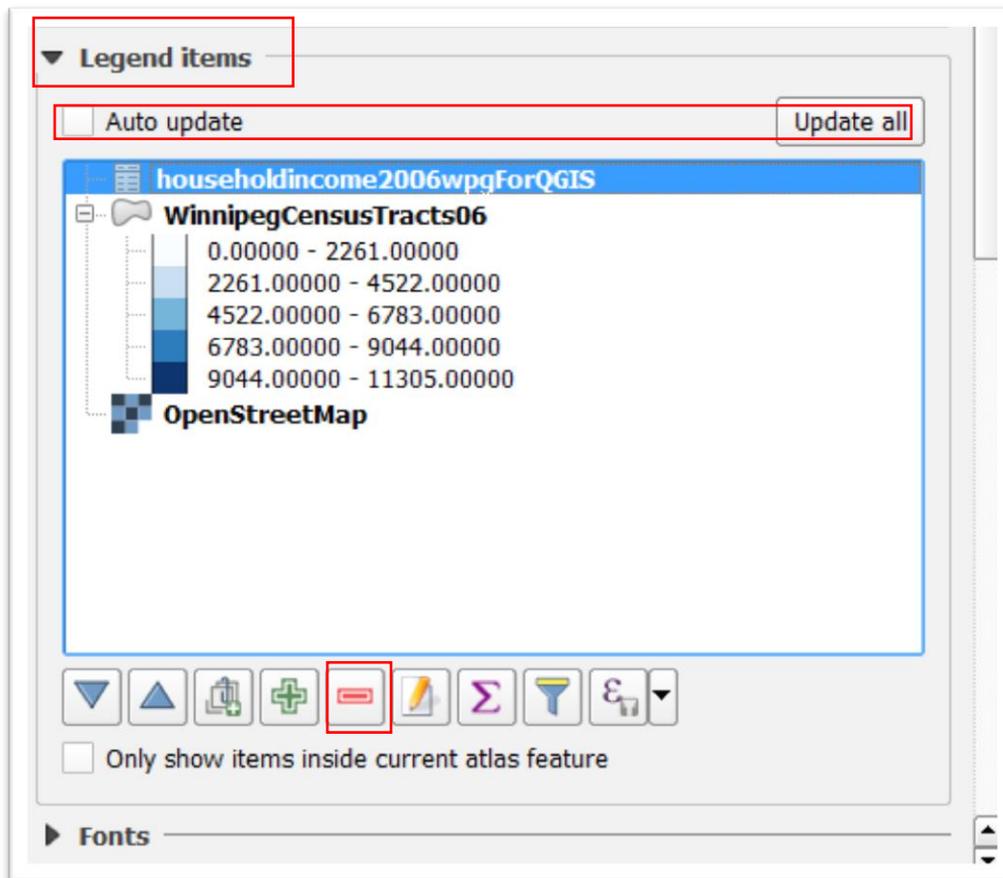


Draw a box where you want the legend to appear.



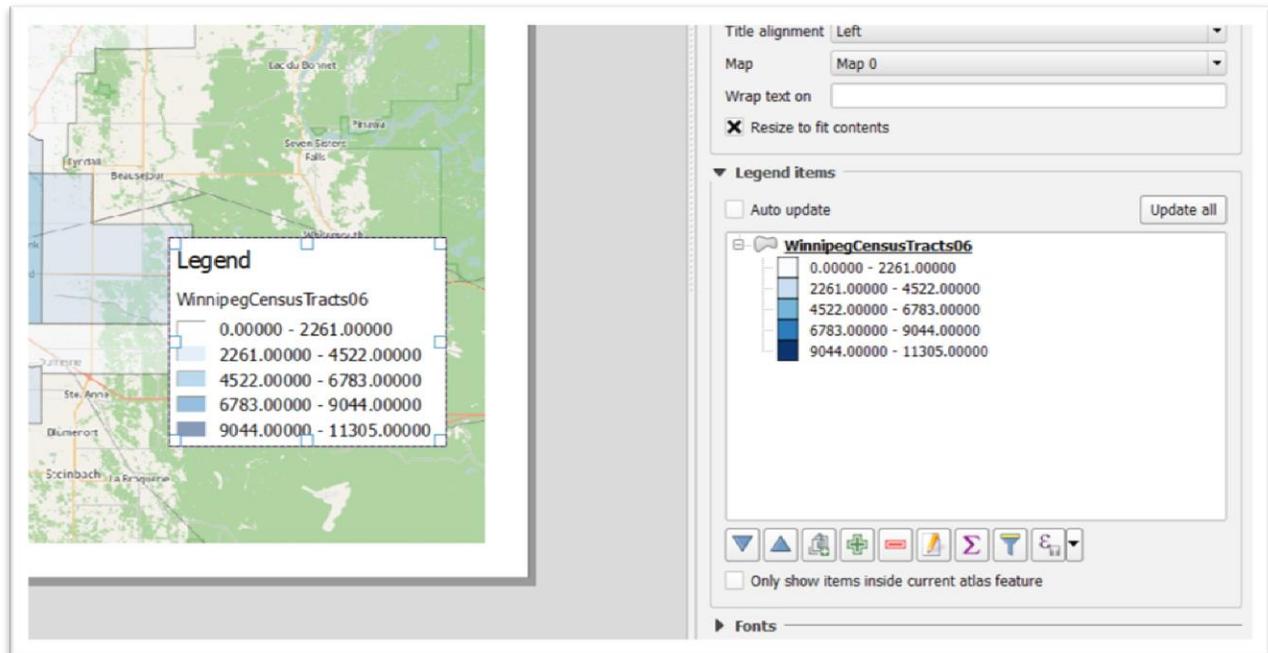
By default, all layers on the map will appear as legend items.

To remove a legend item, uncheck the “Auto update” checkbox to the right, and then select and manually remove the layers you don’t want in your legend using the minus button.

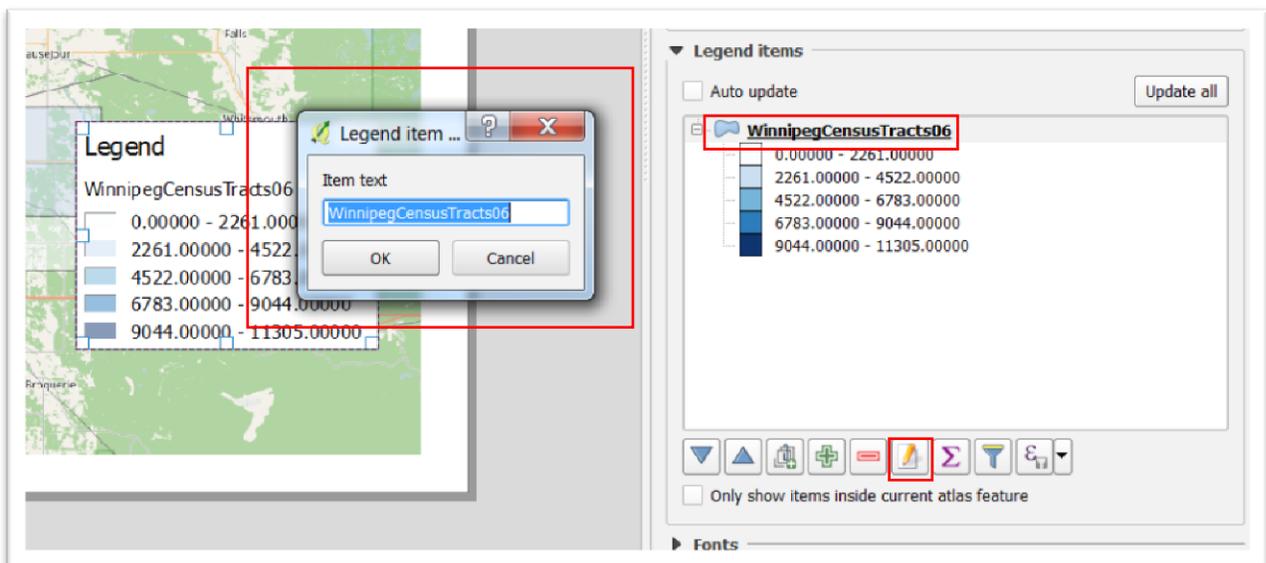


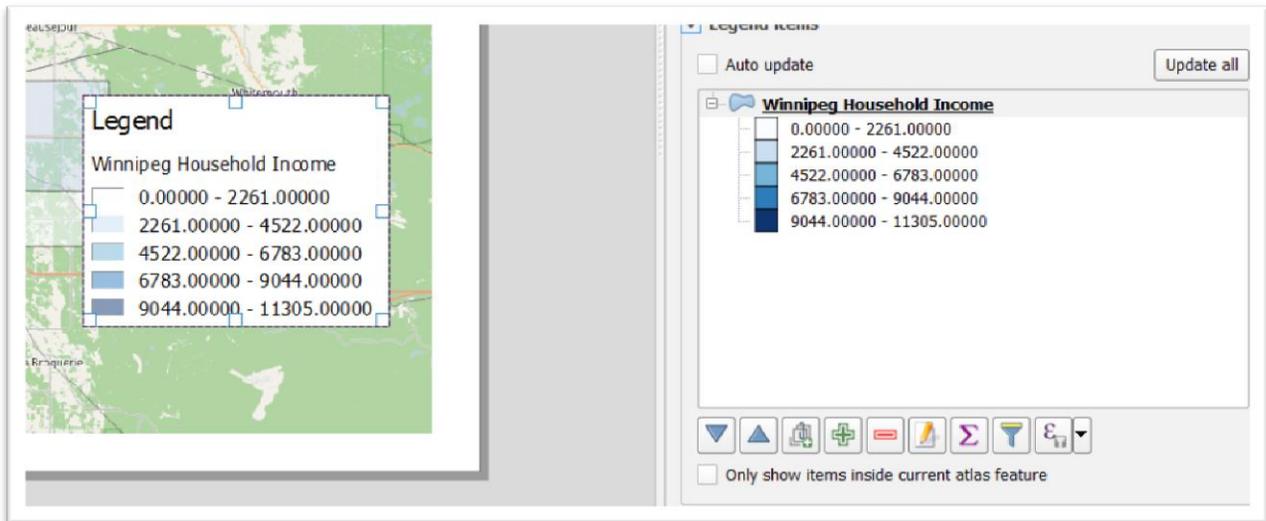
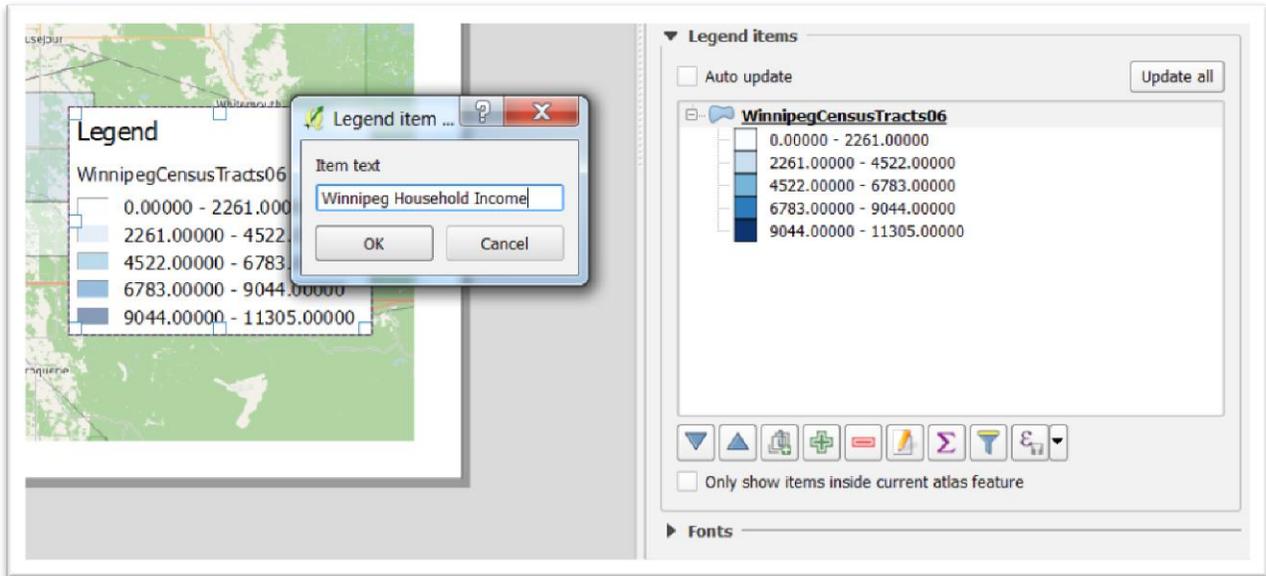
Note: If, for whatever reason the legend dialogue box disappears on the right, click inside the legend on the map to make it re-appear.

In addition to removing the income level csv file name from the legend, do the same the “OpenStreetMap” title.



To change the name of a legend item as it shows up in the legend, click the legend item itself, and then the “Edit” button -- that resembles a pencil – to change its title in the legend.





To change the “Legend” title, or prefer that it doesn’t have a title at all, change it in the “Title” textbox under “Main properties” on your right.



Item properties

Legend

▼ Main properties

Title: Legend

Title alignment: Left

Map: Map 0

Wrap text on: []

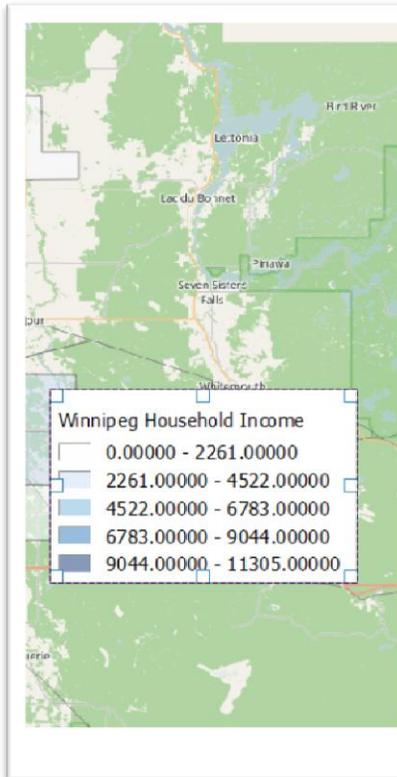
Resize to fit contents

▼ Legend items

Auto update Update all

Winnipeg Household Income

- 0.00000 - 2261.00000
- 2261.00000 - 4522.00000
- 4522.00000 - 6783.00000
- 6783.00000 - 9044.00000
- 9044.00000 - 11305.00000



Legend

▼ Main properties

Title: []

Title alignment: Left

Map: Map 0

Wrap text on: []

Resize to fit contents

▼ Legend items

Auto update Update all

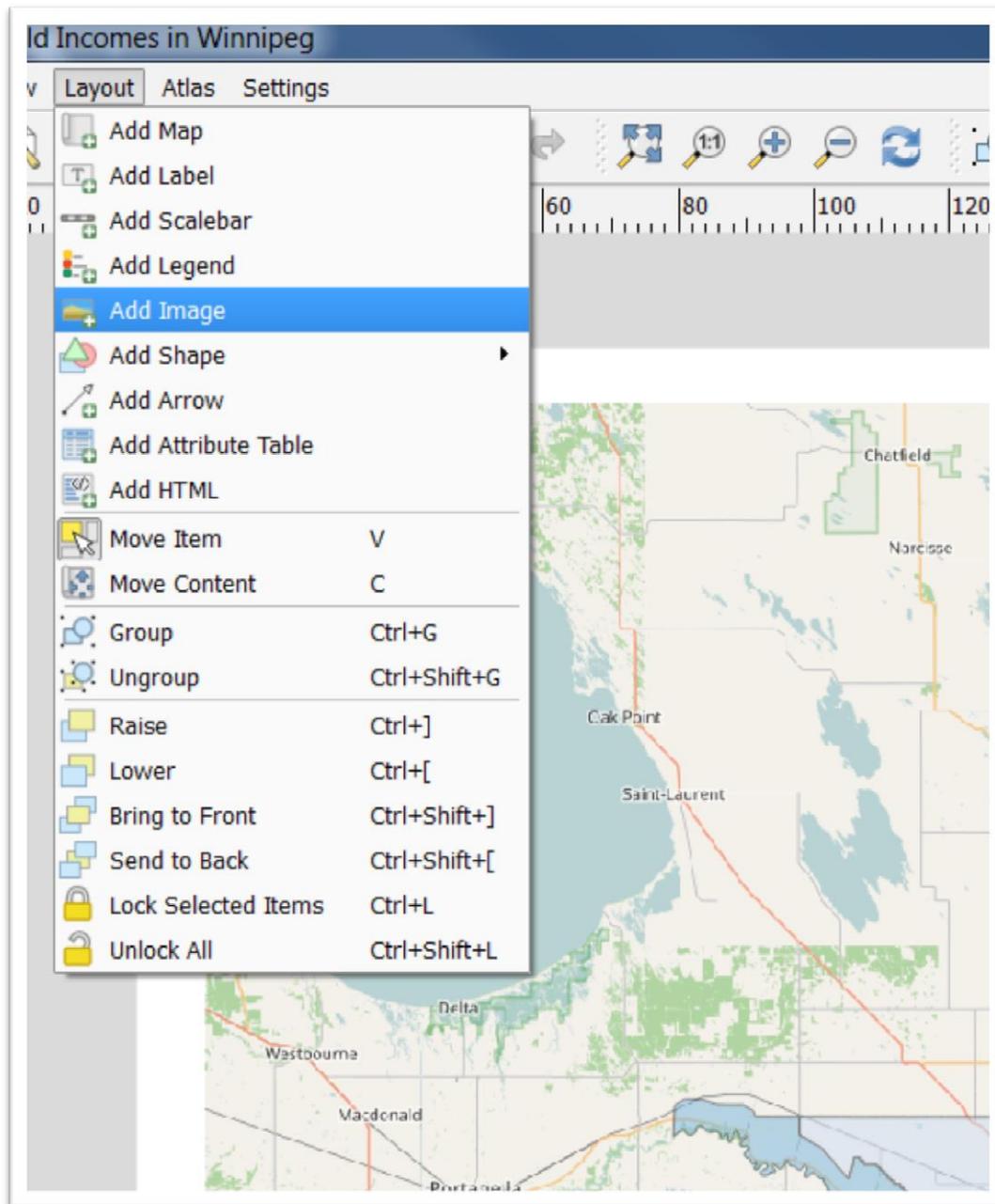
Winnipeg Household Income

- 0.00000 - 2261.00000
- 2261.00000 - 4522.00000
- 4522.00000 - 6783.00000
- 6783.00000 - 9044.00000
- 9044.00000 - 11305.00000

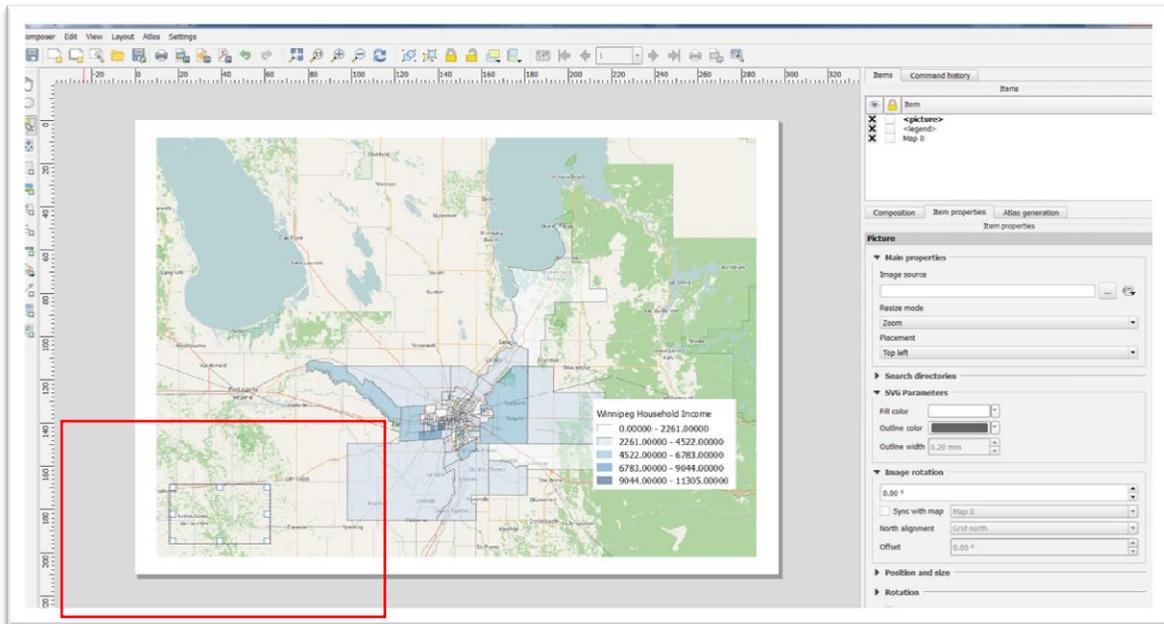
Navigation icons: [] [] [] [] [] [] [] [] [] []

Let's add two more items that will help people viewing the map.

To obtain a North Arrow, go to the menu and select “Layout, and then “Add Image.”

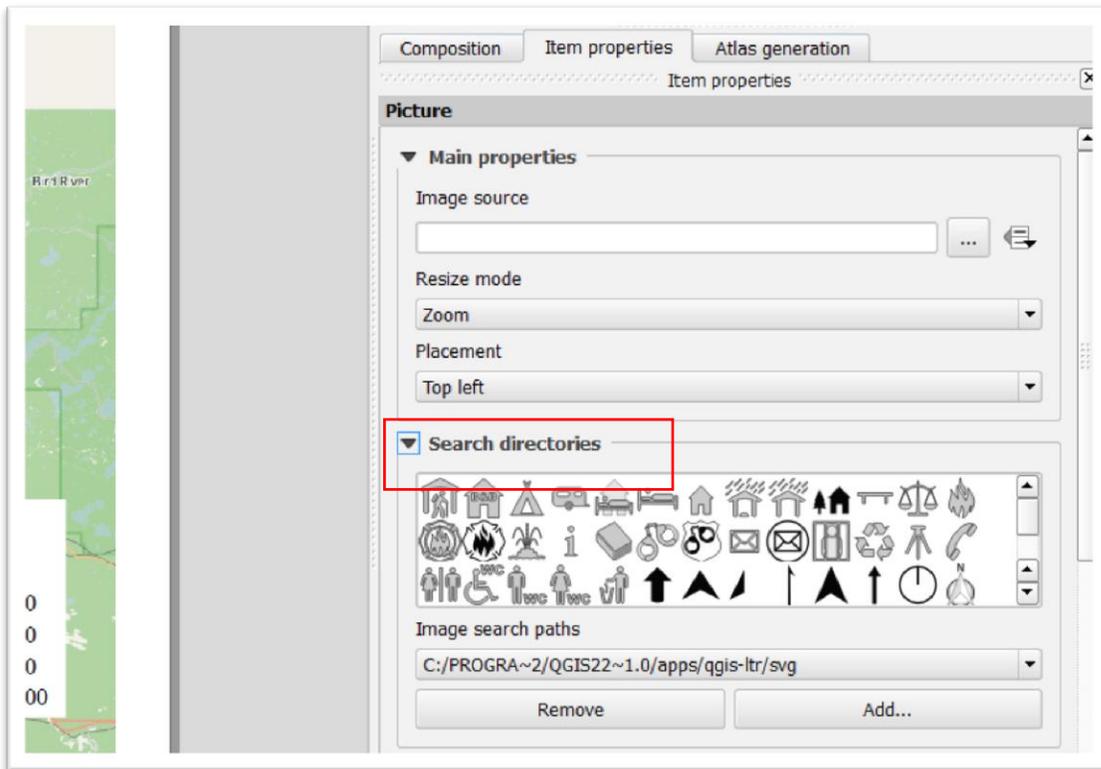


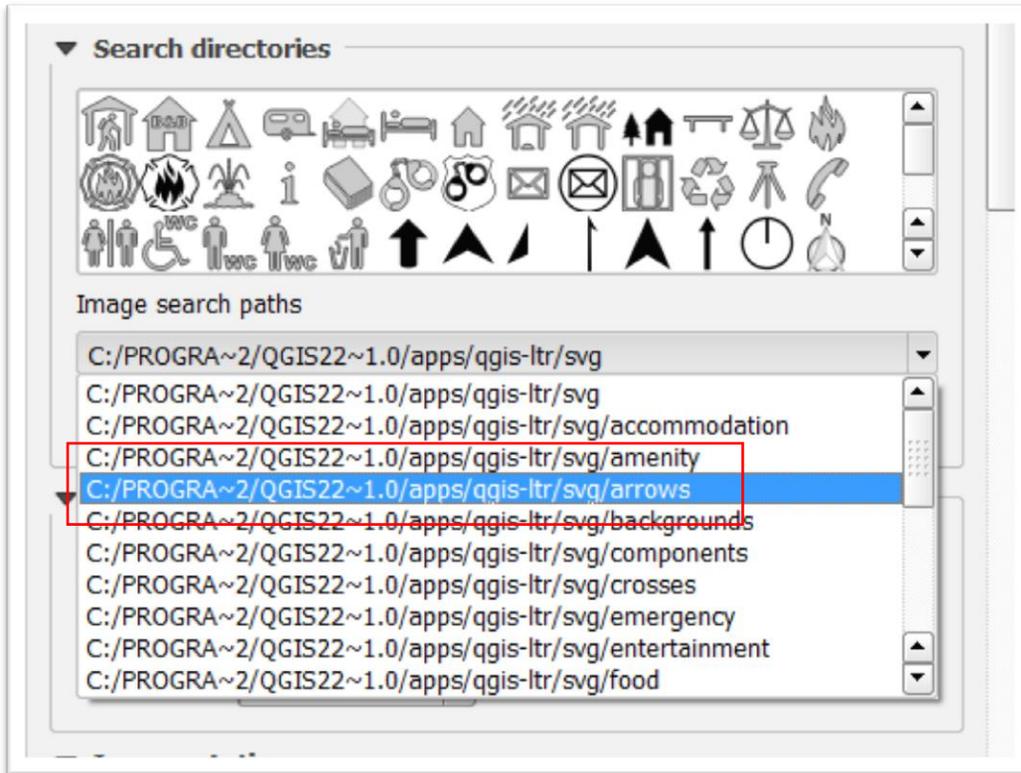
Draw the box where you want the north arrow to go.



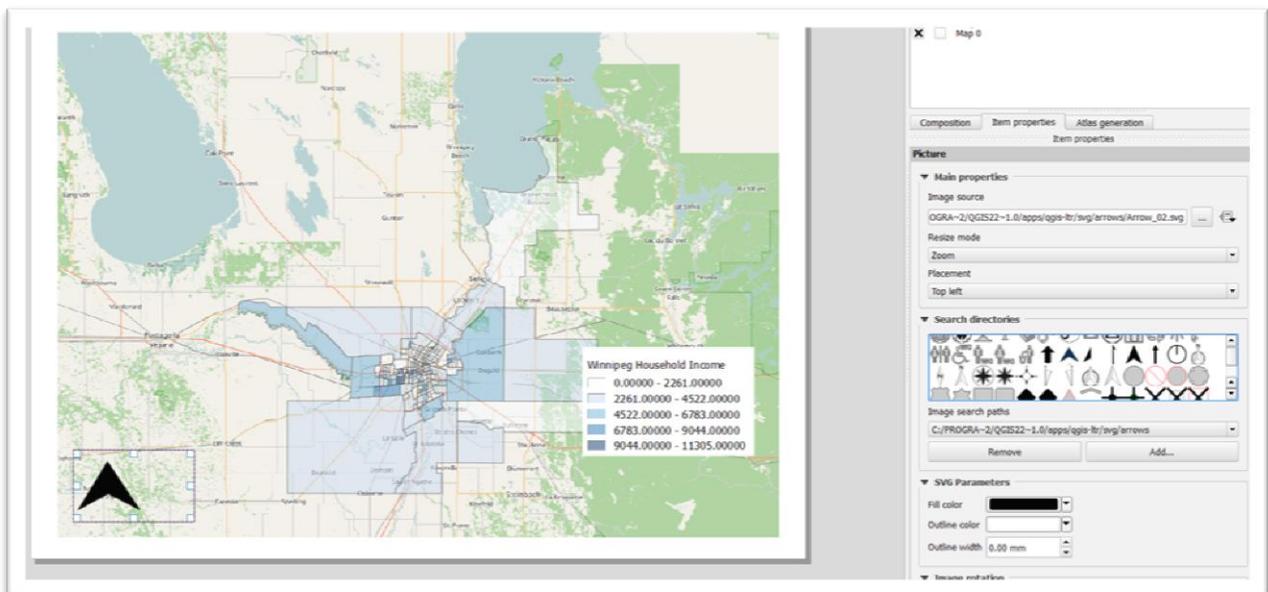
This produces an “Item properties” panel to the right.

Click the “Search Directories” submenu, and under the Image search paths, find the one ending in “/arrows.”



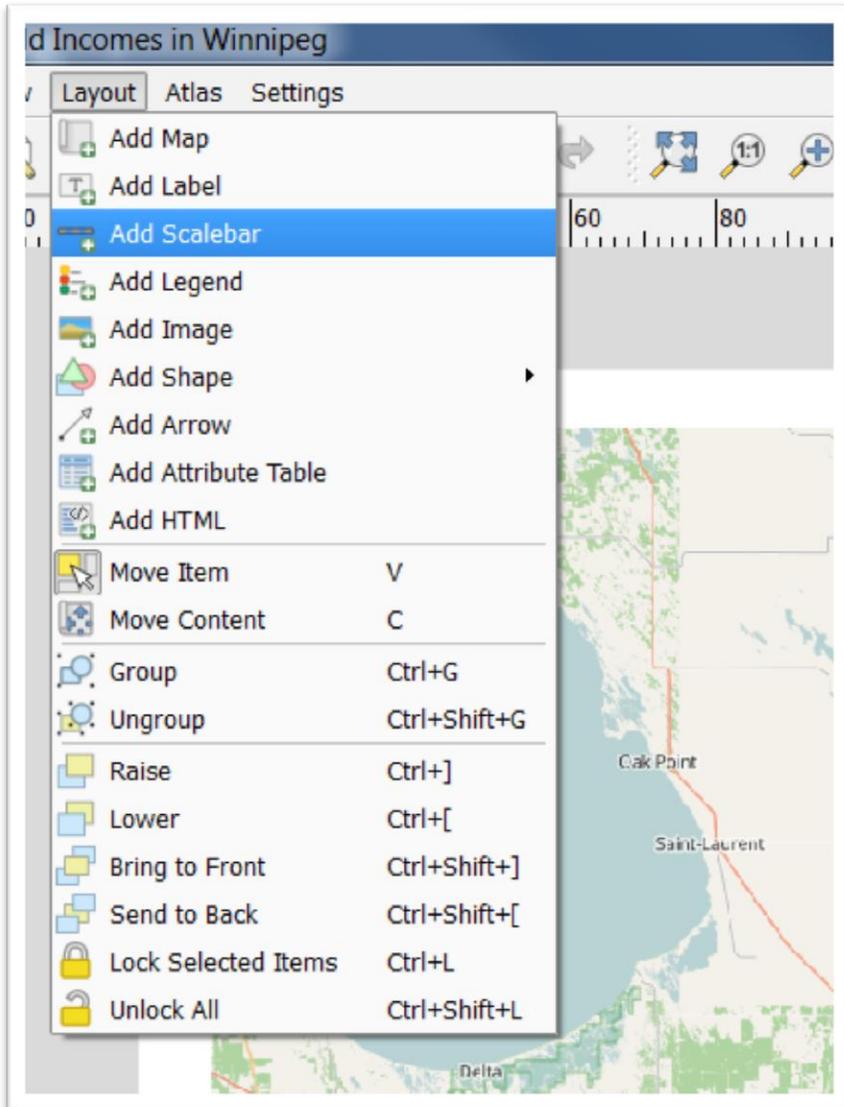


Select an arrow that meets your needs.

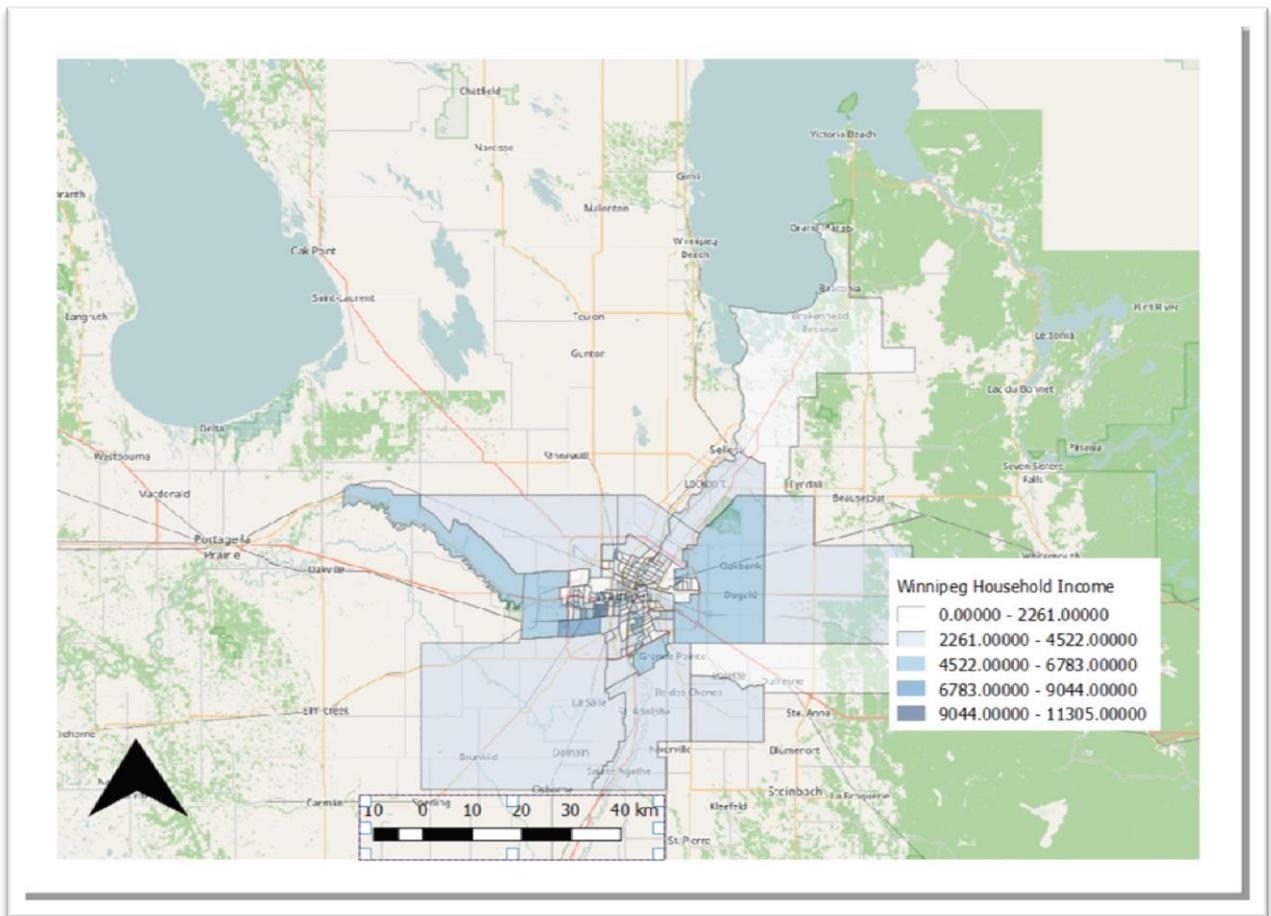


Now let's add a Scale Bar.

In the menu, select "Layout", and then "Add Scalebar."

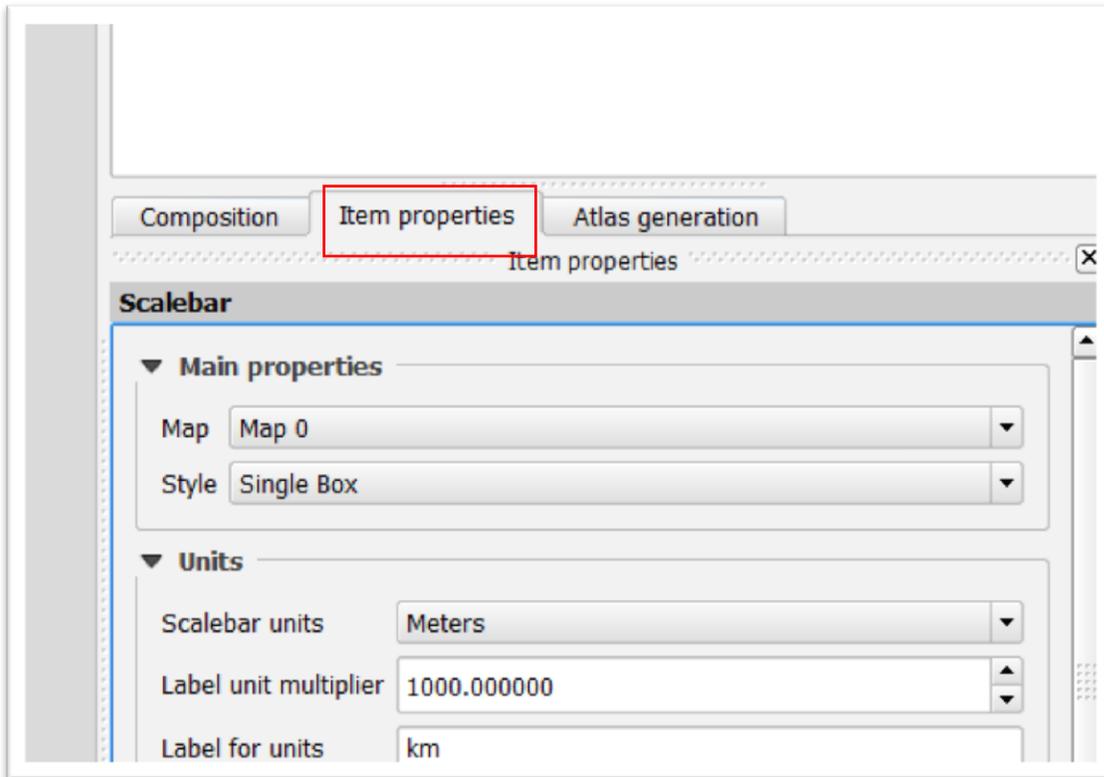


Draw a box where you would like to see the scale bar.

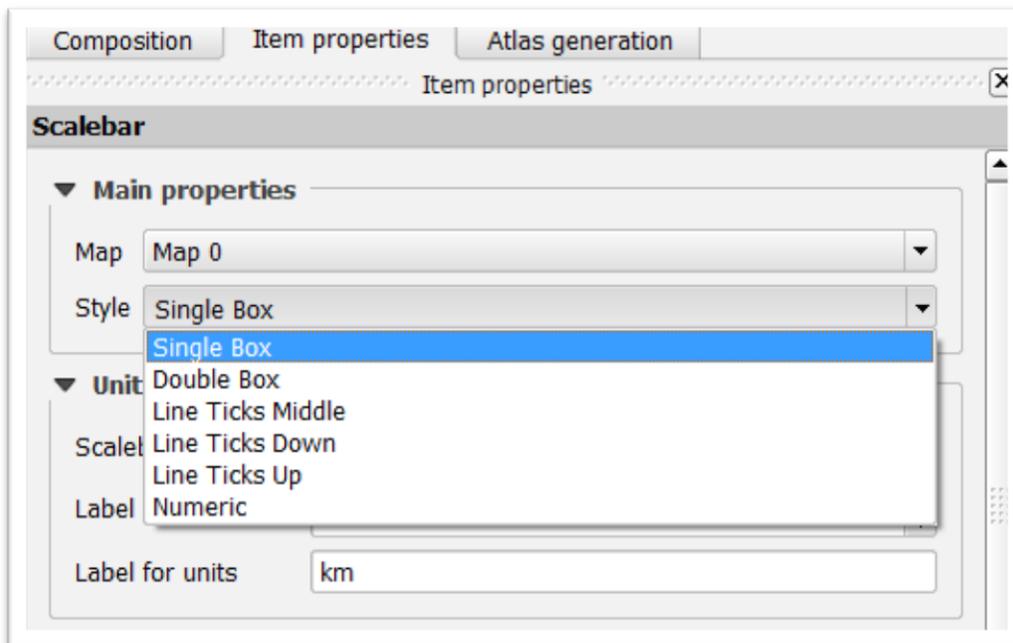


You can also adjust the size of the scale bar box by clicking and dragging on one of the squares at the edge of the box.

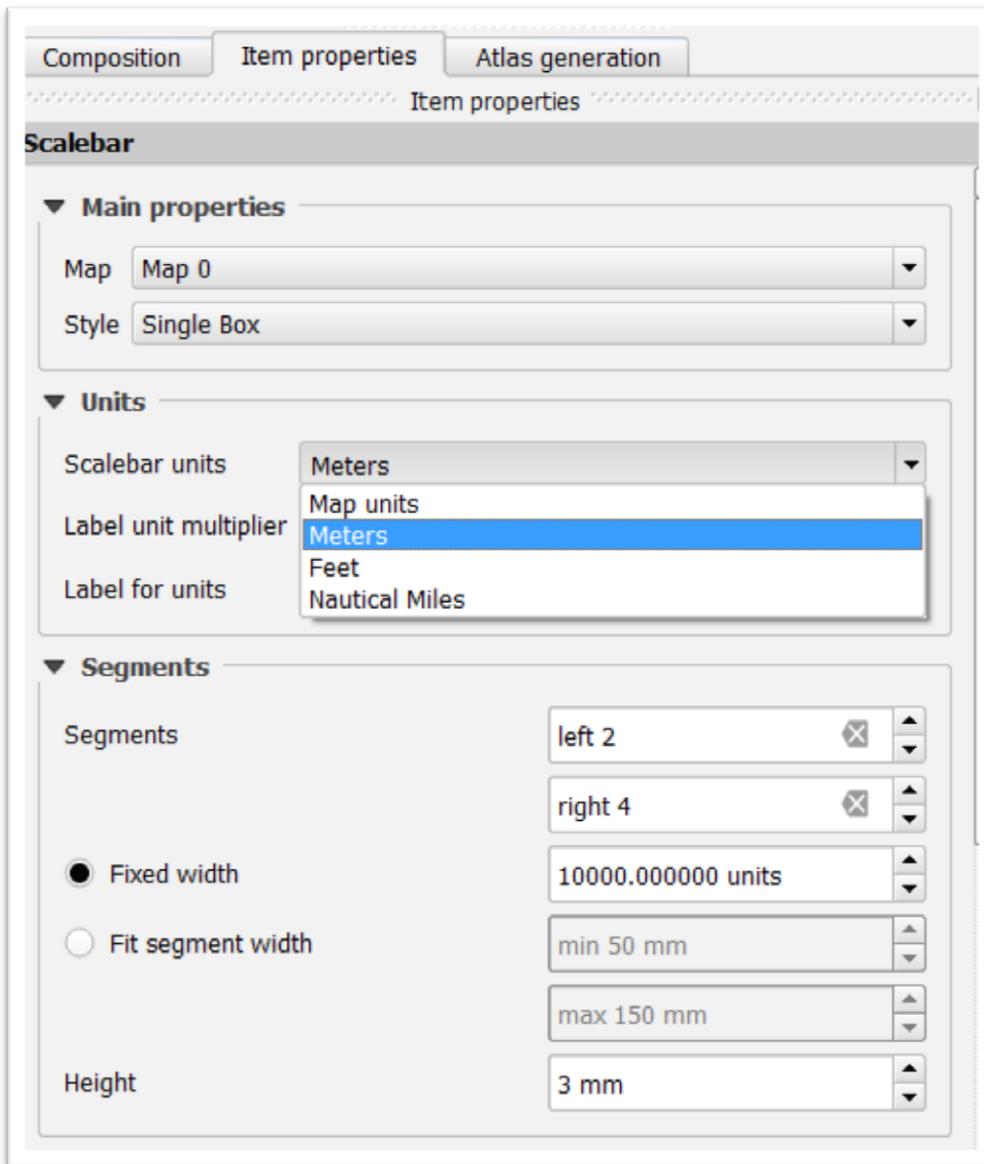
In the “Item properties” tab.....



.....select one of six styles under the “Style” dropdown.

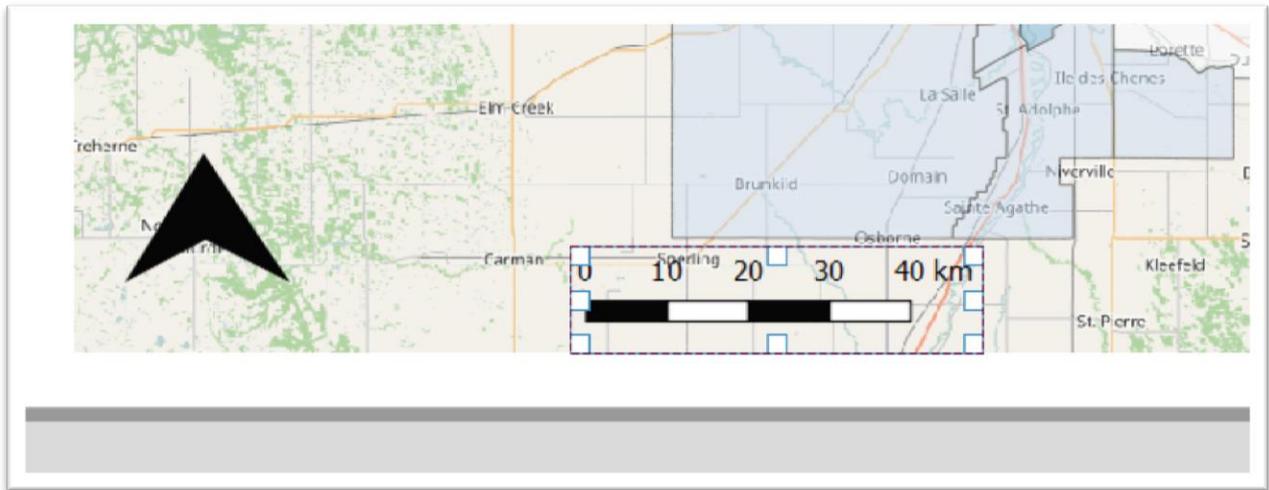


Choose the units for the scale bar under “Units”.



You can also adjust the segments in the Segments area.

For instance, left 0 and right 4 produces a result you can see in the screen grab below.

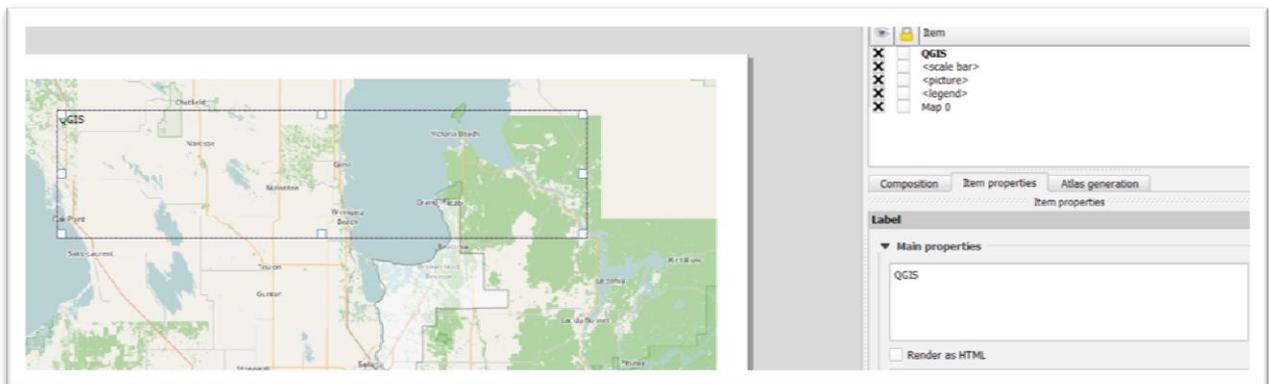


Finally, we will add a title to the map.

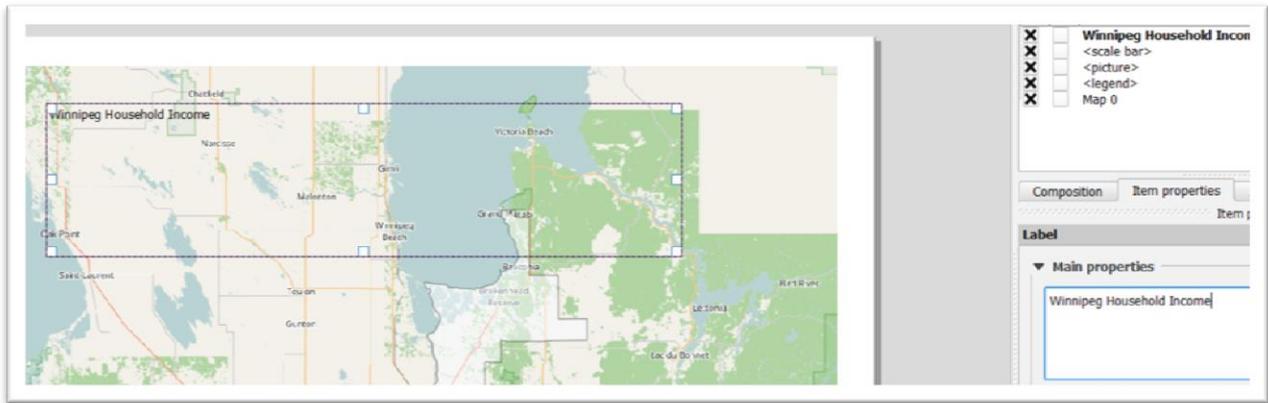
In the menu, select “Layout”, just like we’ve done in previous steps, and “Add Label.”

Draw the box where you’d like the title to go, knowing that can always move it later on.

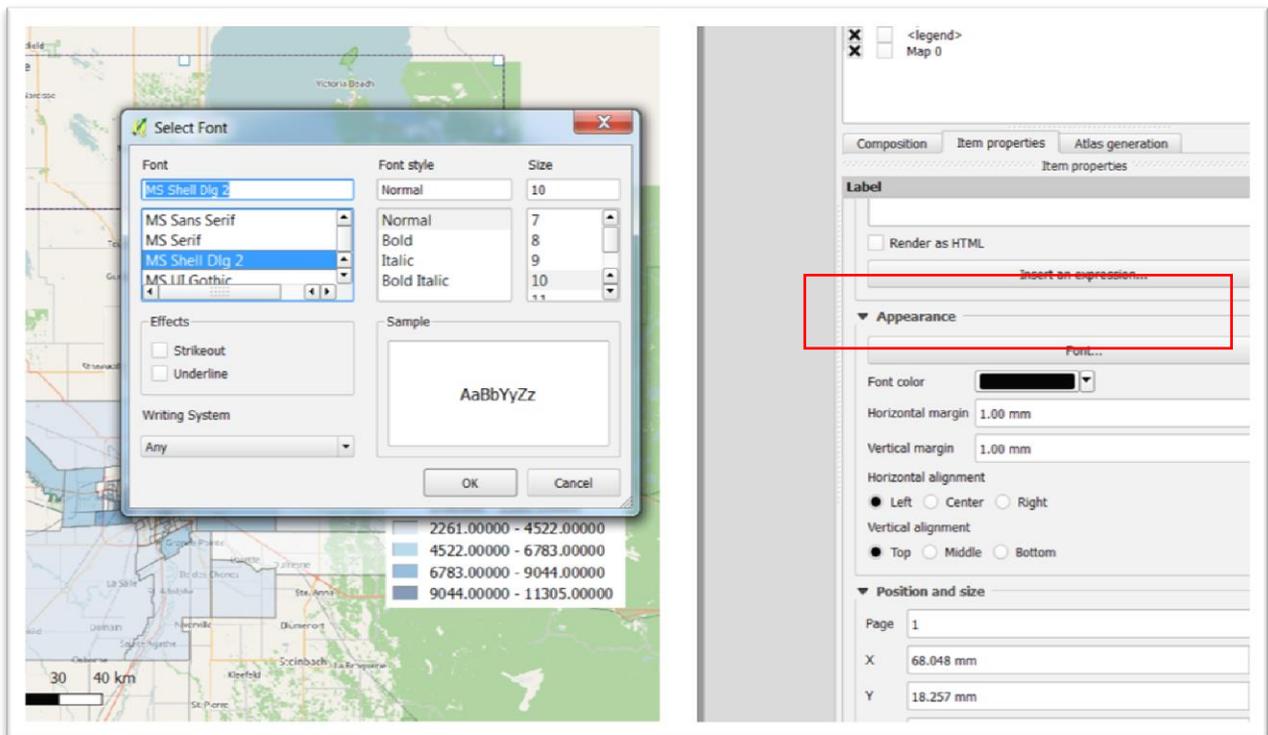
A menu will appear to your right.

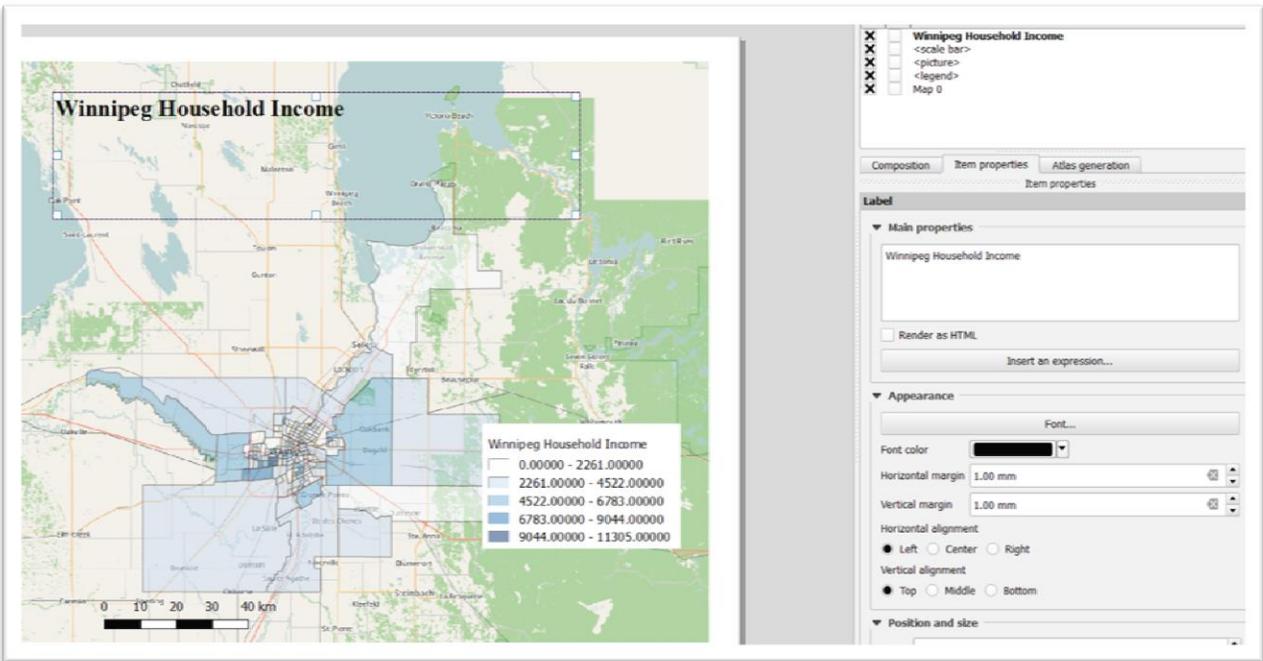
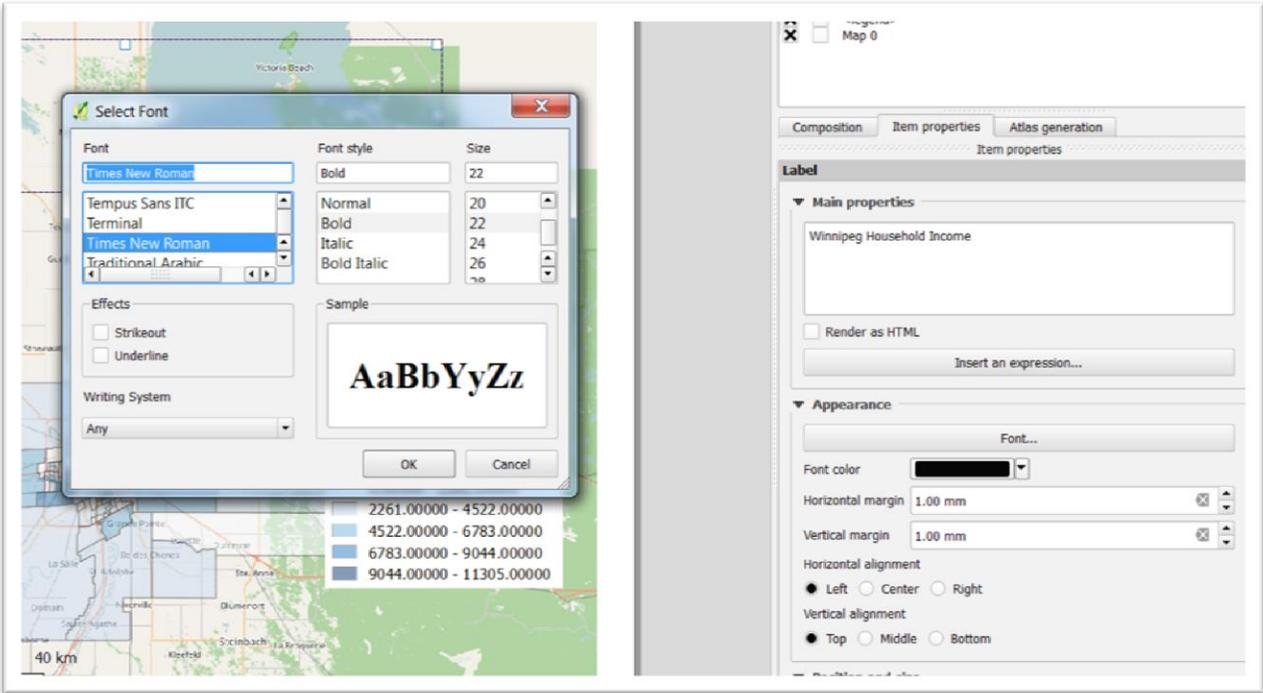


Type the title in the “Main properties” textbox to the right.

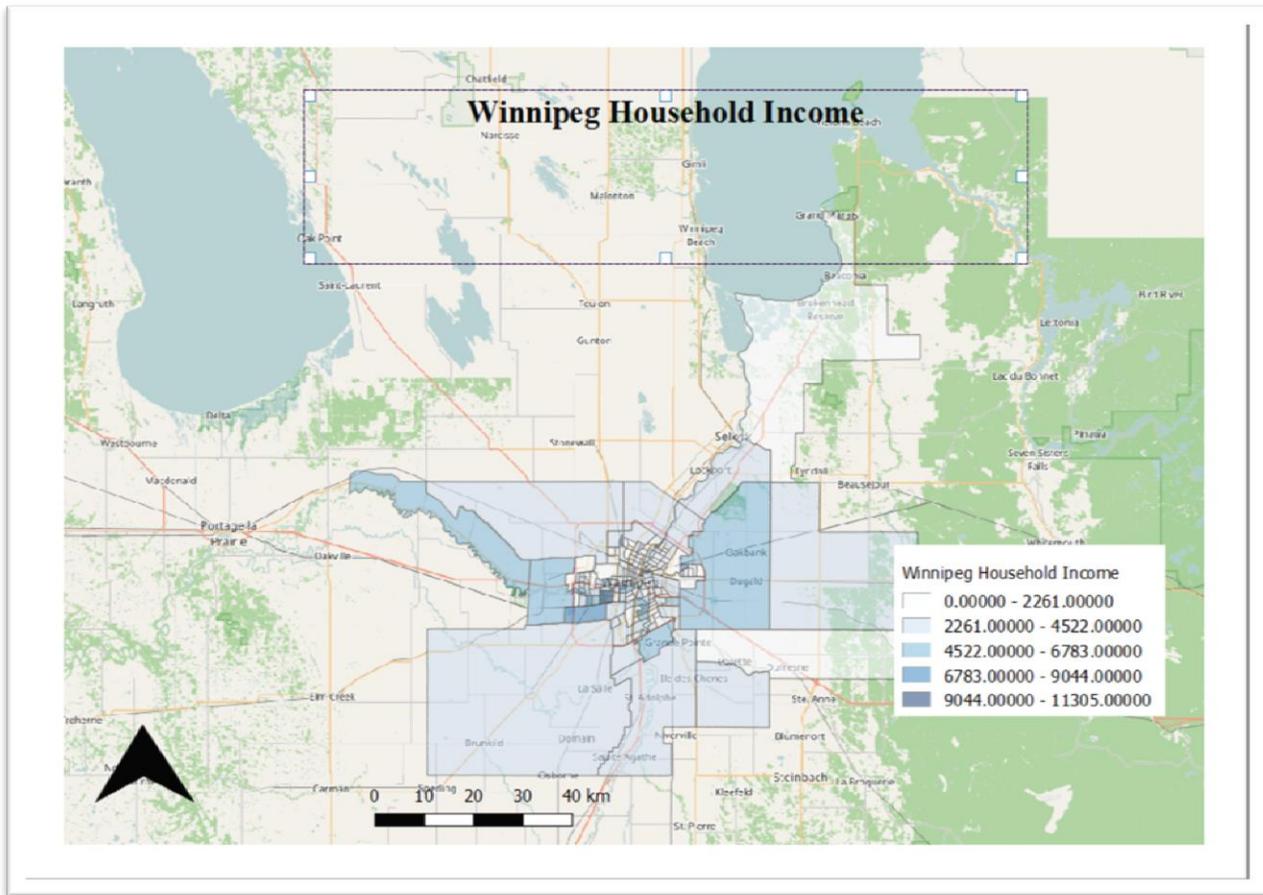
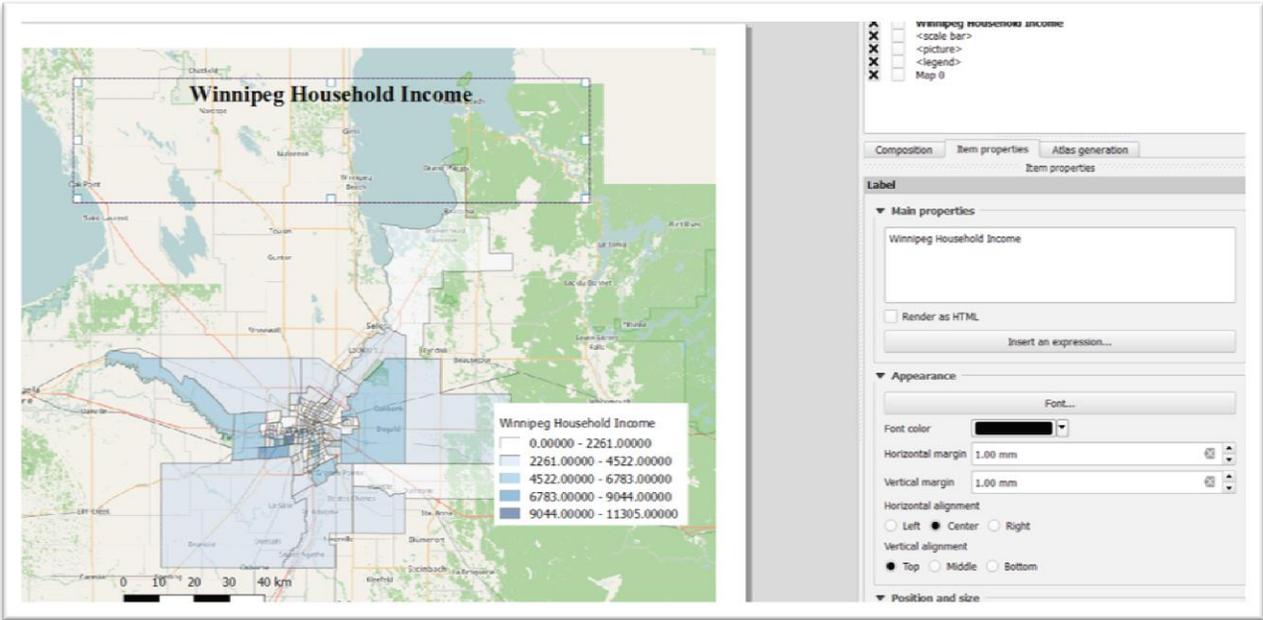


You can also adjust the font size and colour by selecting the “Font” under “Appearance”.



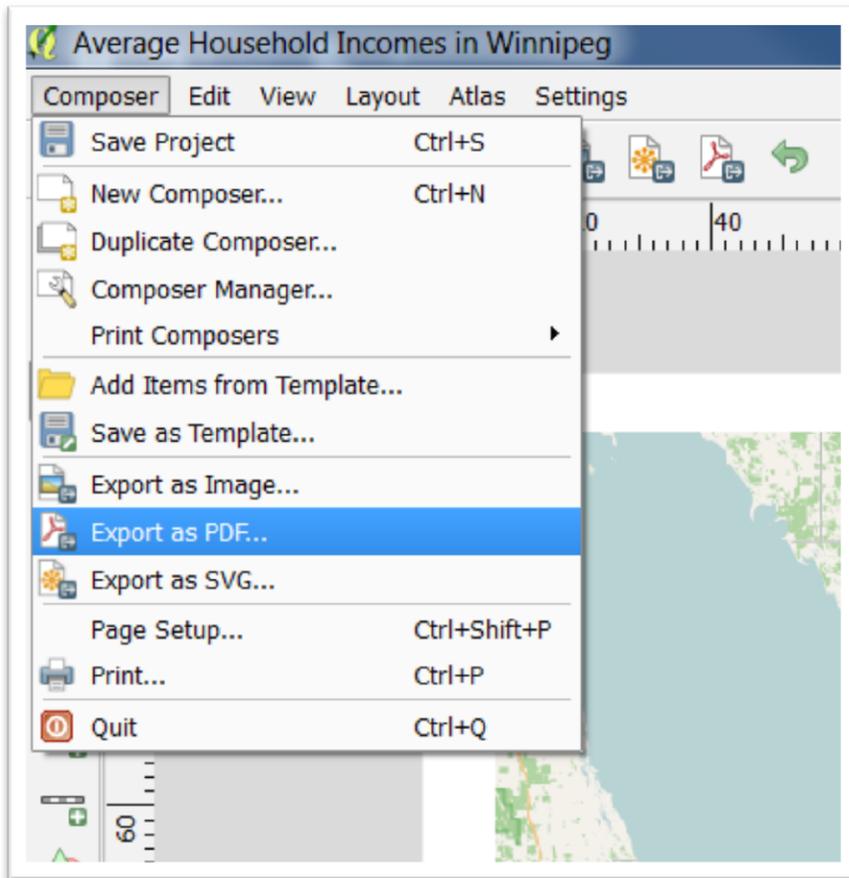


Align the title by selecting the radio button to the right of Center” on the right tunder “Horizontal alignment”.

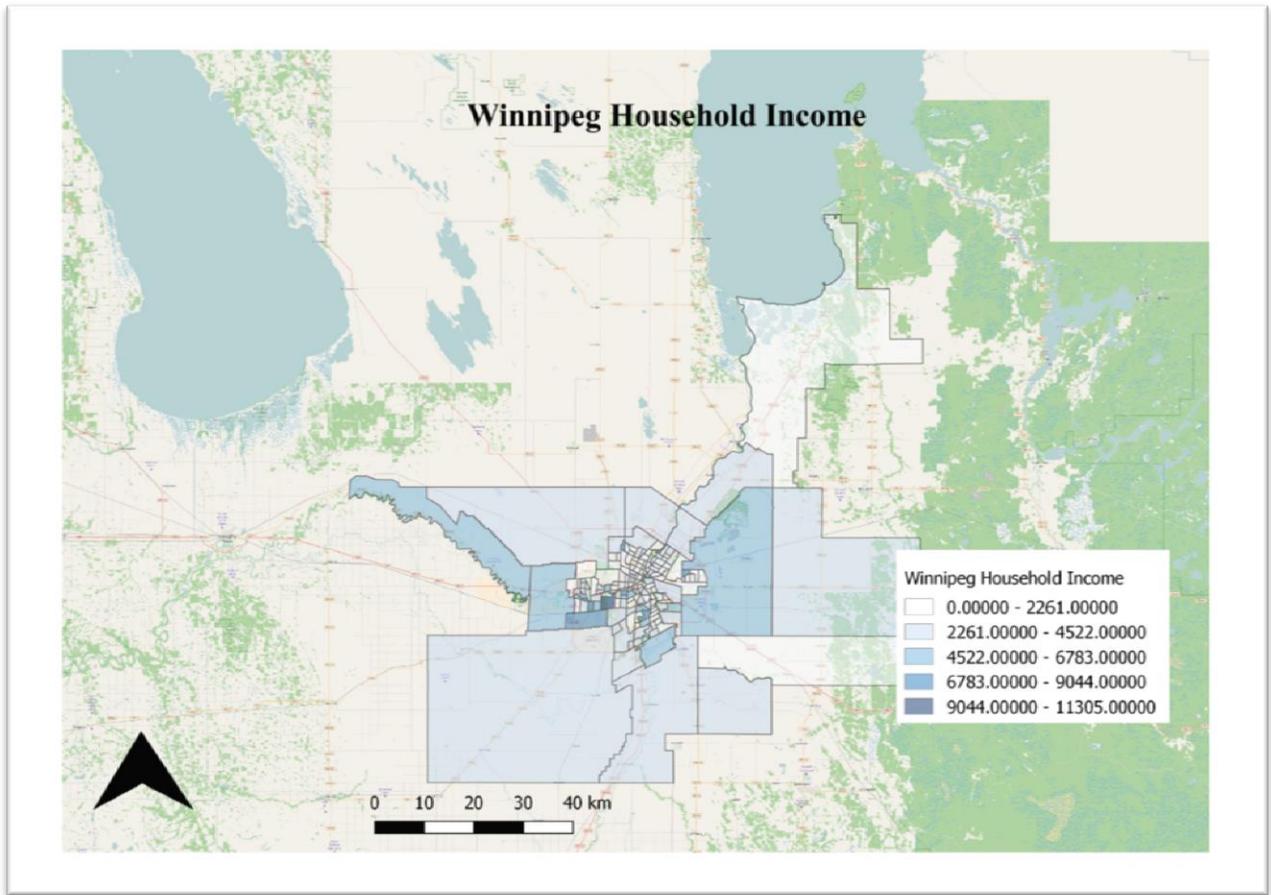


Adjust the font to your liking and, if necessary, move the title to a more desired location on the map.

If you're happy with the result, export your map layout as a PDF by going to "Composer" on the main menu at the top, and selecting the "Export as PDF" option.



Browse to where you want to save the file and give it a name.



Choropleths are effective ways of communicating important information.