

HOW TO GENERATE OFFLINE MAPS FOR SURVEY SOLUTIONS IN QGIS

INTRODUCTION

In this tutorial we will show you how to generate in QGIS the mapping input to configure offline maps for Survey Solutions that will be displayed in both the [Map Dashboard](#) and the [Geography Question](#).

We recommend reading the documentation about the [Geography Question](#) and the [Map Dashboard](#) at the [Survey Solutions knowledge base](#) before you go through this tutorial. It will help you to better understand what the mapping features in Survey Solutions are for and how they work.

In this tutorial we will cover the necessary operations in QGIS to produce offline maps automatically using the Atlas tool.


1. INSTALL QGIS

We will use QGIS to generate and prepare all the GIS inputs for the Geography Question. QGIS is open-source GIS software freely available here: <https://qgis.org/en/site/forusers/download.html>.

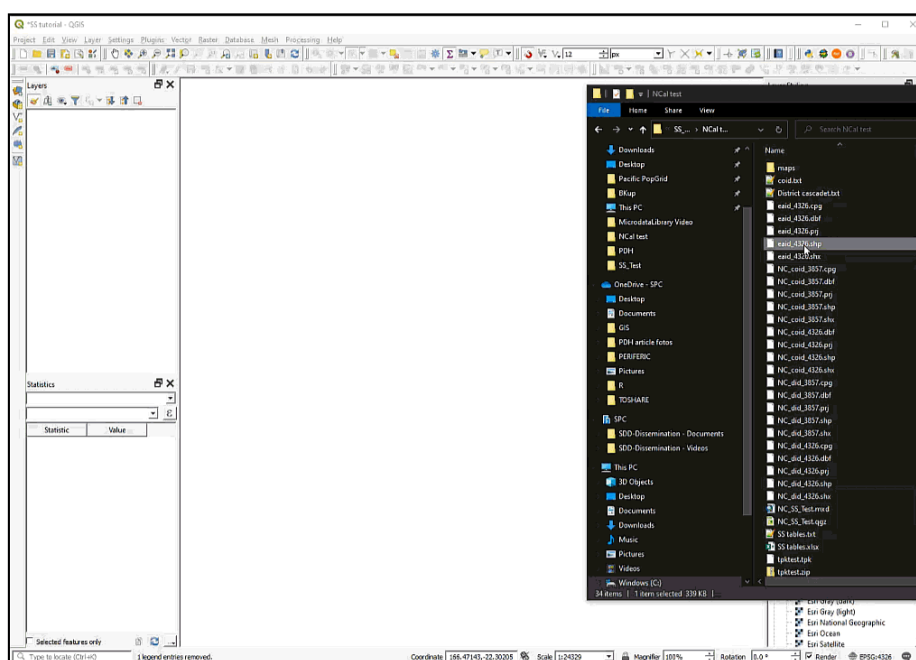
If you need help to install the software in your computer, you can check on the [QGIS for census and survey mapping manual](#).

2. PRODUCE THE MAP LAYOUT

2.1. Load the administrative unit layer (e.g. Enumeration Areas, Census districts)

Once QGIS is installed on your computer, start the program and click on  to generate a New Project instance.

Load the layer corresponding to the administrative unit framework (in this example enumeration area) utilized in the questionnaire loaded in the Survey Solutions server. The easiest way to do this is to drag and drop the .shp file into the map canvas.¹

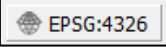


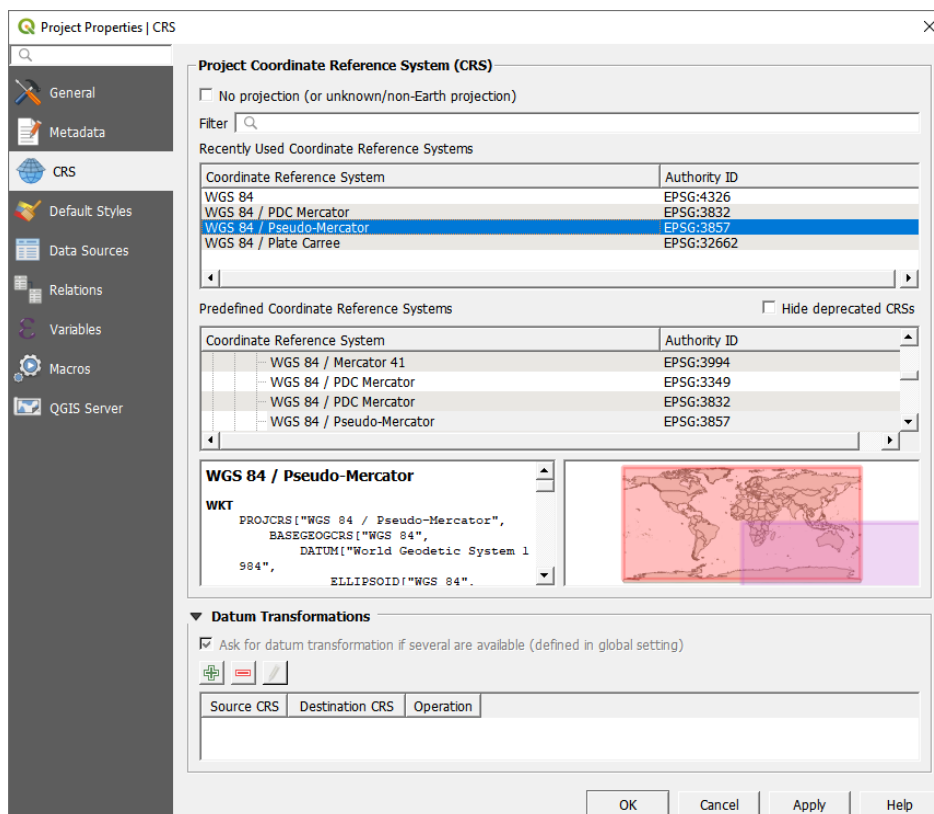
¹ This applies in case of using shapefile format, for other formats such as Geopackage (.gpkg), Keyhole Markup Language (.kml) the "drag and drop" method works as well.

2.2. Configure the projections

We need to set the project's and the layer's projection to WGS 84 Pseudo-Mercator. This is a requirement for the correct operation of the offline maps in the Survey Solutions Interviewer app (Version 20.09).

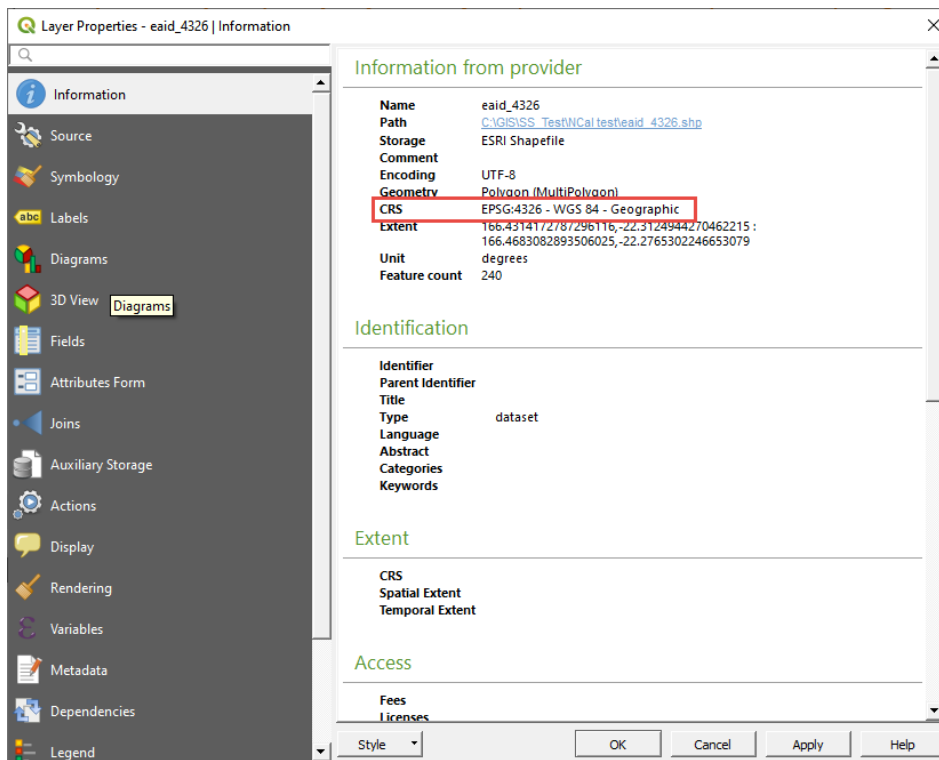
Check and modify project's projection

- In the bottom-right corner of the QGIS interface the CRS used by the project is displayed.
- Click on  to open **Project Properties** and go to **CRS**.
- In this panel, it is possible to select the CRS that will be used by our project.
- Use the search bar to find a suitable CRS for your project. In this case, we will search for **“WGS 84 / Pseudo-Mercator - EPSG: 3857”**.
- Select the CRS with code EPSG: 3857.
- Click **OK**.

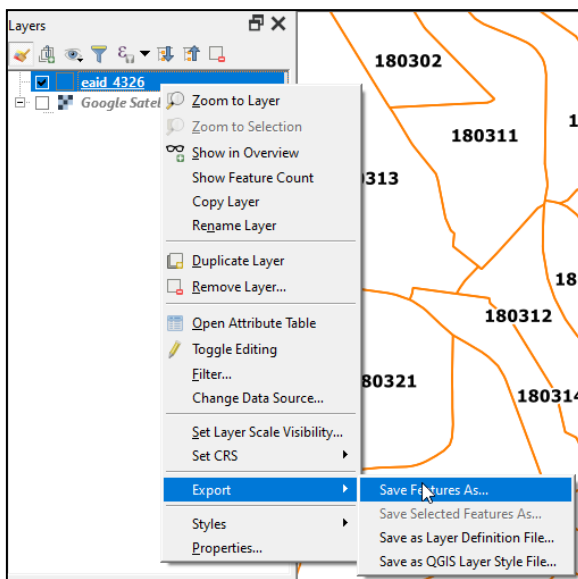




Check and modify layer's projection

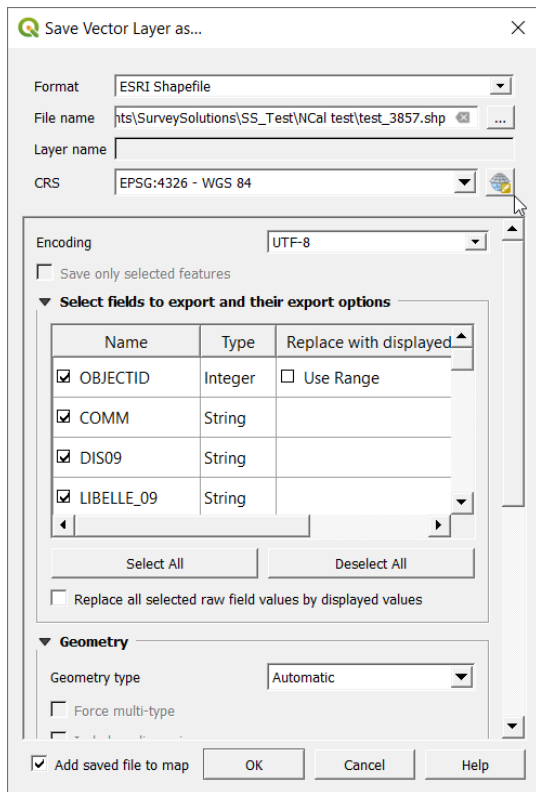
- Open **Layer Properties** to check which CRS the layer is using (to open **Layer Properties**, double-click on the layer's name in the **Layers** panel).
- Go to **INFORMATION**. In the **INFORMATION FROM PROVIDER** section, you will find the CRS used by the layer. Click **OK**.



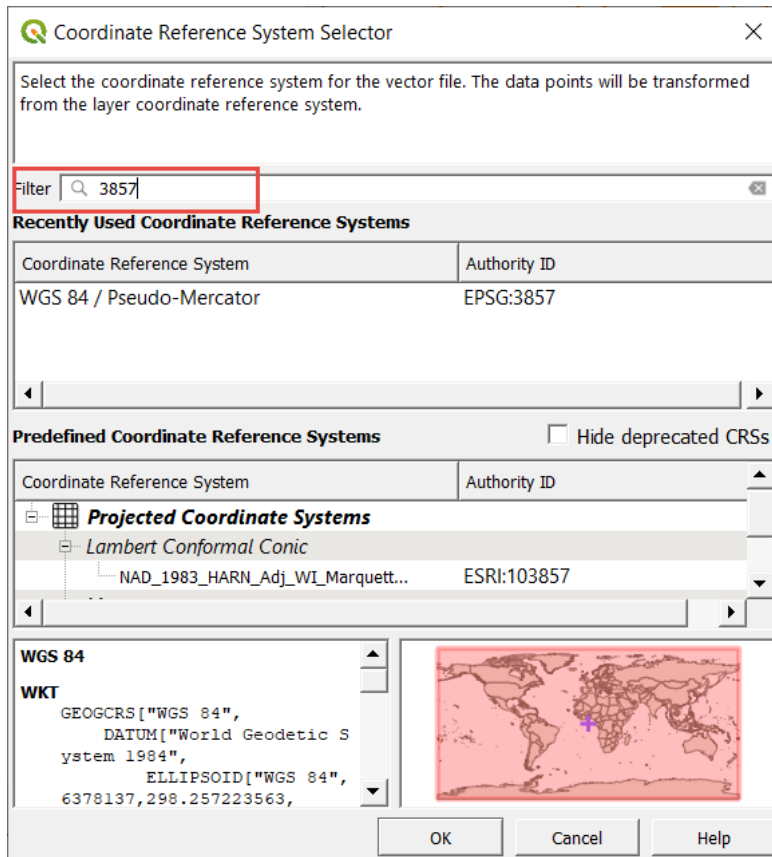
- c. If the CRS used is different from WGS 84 Pseudo-Mercator EPSG:3857, follow the steps below.
- d. In the **Layers** panel, right-click on the layer's name and go to **EXPORT > SAVE FEATURES AS...**



- e. Next to **FILE NAME**, click on  to open the file explorer and select the name and location of the new layer.
- f. Next to the **CRS** bar, click on  to open the **Coordinate Reference System Selector**.



g. In the **FILTER** bar, type: 3857



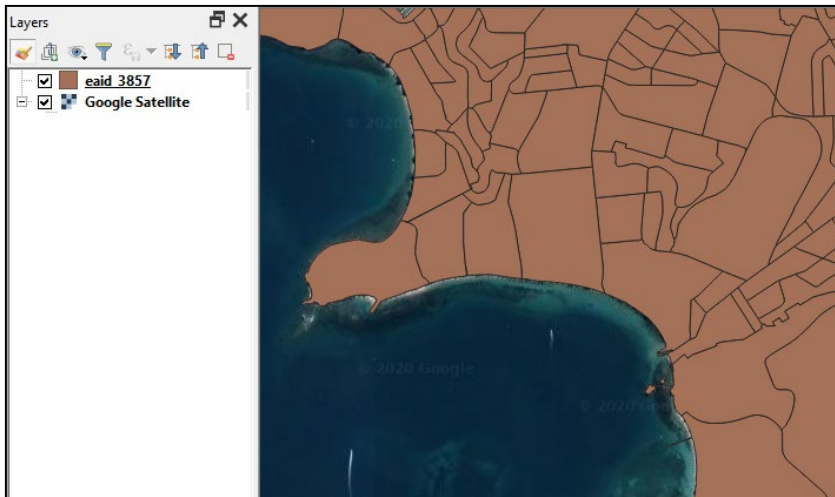
- h. Select the **WGS 84 / PSEUDO-MERCATOR** CRS in one of the panels below and click **OK**.
- i. Back on the **Save Vector Layer as...** panel, click on the **OK** button.

2.3. Configure layers and styles

Add satellite image to the map using XYZ tiles

- a. In the **Browser** panel, right-click over **XYZ TILES** and select **NEW CONNECTION...**

- b. Under **NAME**, add the name we want see on the **Browser** panel for this connection, such as **Google Satellite**.
- c. Paste it into the **URL** bar <https://purl.org/spc/digilib/doc/pscn2>
- d. Click **OK**.
- e. In the **Browser** panel, below **XYZ TILES**, the connection **GOOGLE SATELLITE** should now be available.
- f. Display the satellite image background from Google on the map canvas by double-clicking on **GOOGLE SATELLITE**.
- g. Make sure that in the **Layers Panel**, the satellite image is located below the administrative unit layer to ensure we visualize the ADMINISTRATIVE UNIT layer over the satellite image.



To learn how to add other base maps available, you can check on chapter 3.5 of the [QGIS for census and survey mapping manual](#).

Setting administrative units layer style

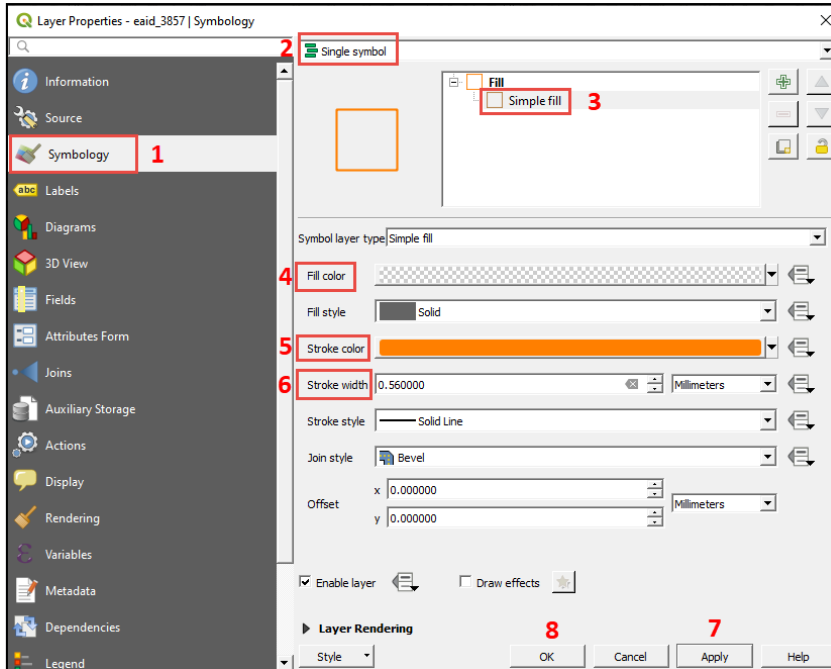
The basic idea of the map is to show the boundaries of the administrative units labelled with the code on top of the satellite image. Something like the example below.



To get to this result we need to set the style of the administrative unit layer with a transparent fill combined with a contrasted color for the outline.

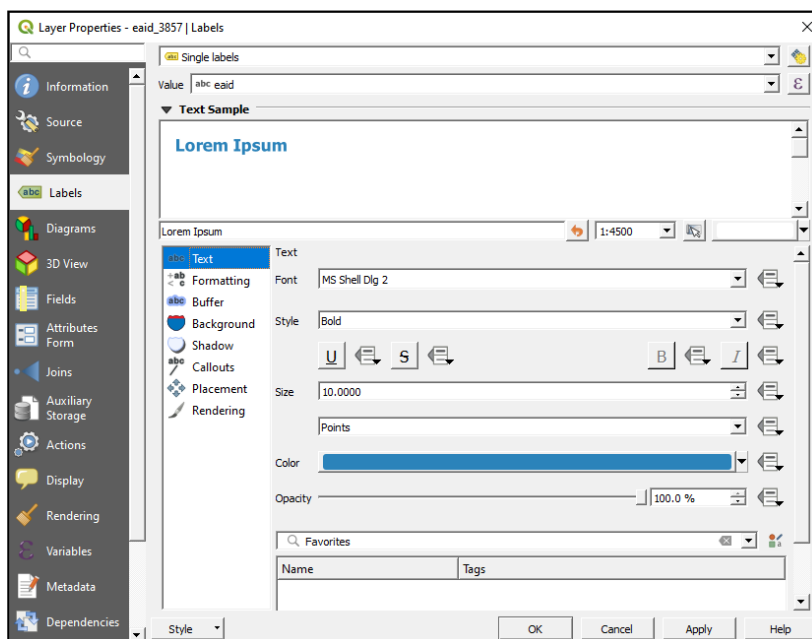
- a. Open **Layer Properties** by double-clicking on the layer.
- b. Go to **SYMBOLOLOGY** and select **SINGLE SYMBOL** option in the drop-down menu located on top.
- c. Click on **SIMPLE FILL** to modify the polygon style settings.
- d. In **FILL COLOUR**, select transparent fill.

- e. In **STROKE COLOUR**, select a colour for the outline of the polygon that contrasts with the background in order to improve the visibility of the boundaries.
- f. In **STROKE WIDTH**, find a compromise between the level of detail and the visibility of the polygon's limits.
- g. Click **APPLY** to preview the results on the map and, once you are happy with them, click **OK** to save the changes.

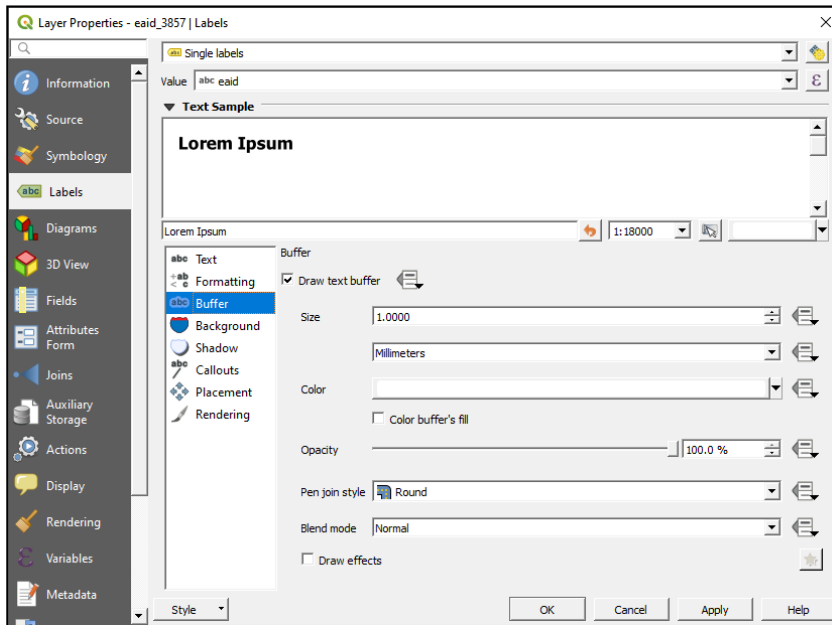


Follow the following steps to add the labels for the administrative unit codes of each polygon.

- a. Open **Layer Properties** by double-clicking on the layer.
- b. Go to **LABEL** and select **SINGLE LABELS** option in the drop-down menu located on top.
- c. In **VALUE** select the field containing the administrative units' code that you want to display on the map. In our case we select the field **eaid**.
- d. In **TEXT** select the font, colour, size and style of the text displayed.




- e. To improve the contrast of the text over the satellite image, go to **BUFFER** and check the **DRAW TEXT BUFFER BOX**.





- f. Click **APPLY** to preview the results on the map and, once you are happy with them, click **OK** to save the changes.

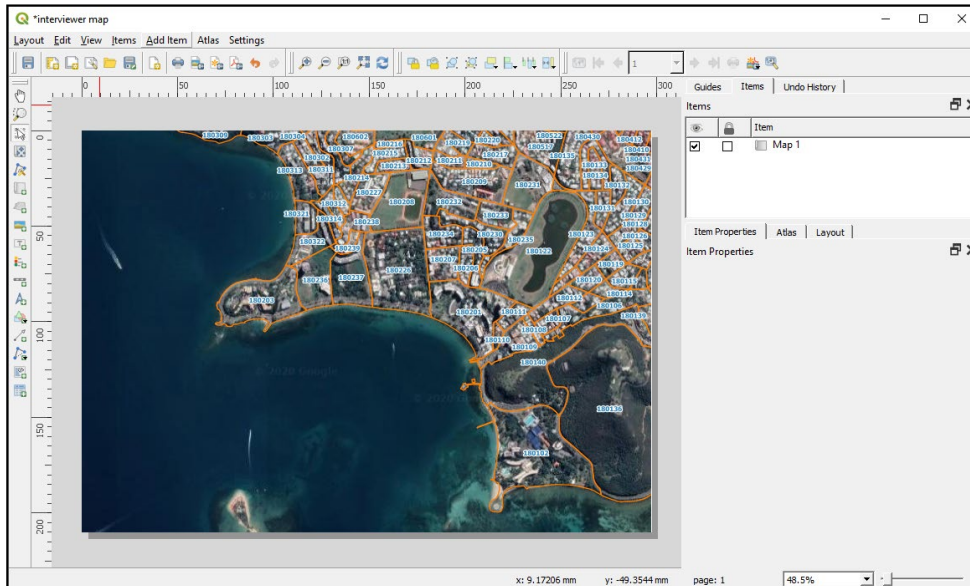


- g. Don't forget to click on  to regularly save your changes in the project.

3. CONFIGURING ATLAS TO AUTOMATE THE MAP CREATION.



3.1. Creating a basic layout

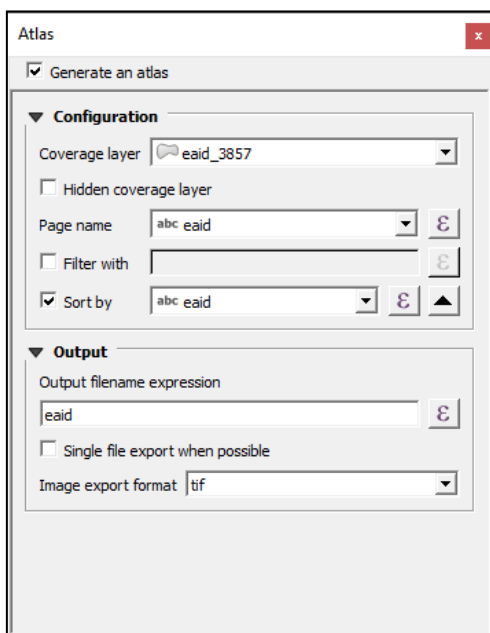
- a. To open a new layout, click on , or, in the top menu, go to **PROJECT > NEW PRINT LAYOUT**.
- b. Give the layout a name, then click **OK** and the **Print Layout** interface will appear with a blank layout.
- c. To add a map canvas, click on  and draw the rectangle where the map will be placed. In this example we do not want to have any white margins in our map, therefore we will adjust the map frame to the page border.




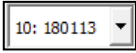




3.2. Atlas configuration

Now we are going to configure the atlas to automate the map creation. In a nutshell, QGIS will jump from one polygon to another creating a map, exporting it into .tif format and naming each file with the corresponding administrative unit's code.

- h. The **Atlas** menu should appear on the right side of the interface where the different layout menus are located. If it does not appear automatically, you can either click on  or go to **ATLAS > ATLAS SETTINGS**.
- i. In the **Atlas** menu, check **GENERATE AN ATLAS** box.
- j. In **COVERAGE LAYER**, select the administrative unit layer (in our case *eauid_3857*), as this is the layer that contains the polygons that we want to map.
- k. **Do not check** the option **HIDDEN COVERAGE LAYER**, as we need to display the administrative unit boundaries on the maps.
- l. In **PAGE NAME**, select the **administrative unit code** field to assign page names using the administrative unit codes.
- m. Leave the **FILTER WITH** option unchecked.
- n. Check the **SORT BY** option and select the **administrative unit code** field to sort the maps using the administrative unit code.
- o. Uncheck **SINGLE FILE EXPORT WHEN POSSIBLE**, click on , delete the default expression and enter the following: **administrative unit code** (in our case "eauid").
- p. In **IMAGE EXPORT FORMAT**, we will select .tif as it is the compatible format with Survey Solutions server.



- q. In the canvas, select the map and go to the **Item Properties** menu. Scroll down to find the **CONTROLLED BY ATLAS** option and check it.
- r. Select **MARGIN AROUND FEATURE** and set **20%** (we modify this parameter according to our needs and how much surface we need to visualize around the polygons).
- s. Go to the top menu and click on  to enable the **ATLAS TOOLBAR**. Use the   buttons to navigate through the different maps. By using the pages display , we can go directly to the different administrative unit, as we have already configured the **PAGE NAME** parameters in this way.
- t. Make sure that you regularly save any changes to the project by clicking on .
- u. In the top menu of the **Layout Interface**, go to **ATLAS > EXPORT ATLAS AS IMAGES...**
Another option is to click on , located in the **ATLAS TOOLBAR**.
- v. Select the directory to where the maps will be exported.
- w. In the **Image Export Options** panel, we will set a resolution seeking a compromise between a reduced size of the files and the correct display of the images. In our example case we choose a resolution between 75 and 125 dpi.
- x. Click on **SAVE** to start with the exporting process.

If you want to learn more about the atlas tool, you can check on the chapter 7 in the [QGIS for census and survey mapping manual](#).

