

TP0: Introduction to QGIS

Nicolas Baghdadi and Hassan Bazzi

Objective:

In this TP, we will introduce QGIS (Quantum GIS) and learn some of its applications.

We will address the following points:

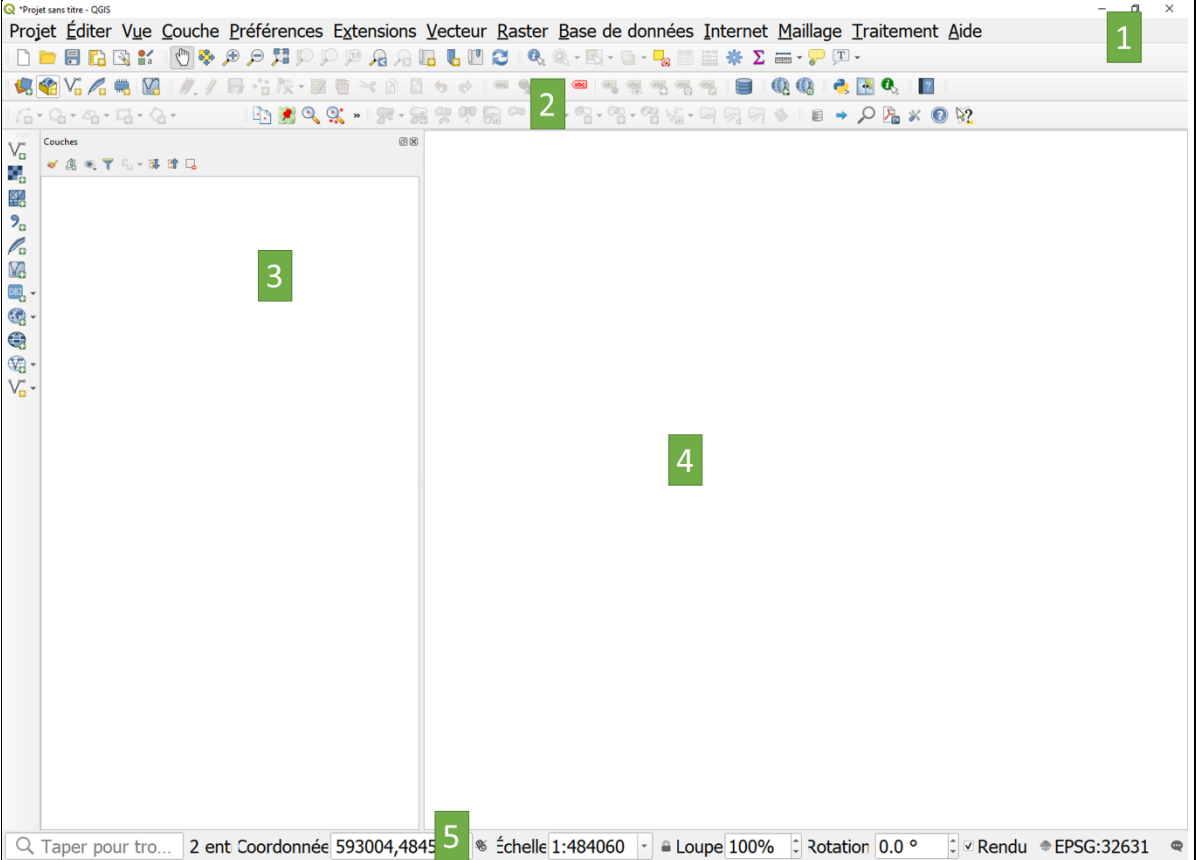
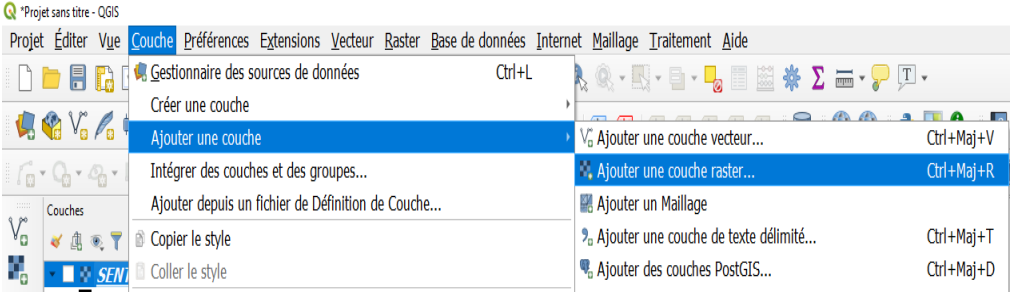

- Loading a layer « raster »
- Creating a new Vector Layer
- Calculating the surface area of a Vector Layer

Prerequisite TP:

1. Installation of QGIS (3.20)

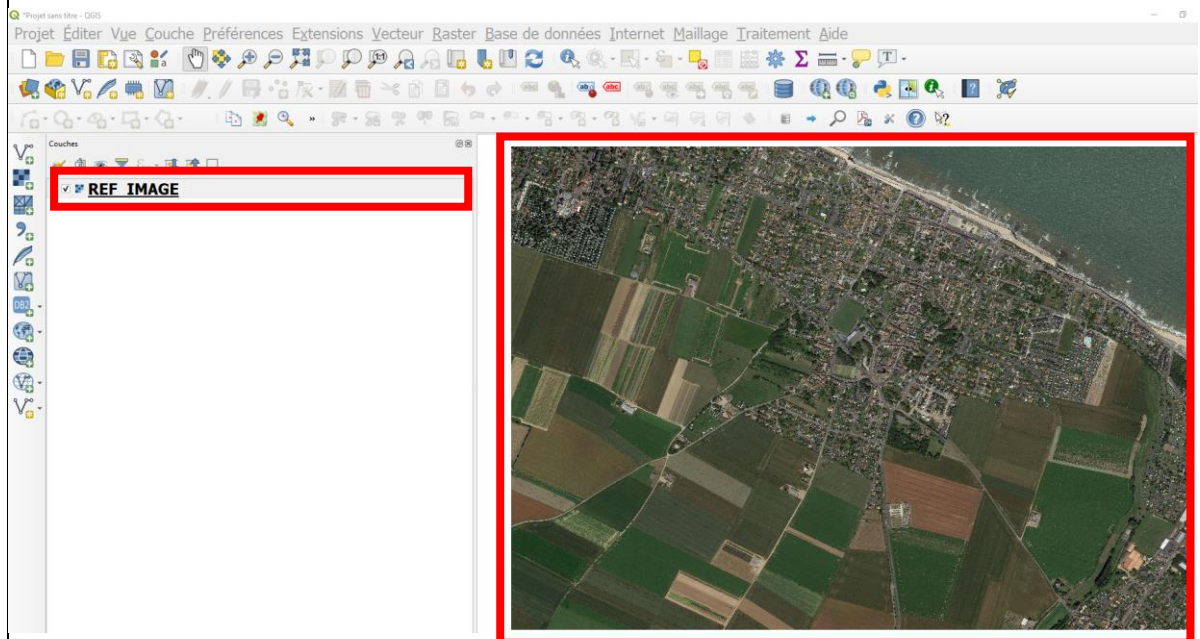
1. Loading an Image:

Objective: Loading an image onto QGIS.

Steps	Manipulation on QGIS
<p>1.1. Open QGIS program</p>	<p>➤ After installing « QGIS », QGIS becomes available for use on your computer. You can now launch the QGIS program by double clicking the « QGIS » icon, now you will see the following interface</p>  <p>➤ The interface is separated into sections :</p> <ul style="list-style-type: none"> ○ 1. The menu bar ○ 2. Tools bar ○ 3. TOC (Table of Content) ○ 4. Map display space ○ 5. Status bar
<p>0.2. Add an image to QGIS</p>	<p>➤ In the menu, click on « Layer » ➔ « Add layer» ➔ « Add Raster layer »</p>  <p>➤ Once a new window appears, click on  and navigate to the reference image folder ..\TPO\IMAGE)</p>

select the image « REF_IMAGE.tif »

- Once the image is added, its name will appear in the Table of Contents (TOC), and the image itself will be displayed in the Map Display area.

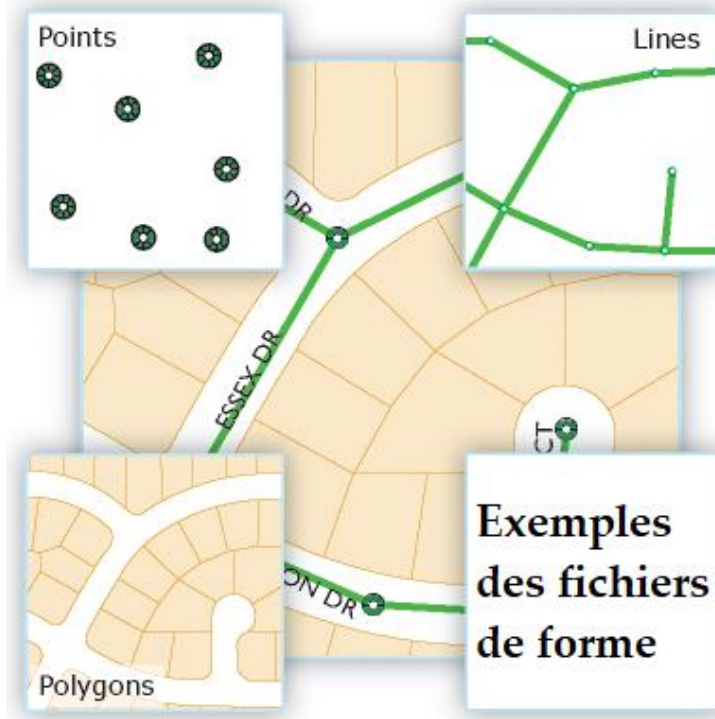
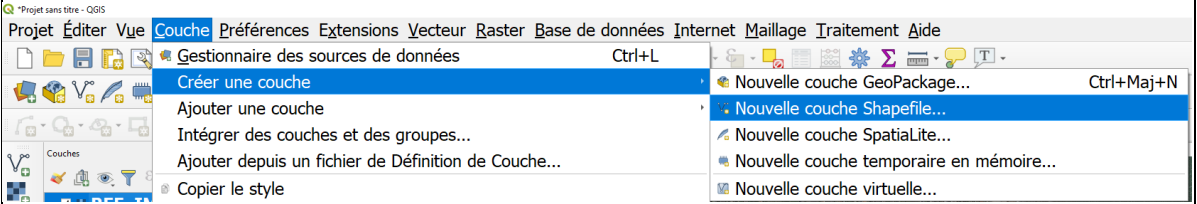




- You can use the scroll wheel on your mouse to zoom in on the image and observe it better.

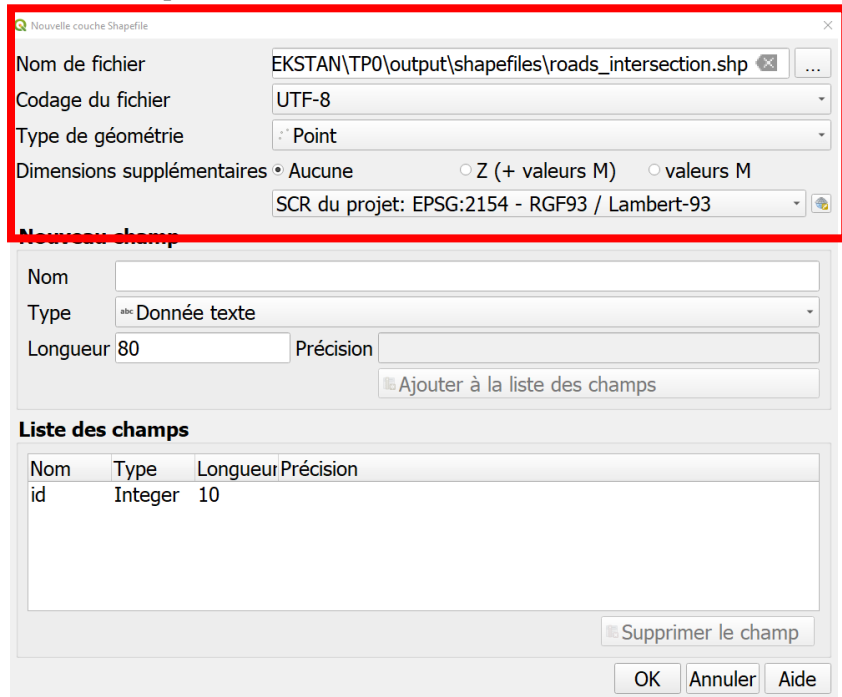


2. Creating a Shapefile

Objective: The objective is to create Shapefiles of the urbanized zone, the roads and the agricultural plots.

Steps	Manipulation on QGIS
2.1. Shapefile	<p>A shapefile is simply a format that allows us to store information about the relative geographical location of a geographical entity. It also stores the attributes of these entities. A geographical entities in a Shapefile can be one of the following:</p> <ul style="list-style-type: none"> ○ Points ○ Lines ○ Polygons <p>For example, the intersections of roads is represented by points, the roads themselves are represented by lines, whereas the agricultural plots will be represented by polygons.</p>  <p>Our objective here is to create Shapefiles that represent the intersections of roads, the roads themselves, The urban zone and the agricultural parcels.</p>
2.2. Create a new Vector Layer (.shp)	<ul style="list-style-type: none"> ➤ We will create 3 shapefiles: <ul style="list-style-type: none"> ○ A shapefile called "roads_intersection" to geo-locate the intersections of roads. ○ A shapefile called "road" for the roads. ○ A shapefile called "Objects" for the buildings, the agricultural parcels and for water. ➤ In the Menu bar go to « Layer » ➔ « Create Layer » ➔ « New Shapefile Layer »  <ul style="list-style-type: none"> ➤ To create « roads_intersection » do the following : <ul style="list-style-type: none"> ✓ Shapefile name: click on  and name the shapefile « roads_intersection.shp »

- ✓ Geometry type: Point
- ✓ Click on  to choose the reference coordinate system (SCR) : EPSG 2154
- ✓ Click on OK to complete creation



Nouvelle couche Shapefile

Nom de fichier: EKSTAN\TPO\output\shapefiles\roads_intersection.shp

Codage du fichier: UTF-8

Type de géométrie: Point

Dimensions supplémentaires: Aucune Z (+ valeurs M) valeurs M

SCR du projet: EPSG:2154 - RGF93 / Lambert-93

Nouveau champ

Nom:

Type: Donnée texte

Longueur: 80 Précision:

Ajouter à la liste des champs



Liste des champs

Nom	Type	Longueur	Précision
id	Integer	10	



Supprimer le champ

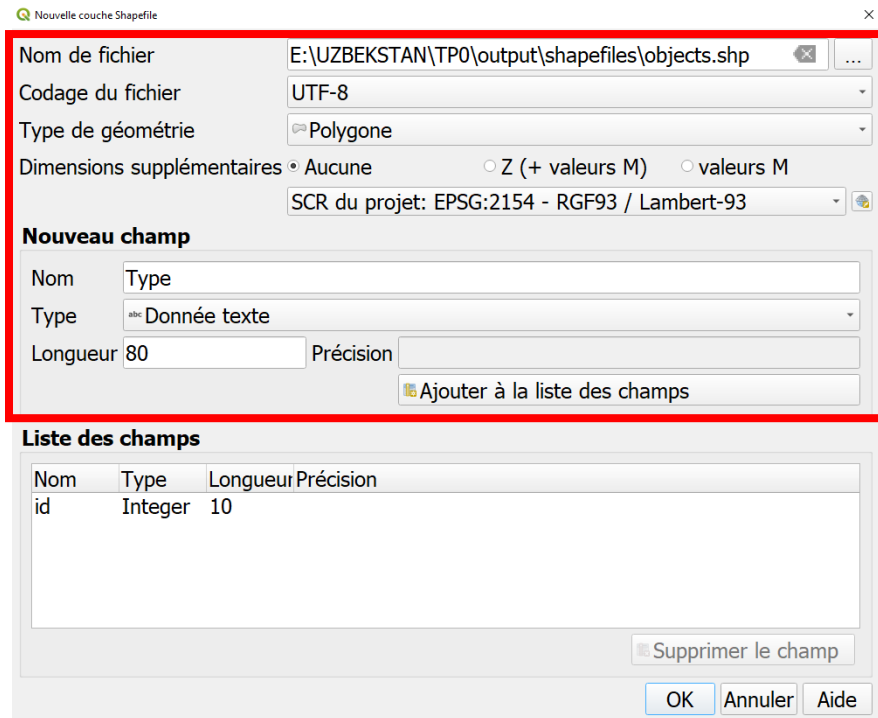
OK Annuler Aide

➤ To create « roads »:

- ✓ Name: click on  and call it « road.shp »
- ✓ Geometry type: Linestring
- ✓ Click on  and specify the reference coordinate system (SCR) : EPSG 2154
- ✓ Click on OK

➤ For « objects »:

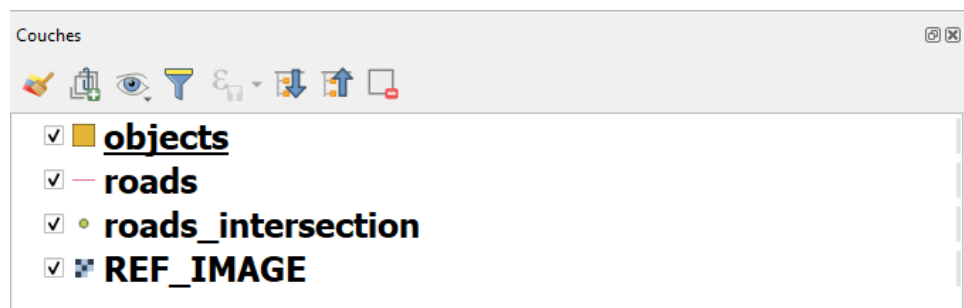
- ✓ Name: click on  and call it « objects.shp »
- ✓ Geometry type: Polygon
- ✓ Click on  and specify the reference coordinate system (SCR) : EPSG 2154
- ✓ In “new field”, Click « Type » for « Name » click on « Add to Fields list ». This allows us to add a new field to the objects shapefile called « Type » that will be present in the attribute table of the shapefile objects.shp.
- ✓ Click on OK



➤ This process will lead to the creation of these type of files :


- ✓ .shp : geometry (shape)
- ✓ .dbf : attributes
- ✓ .shx : identifying unique objects (links shp and dbf)
- ✓ .prj : specifies the SCR (from ArcGIS)
- ✓ .qjp : specifies the SCR (from QGIS)


Once you create a Shapefile it will be added to the table of contents



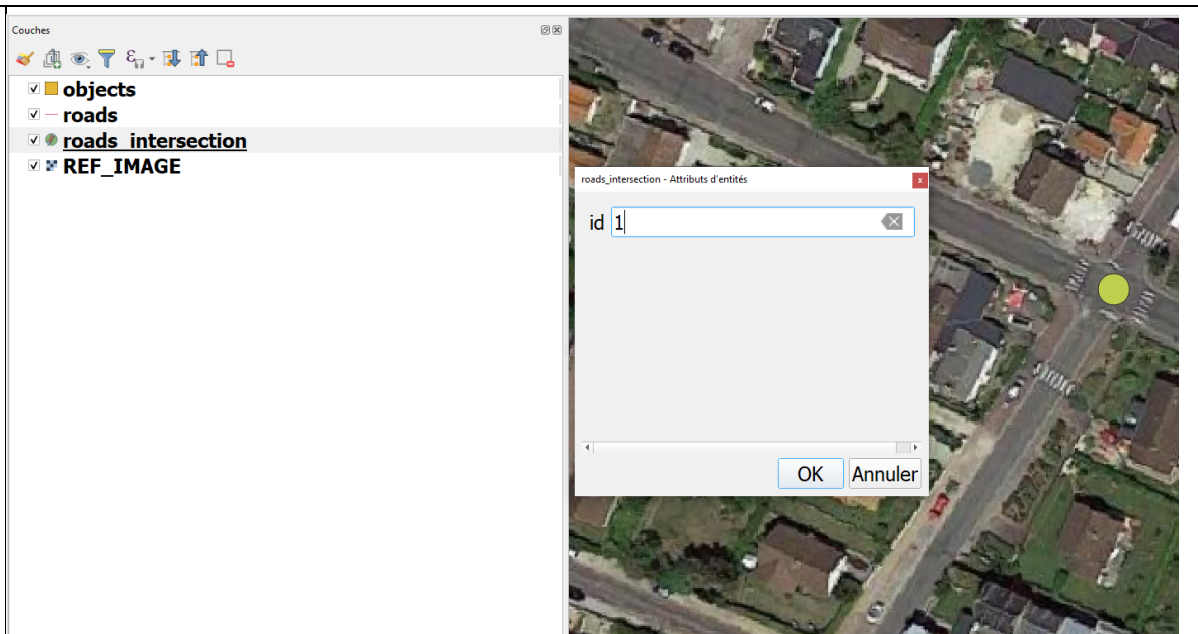
1.3. Adding points to « roads_intersections »

Now we are going to add points that represent the roads' intersection to the shapefile « roads_intersection ».



Click on « roads_intersection » in the table of contents, then click on  in the tool bar. This will enable editing of the shapefile and allow the additions of new points.

After editing is enabled , zoom in with the scroll wheel to find intersections of the roads in the image.

Once you locate an intersection, click on it, a new window will appear. It lets you pick decide the content of this point. Fill the section "ID" by a number (give a different ID for each intersection).





Search for more intersection and add more points. Make sure to add the "ID" with different values each time (example 1, 2, 3 ...)

You can save at any point by clicking  to save. When you're done click  to stop editing.

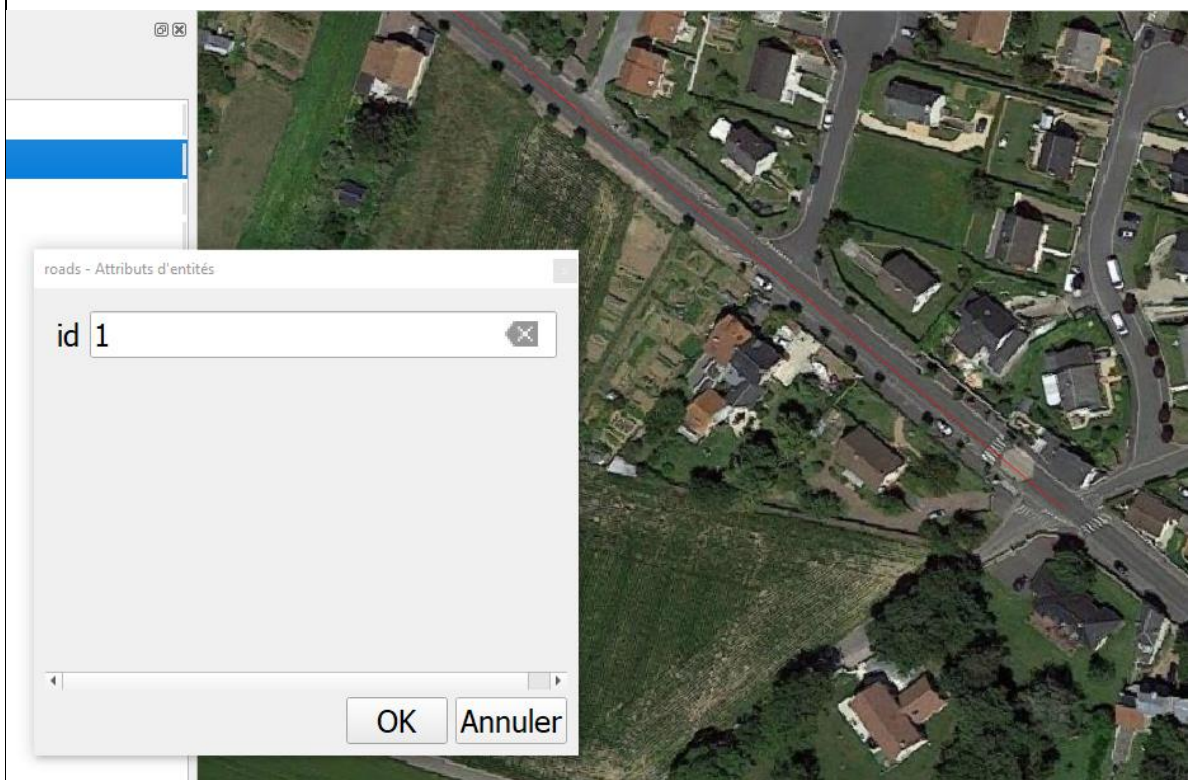
2.3. Adding line to the Shapefile « roads »

We will add lines to the Shapefile « roads ».



Click on « roads» in the TOC, then click  to start editing. Now we can add entities to the shapefile.

Once editing is enabled, click on  to add lines. Zoom in with the scroll wheel to find roads. Draw a line with the mouse, using the left click to add the connection points of the line (=vertex).

Once you draw a line, a new window appears. You can add information like the "ID" give each line a unique ID.





Search for more roads, and draw more lines over them without forgetting to give them IDs (example 1, 2, 3 ...)

You can save by clicking on  , When you're done editing  click on to disable editing.

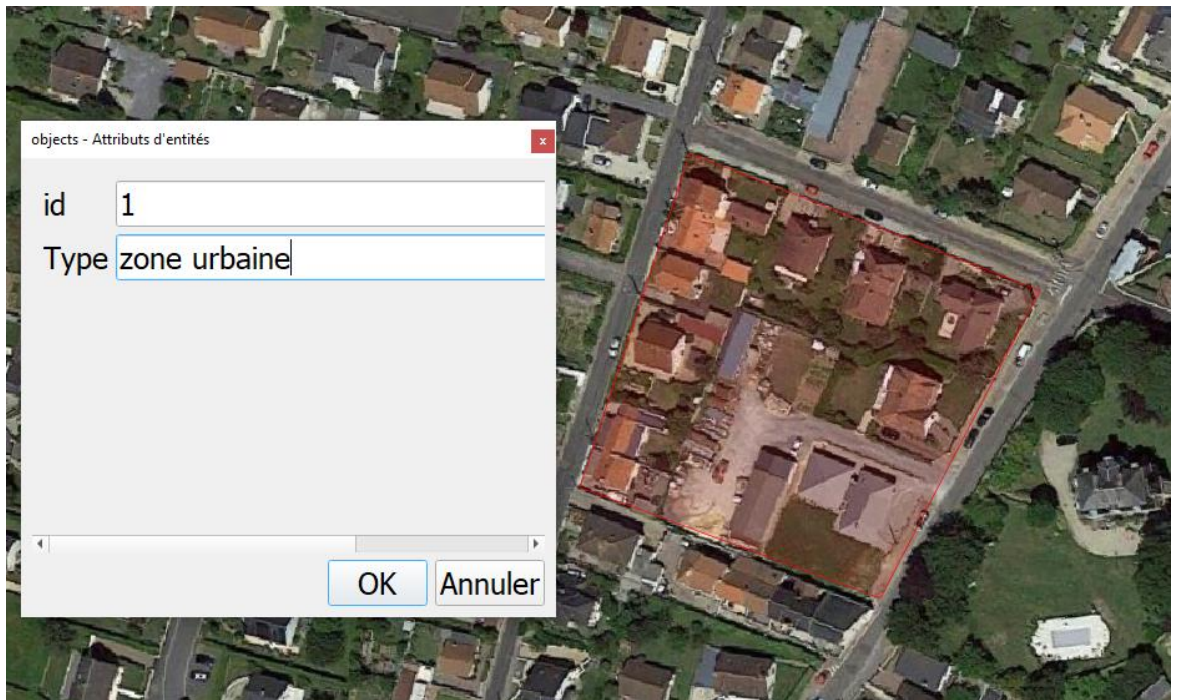
2.4. Adding polygons « objects »

We will now add polygons to the shapefile « objects ».

Click on « objects» in the table of contents, then click on  . This enables editing of the shapefile, so we can now add polygons.

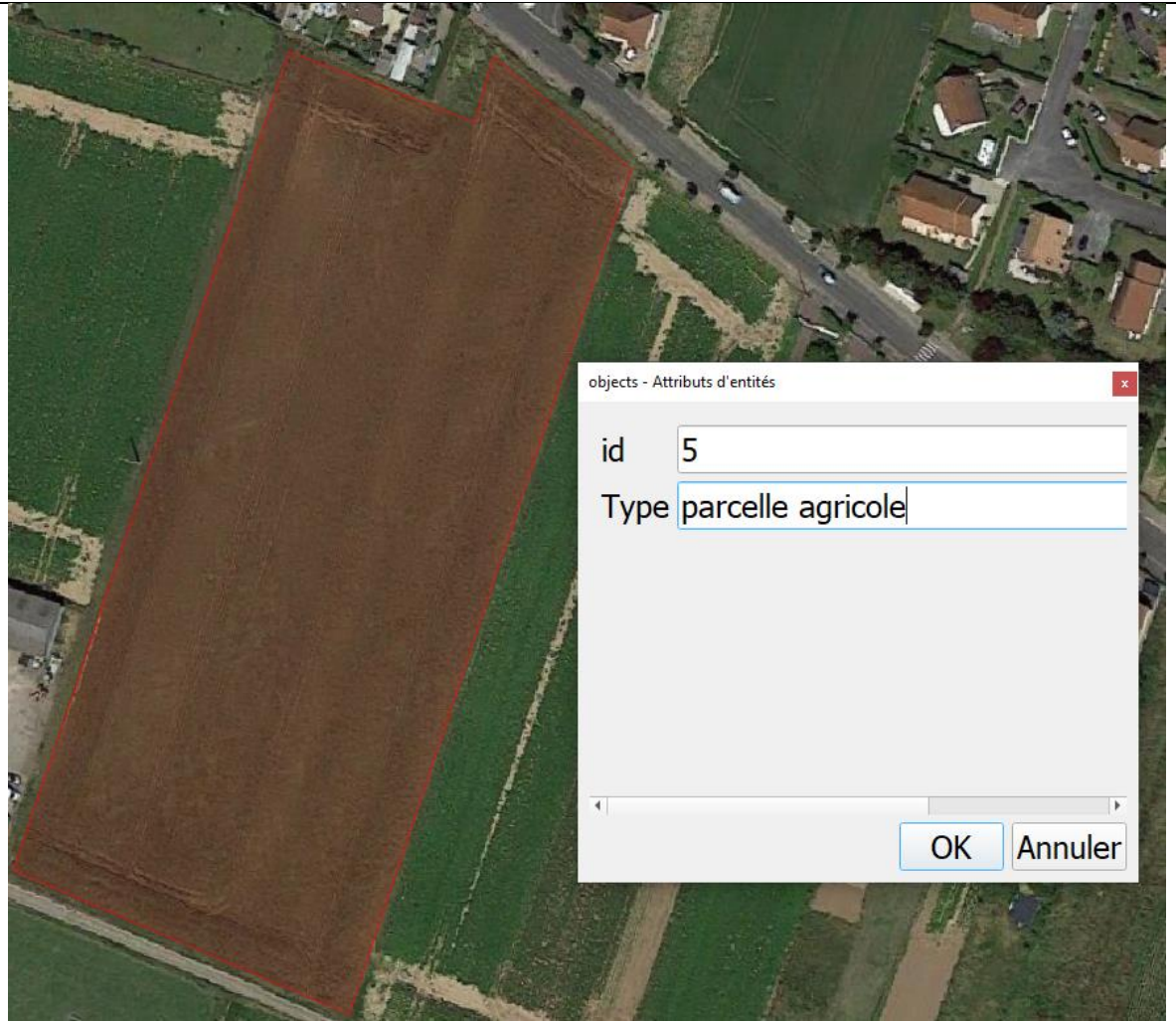
Once editing is enabled, click on  to start adding polygons. Zoom in with the scroll wheel to find an urban zone. Draw a polygon by left clicking and adding vertices (=vertex), right click the mouse to fix the polygon.

Once you add a polygon, a new window appears. Add an “ID” to this polygon like we did for the rest of the shapefiles. But this time we have a new field « Type » to fill, in this field add the type of land cover (examples « urban», « agricultural plots », « water »)



Look on the map for different objects, and add polygons for urban, agricultural plots and water. Don't forget to fill "ID" with unique values (example 1, 2, 3 ...). Fill the “Type” field as such:

Example of polygon types :

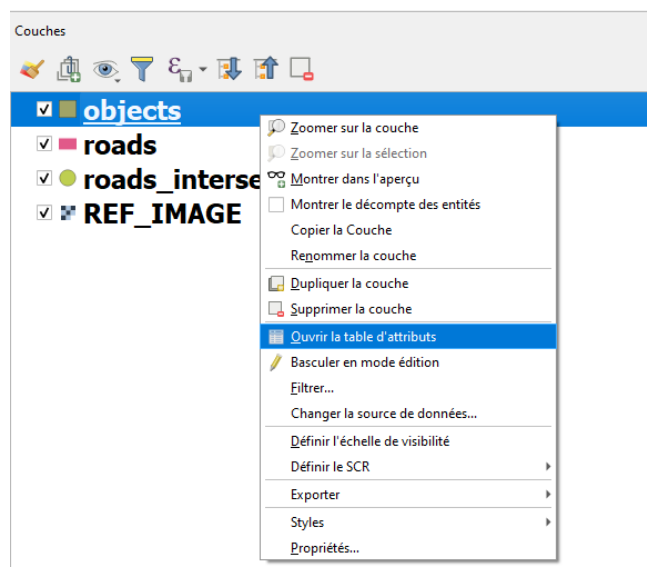


Once you're done adding polygons save  then click on  to disable editing.

2.5. Open attribute tables

When we digitized the map elements, we added text info (ID, Type) manually, this means that we added this info to the attribute table of these shapefiles.

To open the attribute table, right click the shapefile and click "open attribute table"



Couches

- objects**
- roads
- roads_intersection
- REF_IMAGE

objects :: Total des entités: 17, filtrées: 17, sélectionnées: 0

	id	Type
1	1	zone urbaine
2	2	zone urbaine
3	3	parcelle agricole
4	4	parcelle agricole
5	5	parcelle agricole
6	6	parcelle agricole
7	7	parcelle agricole
8	8	parcelle agricole
9	9	parcelle agricole
10	10	parcelle agricole
11	11	parcelle agricole
12	12	parcelle agricole
13	13	parcelle agricole
14	14	parcelle agricole
15	15	zone urbaine
16	16	zone urbaine
17	17	zone urbaine

Montrer toutes les entités

In the attribute table of the shapefile "objects", we will see the input we added when creating each polygon, like type and ID.

We will now add a new column in the attribute table for the total la surface area of each polygon in the Shapefile "Objects".



To add this new field, click the button "field calculator" in the attribute table. A new window will appear

- ✓ « Output field name » : surface.
- ✓ « Output field type » : Decimal number
- ✓ In the list on the bottom right, expand the tab "Geometry", now double click on "\$area" (NOT "area"). This will add the area expressing to the calculator.
- ✓ Click on OK

Calculatrice de champ

Ne mettre à jour que les 0 entités sélectionnées

Créer un nouveau champ

Créer un champ virtuel

Nom:

Type:

Longueur du nouveau champ: Précision:

Mise à jour d'un champ existant

Expression Éditeur de fonction

Aperçu du résultat : 16040.339600863634



- Fichiers et Chemins
- Général
- Géométrie
 - angle_at_vertex
 - \$area
 - area
 - azimuth
 - boundary
 - bounds
 - bounds_height
 - bounds_width

fonction \$area

Renvoie la surface de l'entité courante. La surface calculée par cette fonction respecte à la fois le paramétrage de l'ellipsoïde du projet et l'unité de surface. Ex: si une ellipsoïde a été paramétrée pour le projet

Cette couche n'est pas en cours d'édition. Si vous cliquez sur OK, le mode édition sera automatiquement activé.

Now a new field called "surface" will appear in the attribute table containing the surface area of each polygon in m².

Click on  to save and  to stop editing.



123 id = ε Tout mettre à jour Mettre à jour la sélection

	id	Type	surface
1	1	zone urbaine	6,608.207
2	10	parcelle agricole	12,603.380
3	11	parcelle agricole	23,425.652
4	12	parcelle agricole	19,374.817
5	13	parcelle agricole	35,897.272
6	14	parcelle agricole	34,821.876
7	15	zone urbaine	4,544.111
8	16	zone urbaine	1,697.755
9	17	zone urbaine	22,041.769
10	2	zone urbaine	7,803.768
11	3	parcelle agricole	16,040.340
12	4	parcelle agricole	14,172.553
13	5	parcelle agricole	16,653.534
14	6	parcelle agricole	8,869.108
15	7	parcelle agricole	22,430.753
16	8	parcelle agricole	27,558.794
17	9	parcelle agricole	26,890.320