Using QGIS to Extract and Save Specific OpenStreetMap Data into a GIS format

What you need

- ✓ QGIS 2.2 or above
- ✓ Internet access or an .osm file (tutorial data here)

Tutorial overview

This tutorial will show you how to download data from OpenStreetMap (OSM) with QGIS and how to select and then save the features you want into a GIS format. It is divided into three parts. In the first part, you will learn how to download OSM data with QGIS. In the second part, we will show you how to import those data into QGIS and finally, the last part will explain how to select and save the data you want.

For that purpose, we will assume that you want to map the ski infrastructure and ski pistes of a ski region in Switzerland. You already have a base map, however you are still looking for the ski-lifts and pistes.

(A) Download data directly from OSM

GOAL: download data from OSM using the QGIS embedded tool.

>>>> If you are using the tutorial data, you can skip part A. <<<<

!!! From our experience, there might be some features missing if you use the download tool embedded in QGIS, instead of downloading the data directly from the OSM website !!!

1. Go to the menu Vector > OpenStreetMap > Download data (see Figure 1).

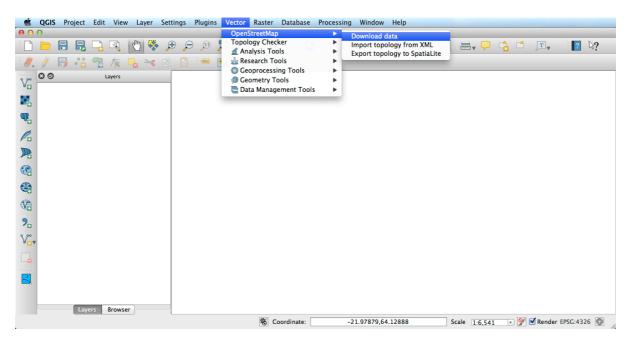


Figure 1: Download data tool

2. Define the extent by entering coordinates (check *Manual*). You could define the extent base on the extent of your map canvas or of a specific layer (see Figure 2).

⊖ ○ ○ Download OpenStreetMap data
Extent
○ From map canvas
○ From layer
• Manual
46.3921
7.0027 7.2776
46.2768
Output file
Close OK

Figure 2: Define extent

>>>> You need to enter latitude and longitude degrees as coordinates. <<<<

- 3. Give a name for your output file and define its location using the
- 4. Click **OK**, when you are done. The download will start.
- 5. The file will be downloaded and saved as define in step 3. You can go through the Finder and see if the file has been downloaded correctly.

>>> This download tool has a limitation. Thus if you need a bigger area, you might want to download the file in .osm format from another source. However, keep in mind that if you try to render too many features at the same time, QGIS will slow down. If that is the case, you can try unchecking the Render option (bottom right corner of the map canvas) and zoom in before rechecking the Render option. If the file is really too big, you might not be able to load it. <<<<

(B) Import your .osm file into QGIS

GOAL: import the downloaded file in part A into a local database using QGIS

1. Go to the menu Vector > OpenStreetMap > Import topology from XML (see Figure 3).

	Analysis Iools Export topology to SpatiaLite	Ĩ <u></u> , 2 %?
V ₀ 2 Layers V ₀ 2 2 V ₀ 3 3 V ₀ 3 3	Ceometry Tools	
Layers Browser	Scale 47,483,648 P Scale 47,483,648 P Sc	Render EPSG:4326 💿 🔥

Figure 3: Import topology tool

- 2. Click on the ... to select the file you downloaded in A or use the tutorial data (see Figure 4).
- 3. QGIS define the name of the database based on the name of your file. You can change it if you want.

0	O OpenStreetMap Import
	Input XML file (.osm)
	/Downloads/data_diablerets.osm
1	Output SpatiaLite DB file
	/Downloads/data_diablerets.osm.db
	Create connection (SpatiaLite) after import
	Connection name data_diablerets
[Close OK

Figure 4: Generate database

- 4. Click OK.
- You can use the DB Manager in QGIS to see if the database has been correctly created. (Menu *Database* > *DB Manager*, then open the tab with SpatiaLite).

>>> The OSM data have a special structure that stores the geometries only in the nodes and then uses references to the node IDs in other types of features (ways and relations). This original structure is saved in the database and this is why you cannot load the OSM features directly from that database into QGIS (there is no geometry in the tables, except the one with nodes). <<<<

(C) Load the osm data into the QGIS Map Canvas

GOAL: generate the geometries and their attributes from the database, load them into the Map Canvas and save them as shapefiles.

1. Go to the menu *Vector* > *OpenStreetMap* > *Export topology to SpatiaLite* (see Figure 5).

	Vector Raster Database P	rocessing Window Help		
	Vector Raster Database P OpenStreetMap Topology Checker Analysis Tools Research Tools Ceoprocessing Tools Ceoprocessing Tools Ceonetry Tools Data Management Tools	Download data Import topology from XML Export topology to SpatiaLite		_T, 2 2 2?
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Layers Browser	8 Coordinate:	-3654,3064	Scale 34,288,429 v 🎐 🗹 Re	nder EPSG:4326 💿 🔥

Figure 5: Export topology tool

2. Click on the ... to load the database created in part B (see Figure 6).

0	O O Export OpenStreetMap topology to SpatiaLite
	Input DB file
	/Downloads/data_diablerets.osm.db
	Export type
	Points (nodes) OPlylines (open ways) Polygons (closed ways)
	Output layer name
	data_lesdiablerets_points
	Exported tags Load from DB
	Tag V Count
	☑ Load into canvas when finished
[Close OK

Figure 6: Export OSM to SpatiaLite window

- 3. According to the OSM rules, ski lifts are lines tagged with *aerialway* and ski pistes are lines or areas tagged with *piste:type.* Thus, we will start with polylines. Click on the button *Polylines (open ways)*.
- 4. Click on *Load from the DB* to see all the possible tags in the file.

5. Select the following tags in order to extract only the lifts and pistes: *aerialway, aerialway:capacity, aerialway:length, aerialway:occupacy, name, piste:type, piste:difficulty, piste:grooming,* and *piste:name.* (see Figures 7)

>>>> The selected tags play the role of filter (only features with at least one existing tag will be selected. But it also defined which attribute columns will be generated for the table/layer. <<<<

!!! Besides the tags allowing for the selection of the features that are wanted, we added the tag "name" in order to export the attribute column with the name of ski lifts and pistes. But it also means that any other feature with a value in that attribute column will be taken as well. !!!

/Downloads/data_diablerets.osm.	db	/Downloads/data_diablerets.osm.db
port type		Export type
) Points (nodes) 🛛 💿 Polylines (open ways) 📿	Polygons (closed ways)	O Points (nodes) • Polylines (open ways) O Polygons (closed w
tput layer name		Output layer name
ata_diablerets_polylines		data_diablerets_polylines
aa_aaberees_porymes		data_diablerets_polylines
ported tags		Exported tags
Load from DB		Load from DB
ag A Count		Tag A Count
access 112		🗹 name 390
addr:city 1230		natural 214
addr:country 1229		note 30
addr:hamlet 153		old_name 1
addr:housename 280		oneway 10
addr:housenumber 177		opening_hours 16
addr:postcode 1235		operator 19
addr:street 100		park_ride 1
		parking 12
admin_level 19		parking 12
🗹 aerialway 58		phone 5
 ✓ aerialway ✓ aerialway:capacity 20 		
 ✓ aerialway ✓ aerialway:capacity ✓ aerialway:length 20 		phone 5✓ piste:difficulty 176
✓ aerialway 58 ✓ aerialway:capacity 20 ✓ aerialway:length 20 ✓ aerialway:occupancy 2		phone 5✓ piste:difficulty 176
 ✓ aerialway ✓ aerialway:capacity ✓ aerialway:length 20 		□ phone 5 ☑ piste:difficulty 176 ☑ piste:grooming 16

Figure 7: Export parameters for polylines (open ways)

6. Click OK.

>>> Although it says "Output layer name", what happens here is the definition of a new table in the database according to the parameters given in steps 3 to 5. Then, the table is loaded into the canvas (if the box in the bottom-left corner is checked). <<<< 7. Do the same but with Polylines (closed ways) to extract the pistes that are polygons. Use the following tags: name, piste:type, piste:difficulty, piste:grooming, and piste:name (see Figure 8). And click OK.

	/Downloads	s/data_diablerets.osm.db	
Export ty	pe		
OPoin	its (nodes)	O Polylines (open ways)	 Polygons (closed ways
Output la	iyer name		
ال معداد ا	Kablanda wabunana		
data_d	liablerets_polygons		
Exported	tags		
Loa	d from DB		
Tag		A Count	
Tag	mtb:scale	191	
3	name	390	
	natural	214	
	note	30	
	old_name	1	
	oneway	10	
	opening_hours	16	
	opening_hours	16	
	opening_hours operator	16 19	
	opening_hours operator park_ride parking phone	16 19 1	
	opening_hours operator park_ride parking phone piste:difficulty	16 19 1 12	
	opening_hours operator park_ride parking phone piste:difficulty piste:grooming	16 19 1 12 5 176 16	
	opening_hours operator park_ride parking phone piste:difficulty piste:grooming piste:name	16 19 1 12 5 176 16 22	
	opening_hours operator park_ride parking phone piste:difficulty piste:grooming piste:name piste:type	16 19 1 12 5 176 16 22 177	
	opening_hours operator park_ride parking phone piste:difficulty piste:grooming piste:name piste:type place	16 19 1 12 5 176 16 22 177 7	
	opening_hours operator park_ride parking phone piste:difficulty piste:grooming piste:name piste:type	16 19 1 12 5 176 16 22 177	

Figure 8: Export parameters for polygons (colsed ways)

8. You now have two tables loaded in your Map Canvas: data_diablerets_polylines and data diablerets polygon. From the first one, we want to extract the lifts on one side and the pistes on the other. Click the name of the table and then on the

Select features using an expression icon to do that.



- 9. In the new window, click on the arrow (or + sign on Windows) next to Fields and *Values* and double-click on *piste:type*. This will select all the features that have an attributes in that column (see Figure 9).
- 10. Click on Select and then Close.

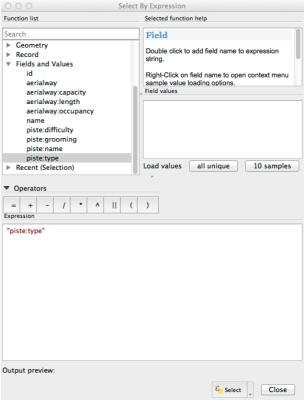


Figure 9: SQL parameter for filtering the pistes

11. The features that are selected should be highlighted in yellow (see Figure 10)

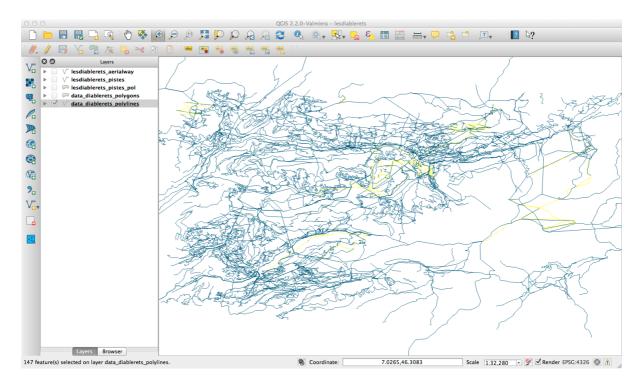


Figure 10: Selected features according to tag piste:type

12. Now, right-click on the table name in the left panel and go on **Save Selection As ...** (see Figure 11).

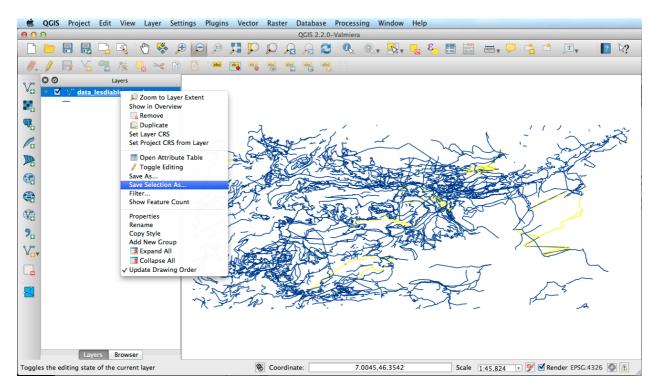


Figure 11: Save Selection As...

13. Save your selection as a *ESRI Shapefile* and give it a name and do not forget to check the box next to *Add saved file to the map* (see Figure 12). Click *OK*.

Format	ESRI Shapefile		\$
Save as			
,,/Documents/0	3_OSGL/lesdiablerets_pistes.shp	Browse	
Encoding	System		*
CRS	Layer CRS		*
WGS 84		Browse	
Symbology export		No symbology	÷
Scale	1:50000		A V
☐ Skip attribute creation ✓ Add saved file to map			
	More Options >>		

Figure 12: Save vector layer as...

!!! Do not change the projection system now. If you need to, do it in a second step because when done at the same time as saving as from a table, it seems to crash QGIS all the time. !!!

14. Repeat steps 8 to 13, changing the parameter in step 9 to *aerialway* (see Figure 13), as well as the name of the file in step 13 (see Figure 14).

$\Theta \bigcirc \Theta$	Select By Expression
Function list	Selected function help
Search	Field
 Record Fields and Values id 	Double click to add field name to expression string.
aerialway	Field values
aerialway:capacity aerialway:length aerialway:occupancy name piste:difficulty piste:grooming aittengame	Load values all unique 10 samples
= + - / * ^	
Expression	
"aerialway" Output preview:	
	ି∺ Select 🖕 Close

Figure 13: SQL parameter for filtering the aerialway

0 0	Save vector layer as	
Format	ESRI Shapefile	
Save as		
/Documents/03	_OSGL/lesdiablerets_aerialway.shp	Browse
Encoding	System	:
CRS	Layer CRS	:
WGS 84		Browse
Symbology export		No symbology
Scale	1:50000	
Skip attribute creation		
Add saved file to map		
	More Options >>	

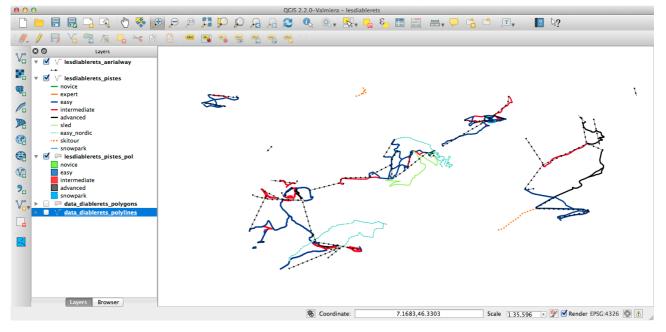
Figure 14: Save vector layer as...

15. To export the pistes with polygon geometries, repeat step 8 to 13 on the polygon table using the selection parameter *piste:type* and finish by **Saving Selection As...** (see Figure 15).

Format	ESRI Shapefile	
Save as		
/Documents/03	_OSGL/lesdiablerets_pistes_pol.shp	Browse
Encoding	System	* *
CRS	Layer CRS	4 T
WGS 84		Browse
Symbology export		No symbology
Scale	1:50000	
☐ Skip attribute creation ✓ Add saved file to map		
	More Options >>	

Figure 15: Save vector layer as...

- 16. If you need the shapefile in a another projection system, right-click on the shapefile name in the left panel and go on Save As... and change the projection while saving under a new name.
- 17. If not, you are done! Congratulations!



>>>> In the folder containing the data for the tutorial, you will find three files defining the styles you can see above. To use them, double-click on the name of a layer, go to the style tab and click on Load Style... <<<<

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