

Subject: Advanced Data Analysis

Module: Geospatial Analysis

Session 2 - Open data and Crowdsourcing smart geoforms

Exercise 1 - Searching and Downloading OpenStreetMap Data



Searching and Downloading OpenStreetMap Data

Getting high quality data is essential for any GIS task inside a Big Data Project.

One great resource for free and openly licensed data is OpenStreetMap (OSM).

https://wiki.openstreetmap.org/wiki/Main_Page

The OSM database consists of streets, local data as well as building polygons. Getting access to OSM data in a GIS format is integrated in QGIS. This tutorial explains the process for searching, downloading and using OSM data in QGIS.

Valuable Big Data applications with OSM?

<https://opensource.com/article/17/8/openstreetmap>

https://www.hotosm.org/updates/2016-04-28_explore_how_the_world_is_mapped_with_osm_analytics

<https://github.com/mapbox/mapping/wiki/Introduction-to-the-OpenStreetMap-Project>

<https://aws.amazon.com/blogs/big-data/querying-openstreetmap-with-amazon-athena/>

<https://github.com/TraceyLauriault/COMS2200A>

<https://conferences.oreilly.com/strata/strata-sq-2016/public/schedule/detail/54360>

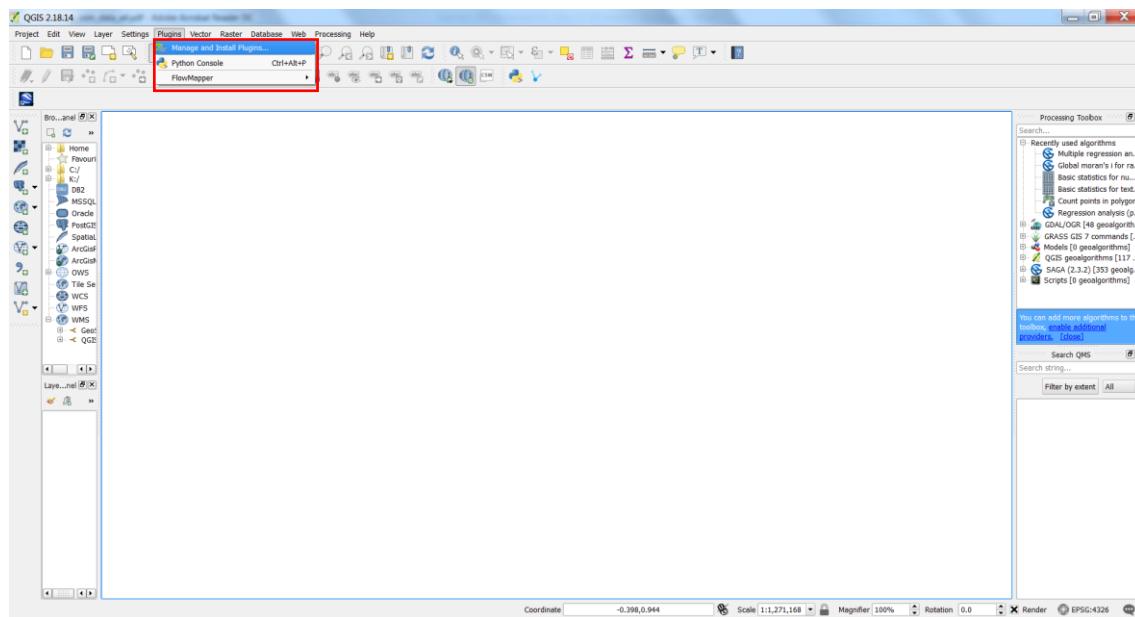
https://wiki.openstreetmap.org/wiki/List_of_OSM-based_services

1. Overview of the task

Search for “London” in OSM database, browse and select map features of the city, and extract locations (e.g. hotels) as a shapefile.

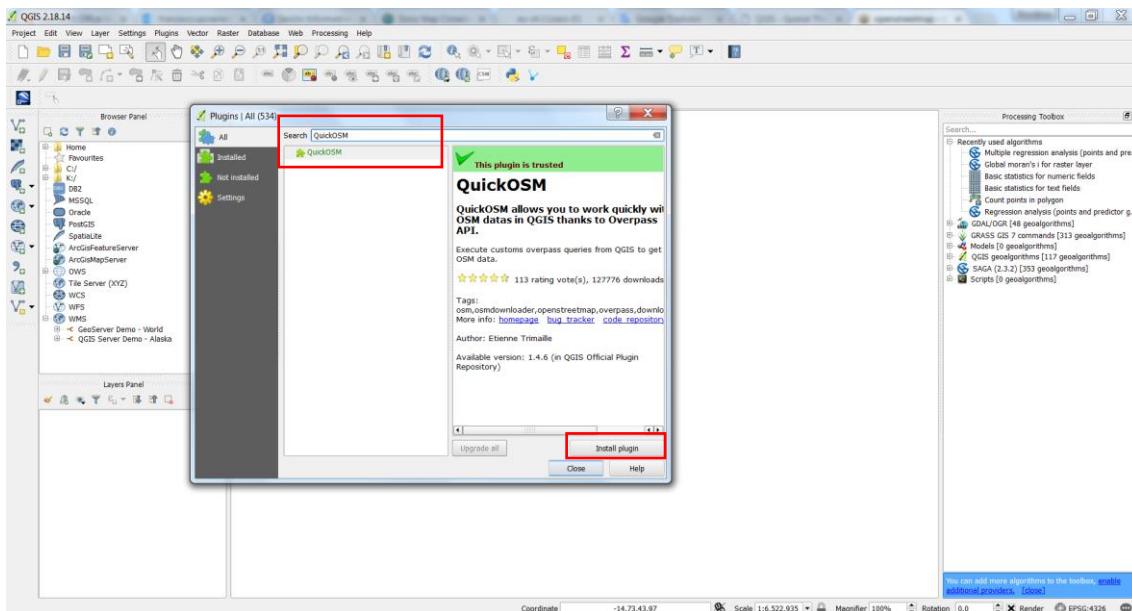
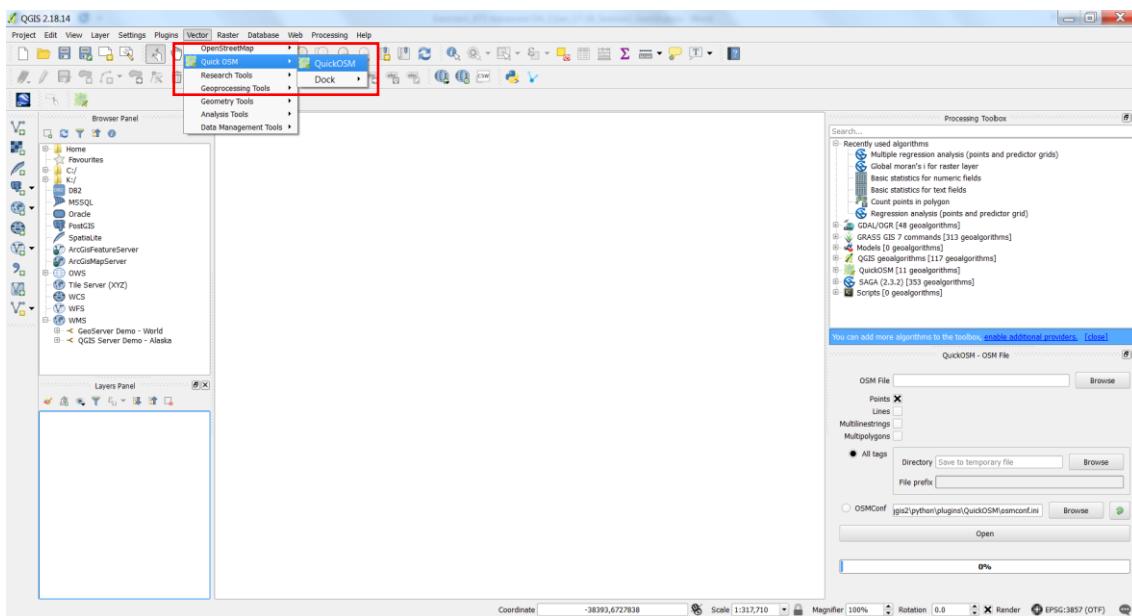
2. Procedure

- 2.1. We will use two “QGIS Las Palmas” plugins to accomplish the task. Make sure you have installed “QuickOSM” and “OpenLayers” plugins.

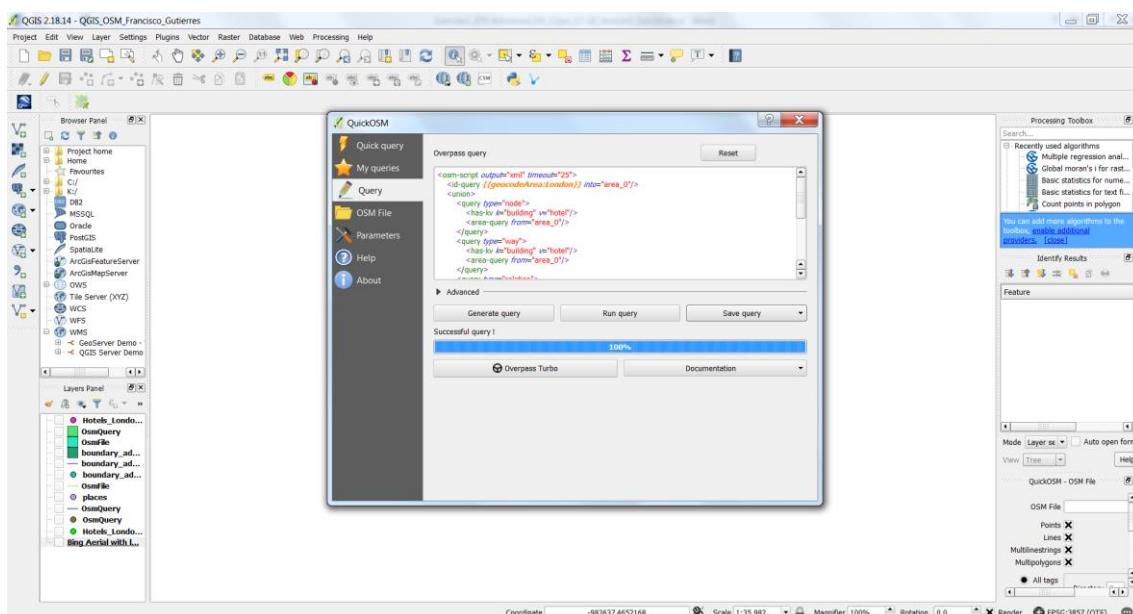
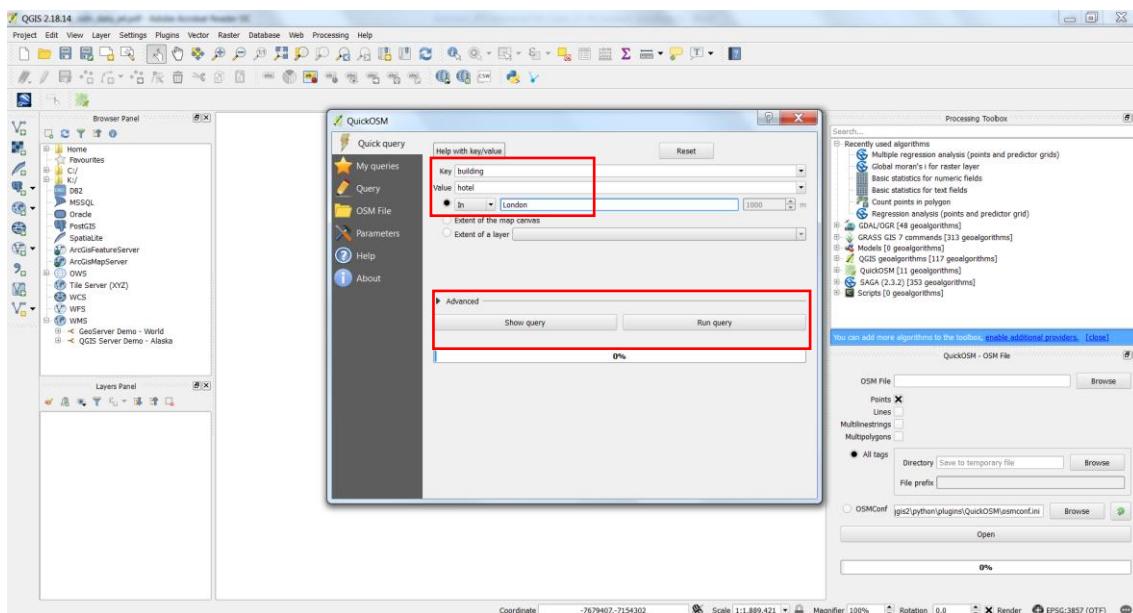


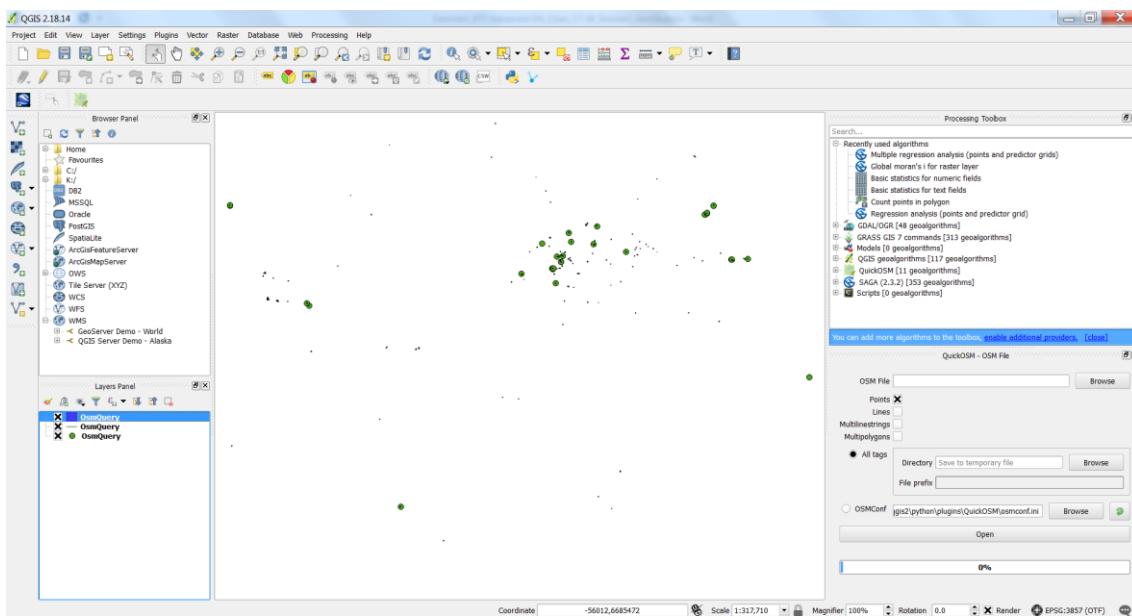
- 2.2. The “QuickOSM” plugin allows you the direct download of different OSM datasets according to the following map features themes.

https://wiki.openstreetmap.org/wiki/Map_Features

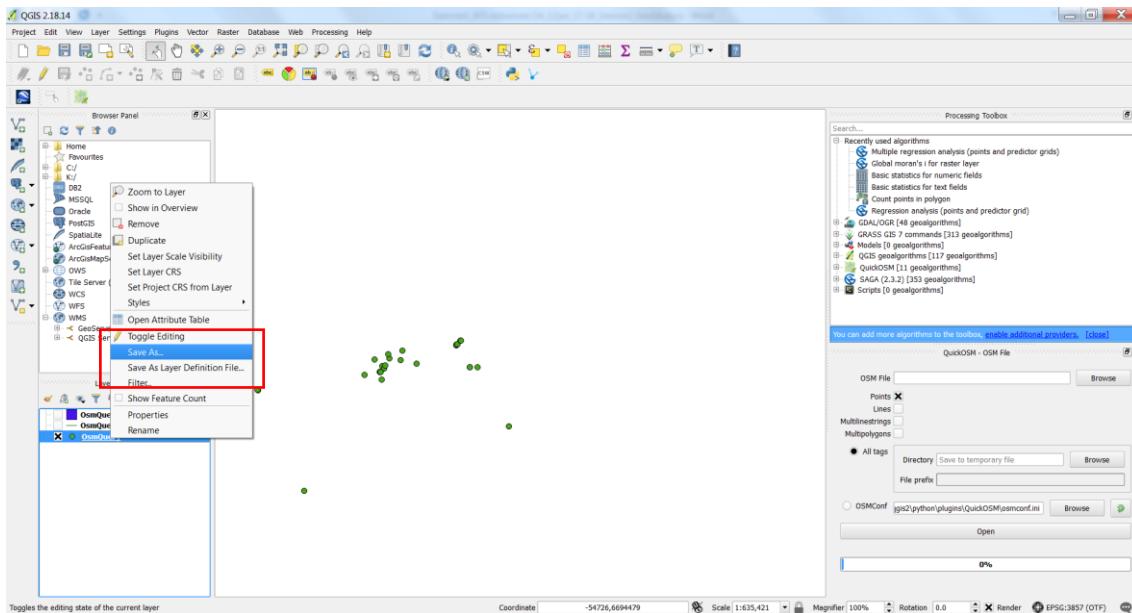


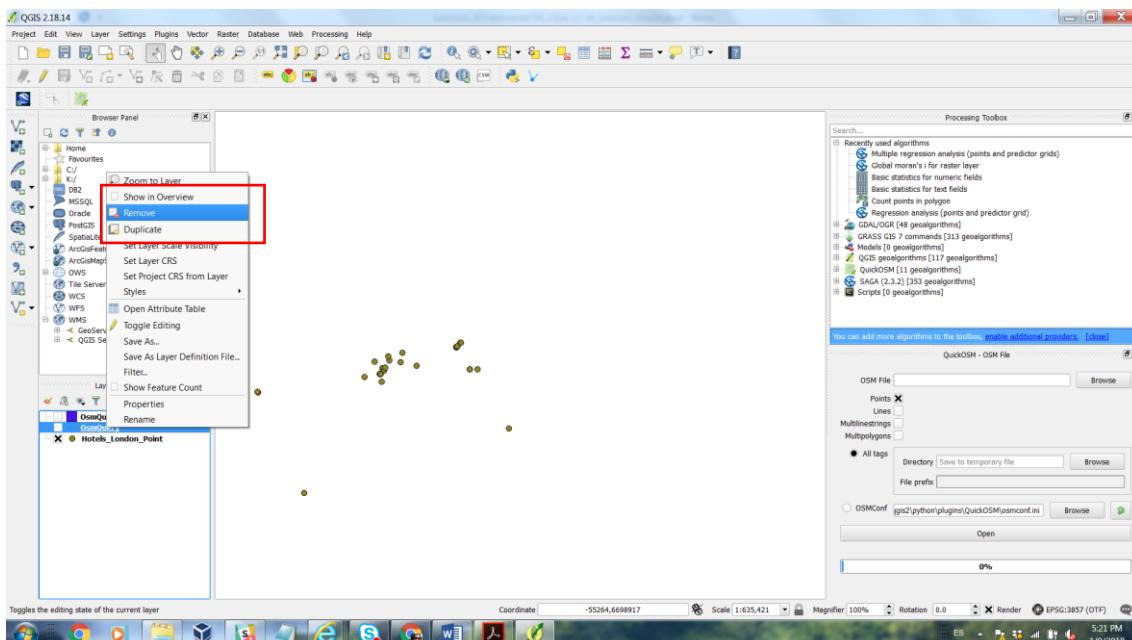
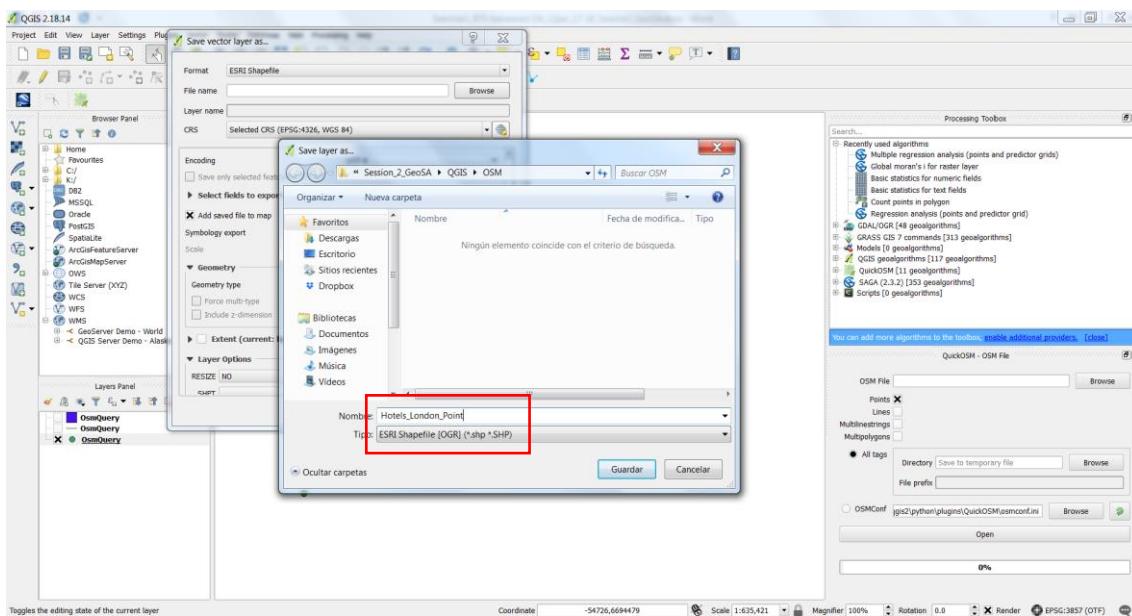
2.3. Let's find hotels features in London. Use "Key = buildings" and "value = hotels". Visualize and run the query (options "Show query" and "Run query").



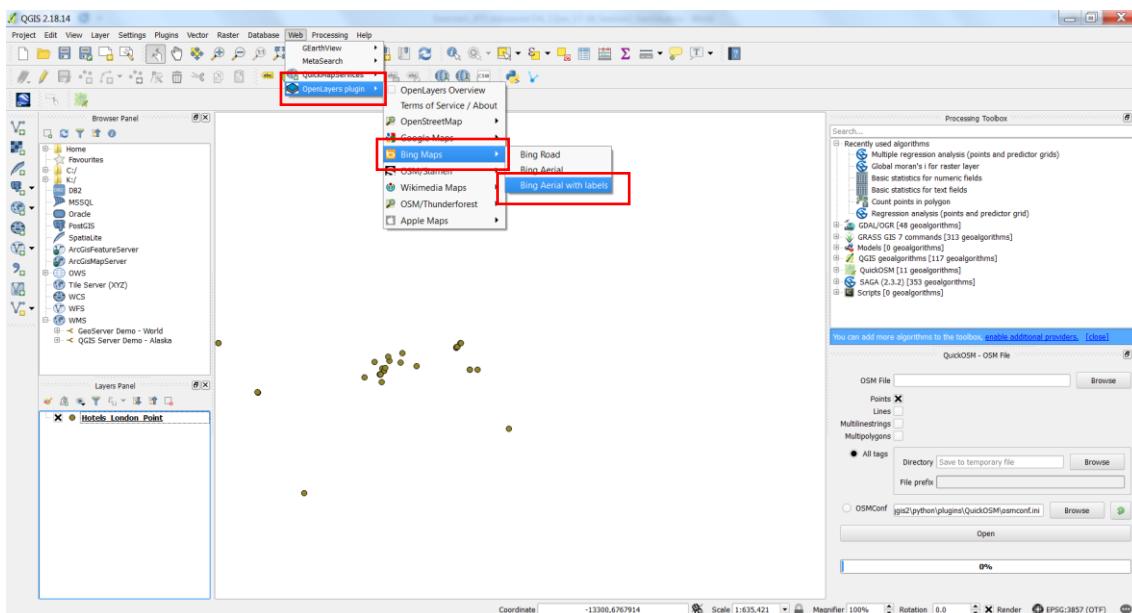
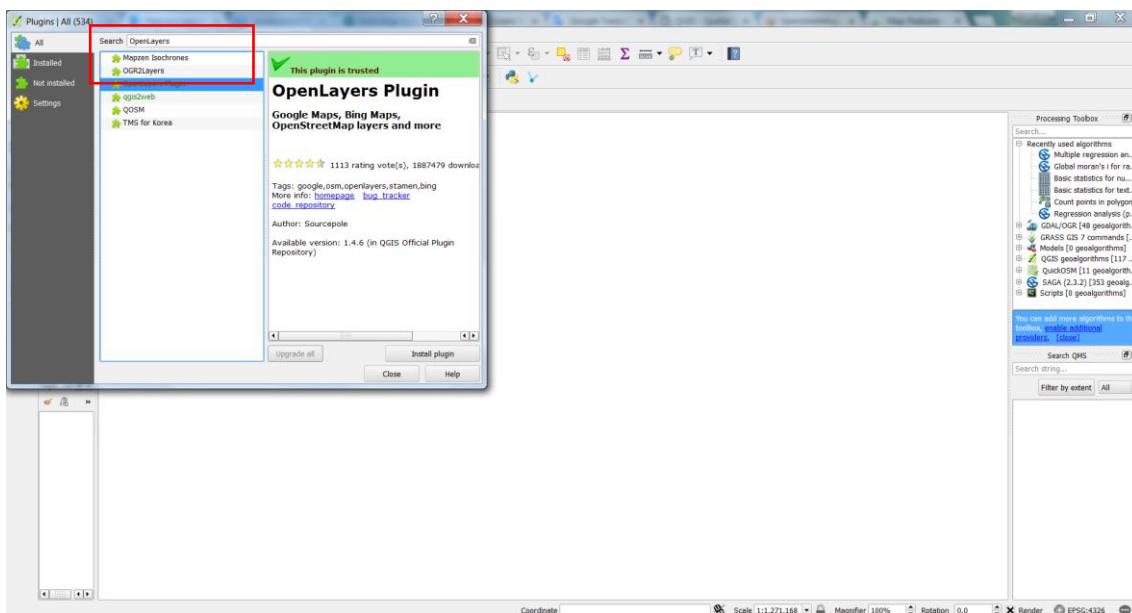


- 2.4. Now you can export the file with OGC standards to your local folder. Export as shapefile the point data about hotels (name "London_Hotels_Point"). Remote the OSMQuery files of your QGIS project and keep the exported shapefile.

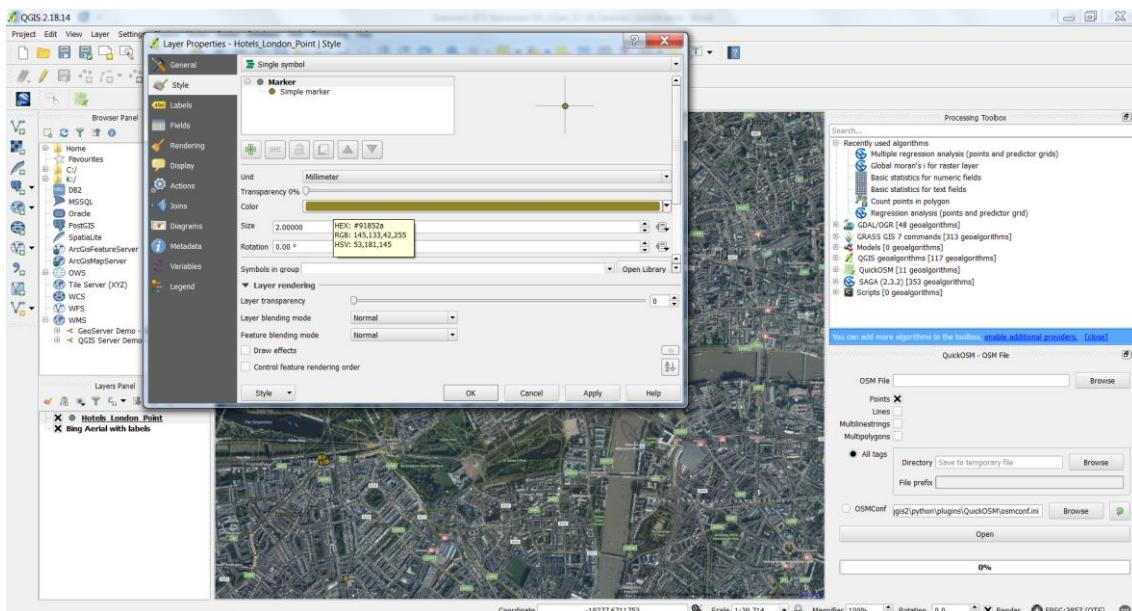
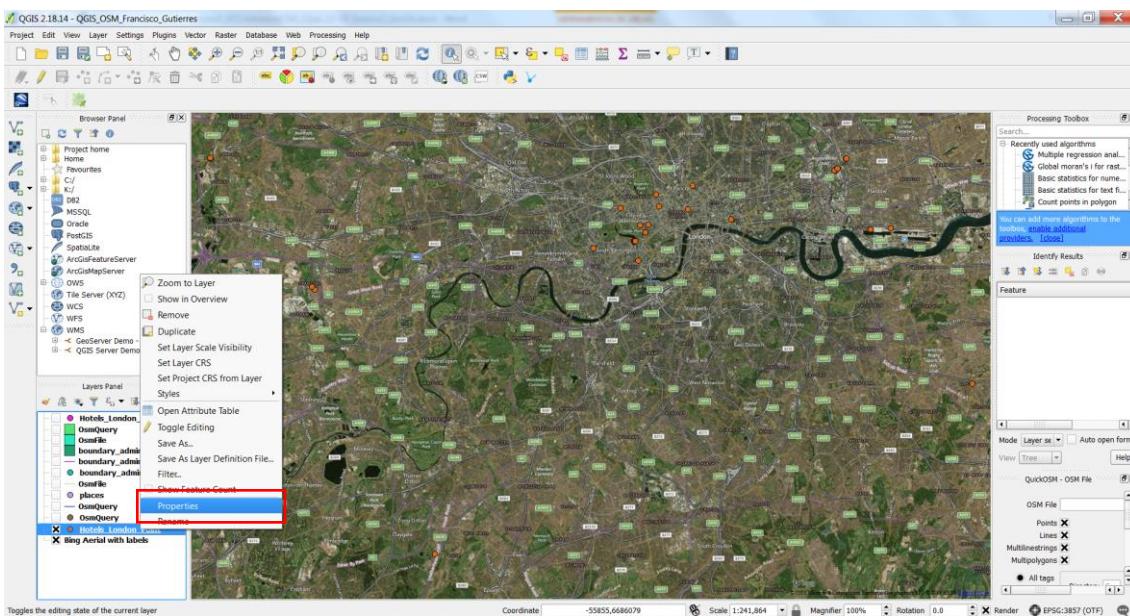


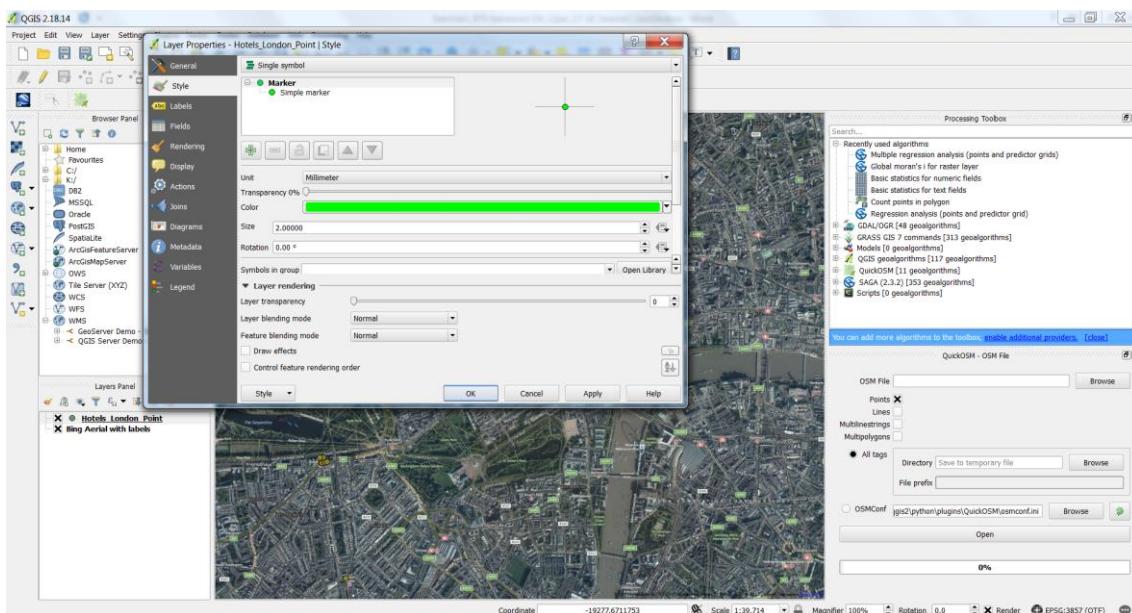


- 2.5. Install the “OpenLayers”. This plugin allows you to access basemaps from various providers in QGIS. Let’s load the “Bings Aerial with labels” in QGIS by going to “Web” → “OpenLayers plugin” → “Bing Maps” → “Bings Aerial with labels” layer.

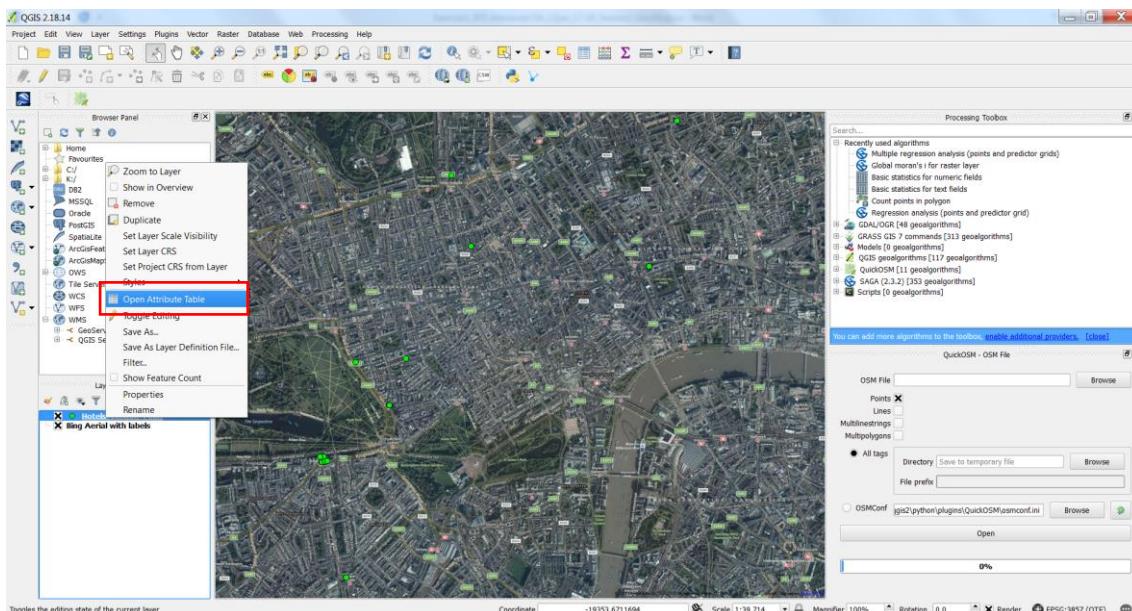


2.6. Modify the symbology of the hotels layer to green (HTML notation: #00fb00).





2.7. Open the attribute table of the hotel layer and explore the information.



2.8. Let's select features by attributes and export them as a new data file. You will note that some features have the attribute value of "hotel" listed under the "building" column. Click on "Select features using an expression button".

Hotels_London_Point : Features total: 35, filtered: 35, selected: 0

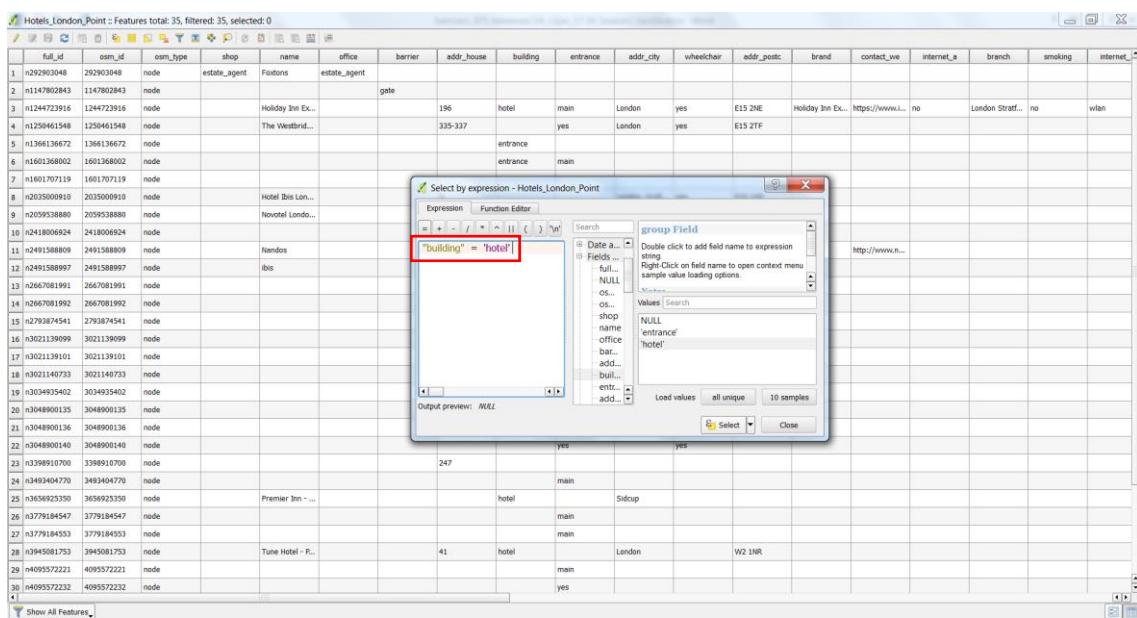
	full_id	osm_id	osm_type	shop	name	office	barrier	addr_house	building	entrance	addr_city	wheelchair	addr_postc	brand	contact_we	internet_a	branch	smoking	internet	
1	n29203048	29203048	node	estate_agent	Fostons	estate_agent														
2	n14780243	114780243	node			gate														
3	n1244723918	1244723918	node	Holiday Inn Ex...			196		hotel	main	London	yes	E15 2NE	Holiday Inn Ex...	https://www.h...	no	London Strat...	no	wlan	
4	n1259461548	1259461548	node	The Westbird...				335-337		yes	London	yes	E15 2TF							
5	n1366136672	1366136672	node						entrance											
6	n1601368002	1601368002	node						entrance	main										
7	n1601707119	1601707119	node																	
8	n2035000910	2035000910	node	Hotel Ibis Lon...				9			London, Gre... ...	yes	E16 1AB							
9	n2059538880	2059538880	node	Novotel Londo...				7						E16 1AA						
10	n2418006924	2418006924	node							main										
11	n2491588009	2491588009	node	Nandos				1A		main	London	yes	E15 4LJ		http://www.n...					
12	n2491588997	2491588997	node	Ibis				1a		main	London	yes	E15 4LJ							
13	n2667081991	2667081991	node							main										
14	n2667081992	2667081992	node							service										
15	n2793874541	2793874541	node						entrance											
16	n3021139999	3021139999	node							emergency										
17	n3021139101	3021139101	node							yes										
18	n3021140733	3021140733	node							yes										
19	n3034935402	3034935402	node							yes										
20	n3048900135	3048900135	node							main	no									
21	n3048900136	3048900136	node																	
22	n3048900140	3048900140	node							yes	yes									
23	n398910700	398910700	node					247												
24	n449404770	3489404770	node							main										
25	n3056925350	3056925350	node	Premier Inn - ...					hotel		Sidcup									
26	n3779184547	3779184547	node							main										
27	n3779184553	3779184553	node							main										
28	n3945081753	3945081753	node	Tune Hotel - P...			41	hotel		London		W2 1NR								
29	n409572221	409572221	node							main										
30	n409572232	409572232	node							yes										

Show All Features

Hotels_London_Point : Features total: 35, filtered: 35, selected: 0

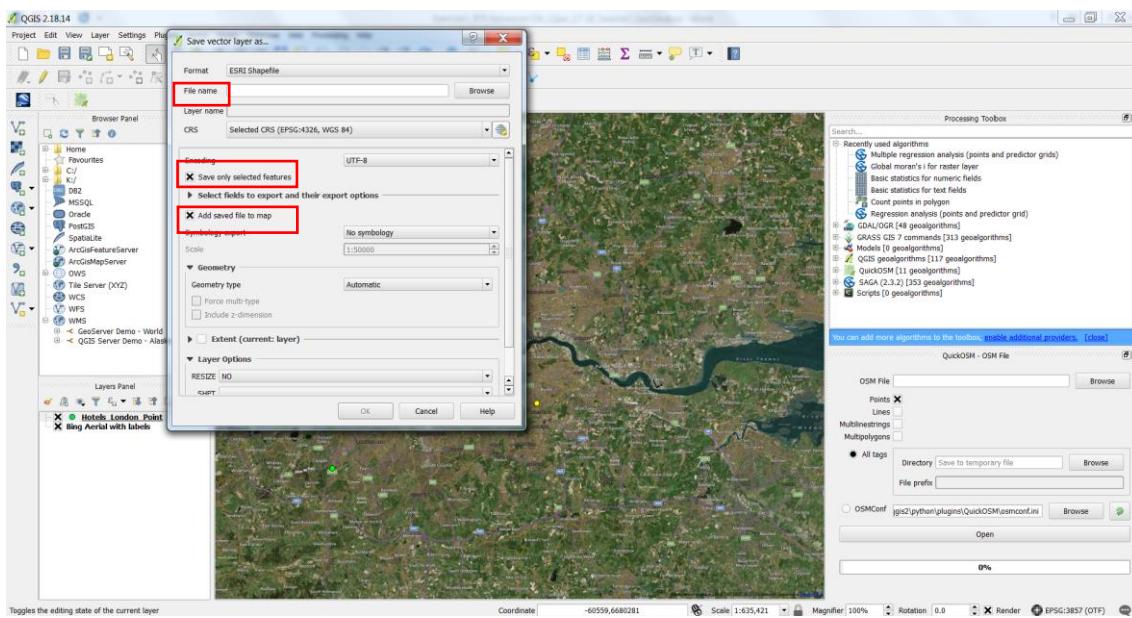
	full_id	osm_id	osm_type	shop	name	office	barrier	addr_house	building	entrance	addr_city	wheelchair	addr_postc	brand	contact_we	internet_a	branch	smoking	internet	
1	n29203048	29203048	node	estate_agent	Fostons	estate_agent														
2	n14780243	114780243	node		gate															
3	n1244723918	1244723918	node	Holiday Inn Ex...			196	hotel	main	London	yes	E15 2NE	Holiday Inn Ex...	https://www.h...	no	London Strat...	no	wlan		
4	n1259461548	1259461548	node	The Westbird...				335-337	yes	London	yes	E15 2TF								
5	n1366136672	1366136672	node						entrance											
6	n1601368002	1601368002	node						entrance	main										
7	n1601707119	1601707119	node																	
8	n2035000910	2035000910	node	Hotel Ibis Lon...										E16 1AB						
9	n2059538880	2059538880	node	Novotel Londo...										E16 1AA						
10	n2418006924	2418006924	node																	
11	n2491588009	2491588009	node	Nandos				1A		main	London	yes	E15 4LJ		http://www.n...					
12	n2491588997	2491588997	node	Ibis				1a		main	London	yes	E15 4LJ							
13	n2667081991	2667081991	node							main										
14	n2667081992	2667081992	node							service										
15	n2793874541	2793874541	node							entrance										
16	n3021139999	3021139999	node								emergency									
17	n3021139101	3021139101	node								yes									
18	n3021140733	3021140733	node								yes									
19	n3034935402	3034935402	node								yes									
20	n3048900135	3048900135	node								main	no								
21	n3048900136	3048900136	node																	
22	n3048900140	3048900140	node																	
23	n398910700	398910700	node					247												
24	n449404770	3489404770	node							main										
25	n3056925350	3056925350	node	Premier Inn - ...					hotel		Sidcup									
26	n3779184547	3779184547	node							main										
27	n3779184553	3779184553	node							main										
28	n3945081753	3945081753	node	Tune Hotel - P...			41	hotel		London		W2 1NR								
29	n409572221	409572221	node								main									
30	n409572232	409572232	node							yes										

Show All Features

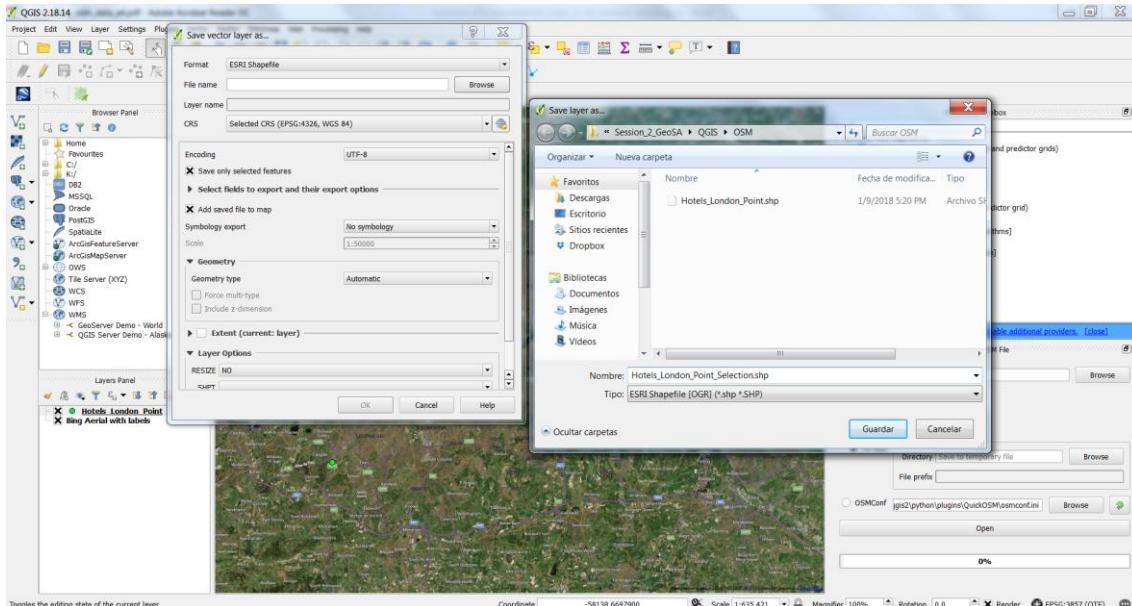


full_id	osm_id	osm_type	shop	name	office	barrier	addr_house	building	entrance	addr_city	wheelchair	addr_postc	brand	contact_we	internet_a	branch	smoking	internet			
1	n29203048	29203048	node		estate_agent	Foxtons	estate_agent														
2	n14780243	114780243	node			gate															
3	n1244723918	1244723918	node	Holiday Inn Ex...			196	hotel	main	London	yes	E15 2HE	Holiday Inn Ex...	https://www.h...	no	London Strat...	no	vlan			
4	n125461548	125461548	node	The Westbird...			335-337		yes	London	yes	E15 2TF									
5	n1361364672	1361364672	node				entrance														
6	n1601368002	1601368002	node				entrance	main													
7	n1601707119	1601707119	node																		
8	n2035009010	2035009010	node	Hotel Ibis Lon...			9			London, Gras...	yes	E16 1AB									
9	n2059538880	2059538880	node	Novotel Londo...			7						E16 1AA								
10	n2418006924	2418006924	node							main											
11	n2491588809	2491588809	node	Nandos			1A		main	London		E15 4LJ	http://www.n...								
12	n2491588997	2491588997	node	Ibis			1B		main	London		E15 4LJ									
13	n2667081991	2667081991	node							main											
14	n2667081992	2667081992	node							service											
15	n2793747541	2793747541	node							entrance											
16	n3021139999	3021139999	node							emergency											
17	n3021139101	3021139101	node							yes											
18	n3021140733	3021140733	node							yes											
19	n3034935402	3034935402	node							yes											
20	n3048900135	3048900135	node							main			no								
21	n3048900136	3048900136	node							yes											
22	n3048900140	3048900140	node							yes			yes								
23	n398910700	398910700	node							yes			yes								
24	n493404770	3493404770	node							main											
25	n636925250	3636925250	node	Premier Inn - ...					hotel		Sidcup										
26	n3779184547	3779184547	node							main											
27	n3779184553	3779184553	node							main											
28	n3945081753	3945081753	node	Tune Hotel - P...			41	hotel		London		W2 1NR									
29	n4095572221	4095572221	node							main											
30	n4095572232	4095572232	node							yes											

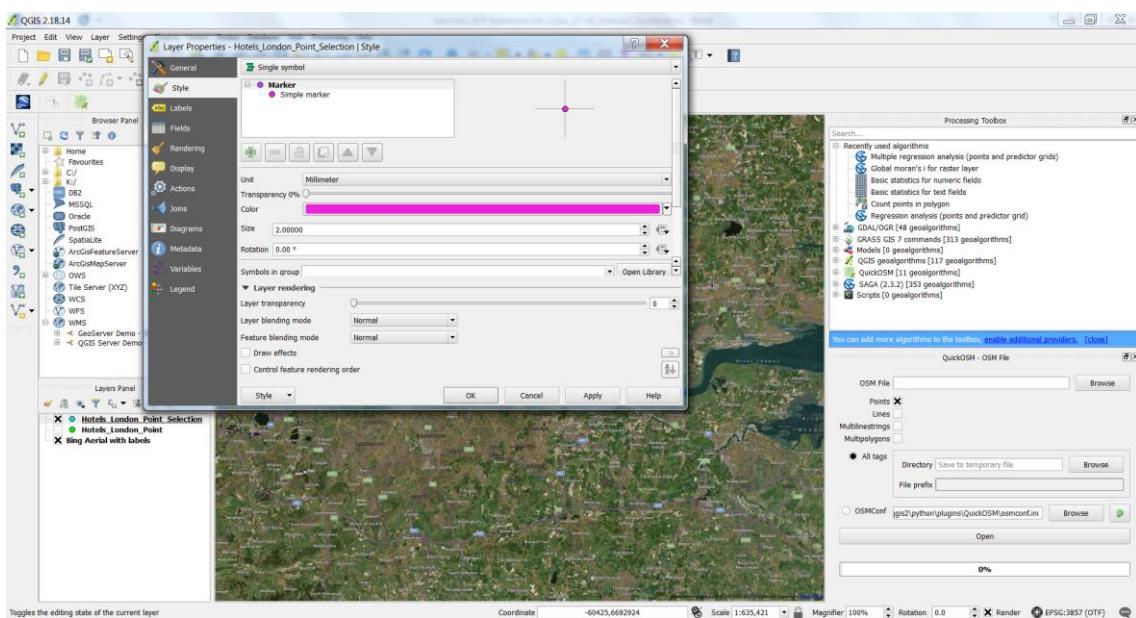
2.9. Back in the QGIS Las Palmas, you will see 3 points highlighted in yellow. These are the result of our query. Right-click the "Hotels_London_Point" layer and choose the option "Save as...".



- 2.10. In the “Save vector layer as...” dialog, enter the name of the output file (format: shapefile) as “Hotels_London_Point_Selection”. In the “Save vector layer as...” dialog choose the option “Save only selected features”. Leave all other options as they are and make sure the “Add saved file to map” option is checked. Click OK.



- 2.11. You will see a new layer named “Hotels_London_Point_Selection” in the QGIS project. Uncheck the “Hotels_London_Point layer”.
 2.12. Change the symbology of the new file. Check the attribute table of the new layer.



full_id	osm_id	osm_type	shop	name	office	barrier	addr_house	building	entrance	addr_city	wheelchair	addr_postc	brand	contact_we	internet_a	branch	smoking	internet_l
1	1244723916	node		Holiday Inn Ex...			196	hotel	main	London	yes	E15 2HE	Holiday Inn Ex..	https://www.i...	no	London Strat..	no	wlan
2	3656925350	node		Premier Inn ...				hotel		Sidcup								
3	3945081753	node		Tune Hotel - P...			41	hotel		London		W2 1NR						

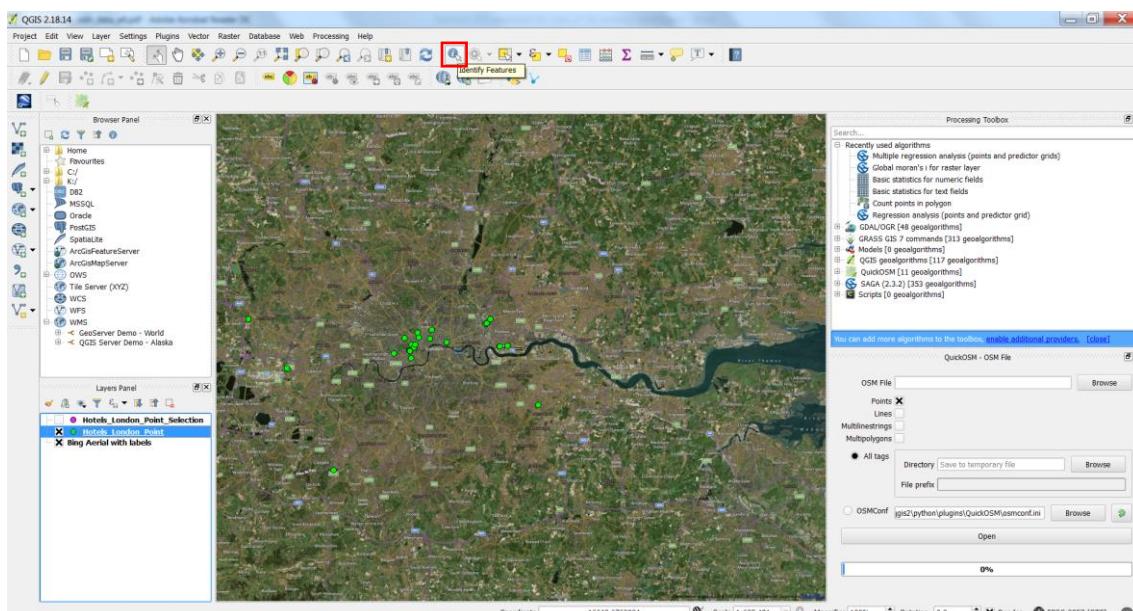
2.13. Remove the filter of the layer "Hotels_London_Point" with the option "Deselect all".

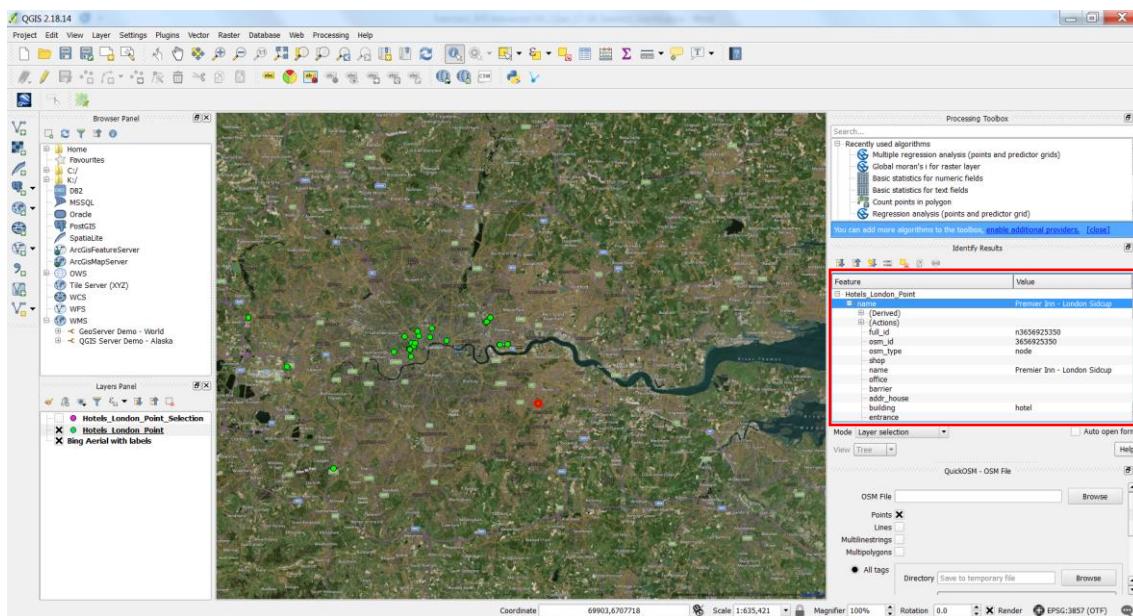
Hotels_London_Point : Features total: 35, filtered: 35, selected: 3

	full_id	osm_id	osm	name	office	barrier	addr_house	building	entrance	addr_city	wheelchair	addr_postc	brand	contact_we	internet_a	branch	smoking	internet
1	n29203048	29203048	node	estate_agent	Fostons	estate_agent												
2	n1147802843	1147802843	node		gate													
3	n1244723116	1244723116	node	Holiday Inn Ex...			196	hotel	main	London	yes	E15 2NE	Holiday Inn Ex...	https://www.h...	no	London Strat...	no	wtan
4	n1259461548	1259461548	node	The Westbrid...			335-337		yes	London	yes	E15 2TF						
5	n1366136472	1366136472	node					entrance										
6	n1601368002	1601368002	node					entrance	main									
7	n1601707119	1601707119	node															
8	n2035009010	2035009010	node	Hotel Ibis Lon...			9			London, GtB...	yes	E16 1AB						
9	n2059538880	2059538880	node	Novotel Londo...			7					E16 1AA						
10	n2418006924	2418006924	node						main									
11	n2491588009	2491588009	node	Nandos			1A		main	London		E15 4LJ		http://www.n...				
12	n2491588997	2491588997	node	Ibis			1a		main	London		E15 4LJ						
13	n2667081991	2667081991	node					entrance										
14	n2667081992	2667081992	node						main									
15	n2793874541	2793874541	node						service									
16	n3021139999	3021139999	node						emergency									
17	n3021139101	3021139101	node						yes									
18	n3021140733	3021140733	node						yes									
19	n3034935402	3034935402	node						yes									
20	n3048900135	3048900135	node						main		no							
21	n3048900136	3048900136	node															
22	n3048900140	3048900140	node						yes		yes							
23	n398810700	398810700	node				247											
24	n449404770	3449404770	node						main									
25	n450425150	3450425150	node	Premier Inn - ...				hotel				Staple						
26	n3779184547	3779184547	node						main									
27	n3779184553	3779184553	node						main									
28	n3945001173	3945001173	node	Tower Hotel - P...			41	hotel		London		W2 1NR						
29	n4095372221	4095372221	node						main									
30	n4095372232	4095372232	node						yes									

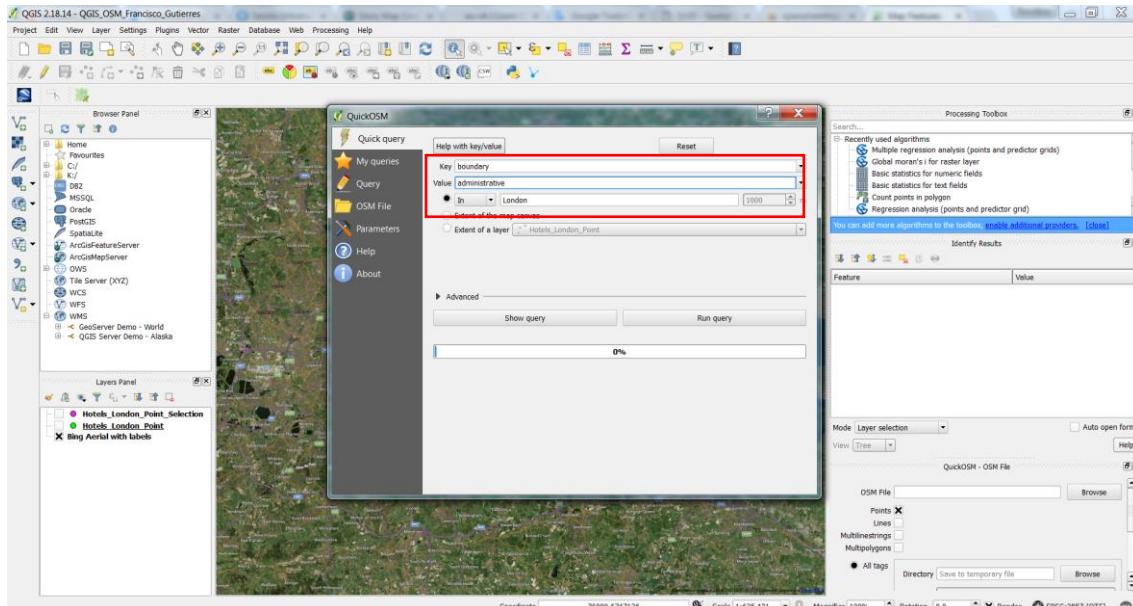
Show All Features

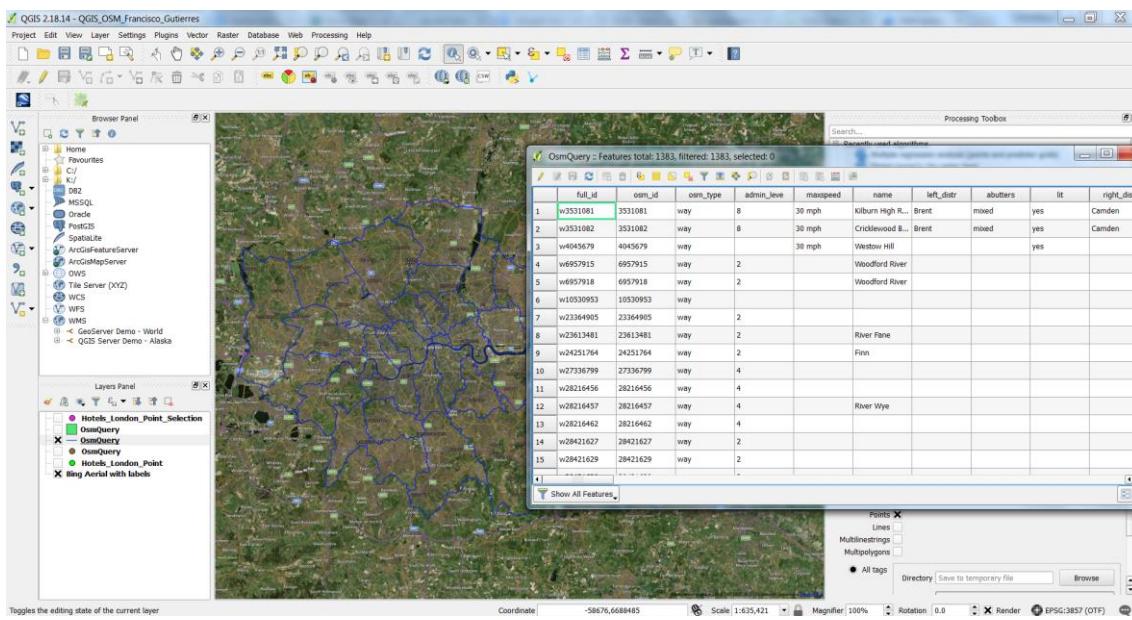
2.14. The extraction of the hotels shapefile layer is now complete. You can use the “Identify Features” tool to click on any of the point as see its attributes.





2.15. Repeat the procedure for others “OSM” layers for London or for your project study area. For example the boundaries of London. Change the symbology and explore the information.





- 2.16. Save your QGIS project as "QGIS_OSM_%Studentname%".
- 2.17. Let's download OSM data for Barcelona (as shapefile) from public websites and import to QGIS Las Palmas.

<https://download.bbbike.org/osm/bbbike/Barcelona/>

OSM extracts for Barcelona

- Barcelona.osm.csv.xz 2.8M
- Barcelona.osm.garmin-onroad.zip 2.3M
- Barcelona.osm.garmin-open topo.zip 10.7M
- Barcelona.osm.garmin-osm.zip 10.1M
- Barcelona.osm.gz 34.4M
- Barcelona.osm.mapsforge-osm.zip 9.2M
- Barcelona.osm.navit.zip 13.8M
- Barcelona.osm.oql.xz 25.6M
- Barcelona.osm.pbf 15.3M
- Barcelona.osm.shp.zip** 27.3M
- Barcelona.osm.svg-google.zip 6.4M
- Barcelona.poly
- CHECKSUM.txt

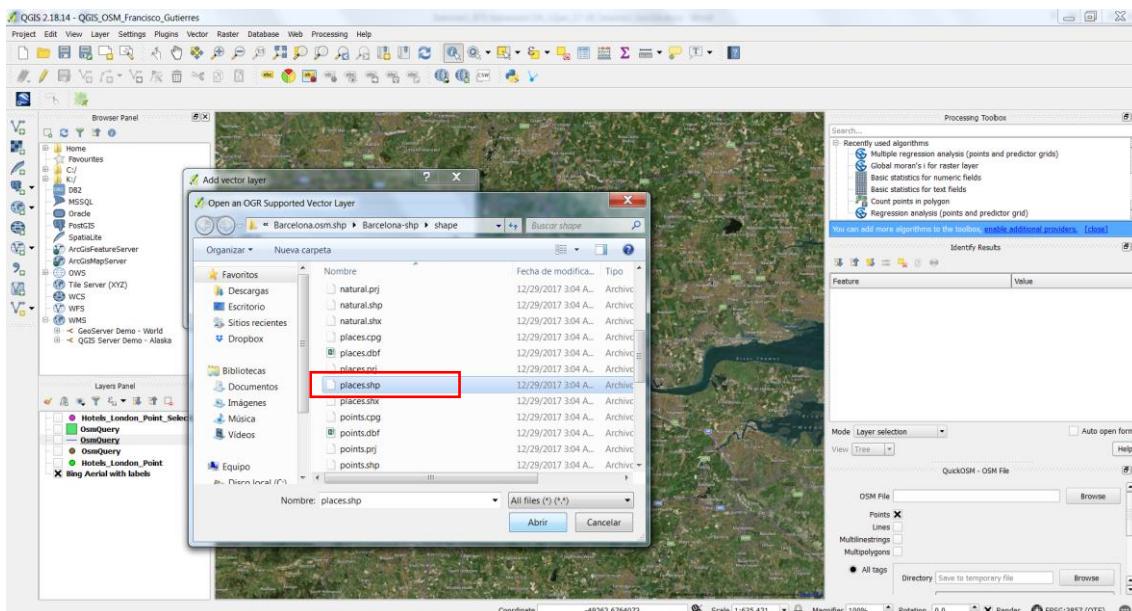
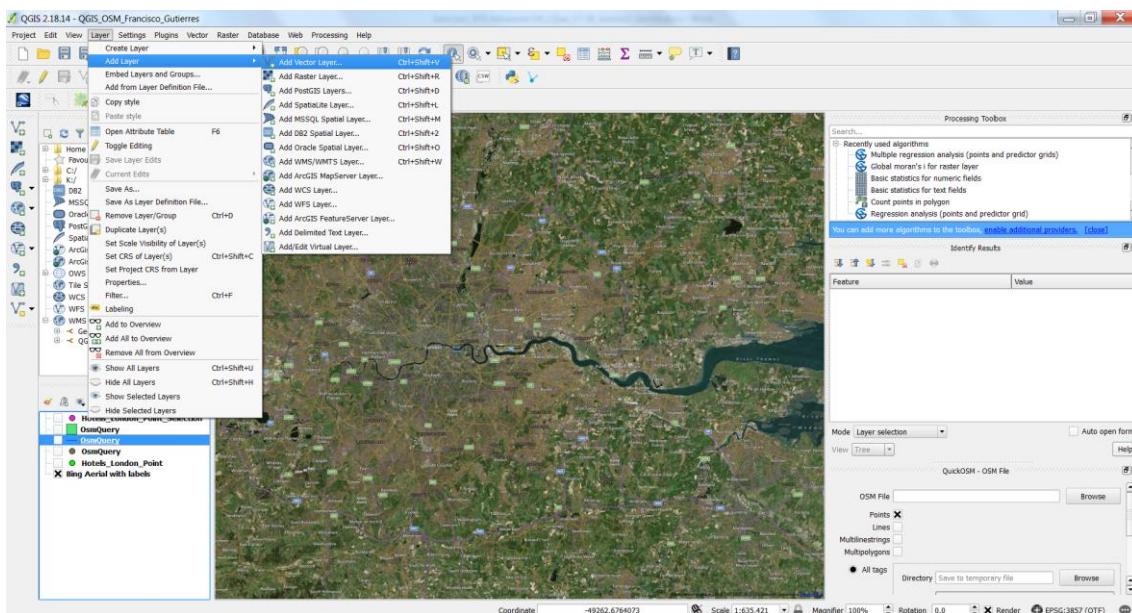
Start bicycle routing for [Barcelona](#)

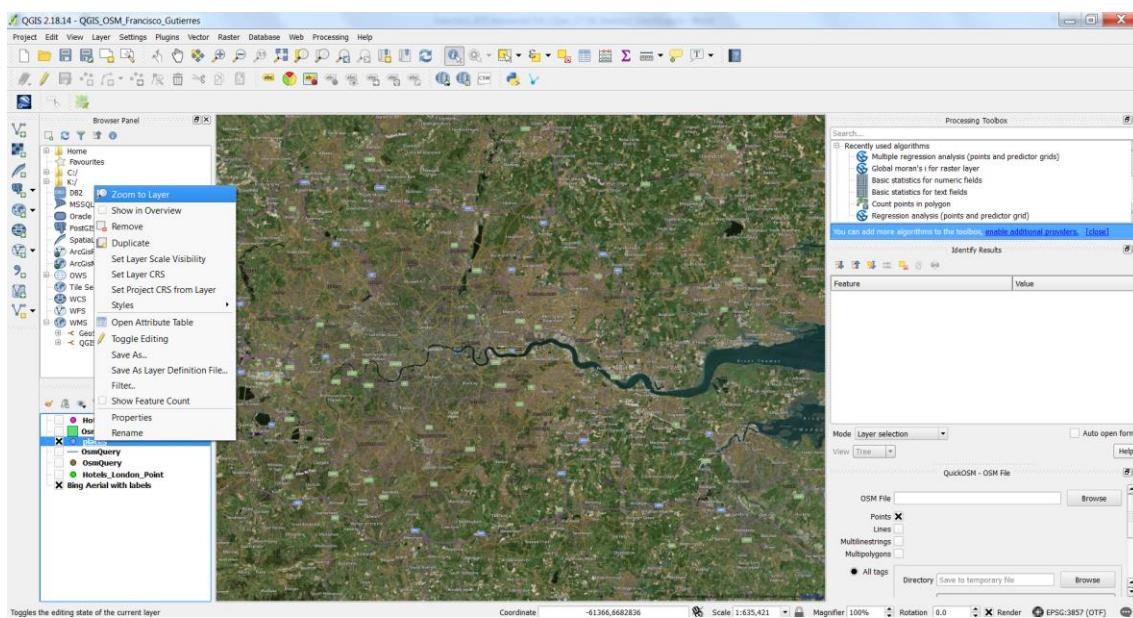
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home | donate | [Barcelona](#) | commercial support | more cities

(c) 2008-2017 BBBike.org // Map data (c) OpenStreetMap.org contributors
map complete - item extract service

- 2.18. Add the shapefiles included in the extracted OSM data for Barcelona.





2.19. Explore the data (attribute table and using the “Identify Feature” tool).

2.20. Download and add the data located in the following link:

https://wiki.openstreetmap.org/wiki/Barcelona_Parcel_Import

Goals
Merge the official data source of CartoBCN into OSM.

Schedule
The import will happen during the weekends of the last week of November and the first week of December

Import Data

Background
Provide links to your sources.
Data source site: <http://w20.bcn.cat/cartobcn/default.aspx?lang=en>
Data license: http://w24.bcn.cat/geoportal/descargas/cond_ue_carto.pdf
Type of license (if applicable): CC-BY 3.0
OSM attribution (if required): <https://wiki.openstreetmap.org/w/index.php?title=Contributors&oldid=28CartoBCN.29>
ODbL Compliance verified: yes

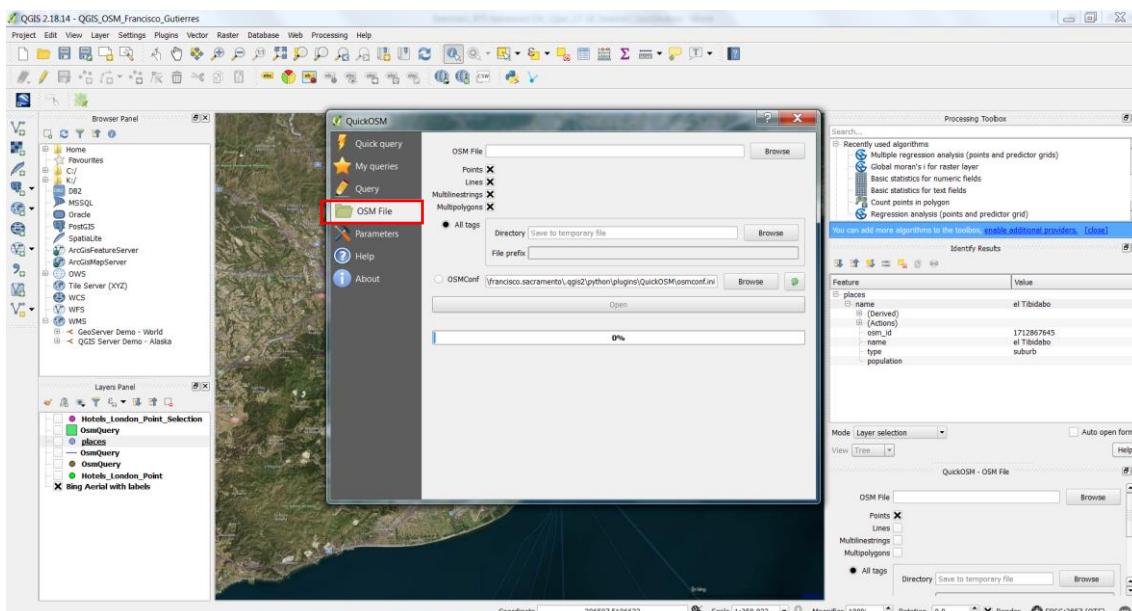
OSM Data Files
The file used for the import is **barna.osm.bz2**

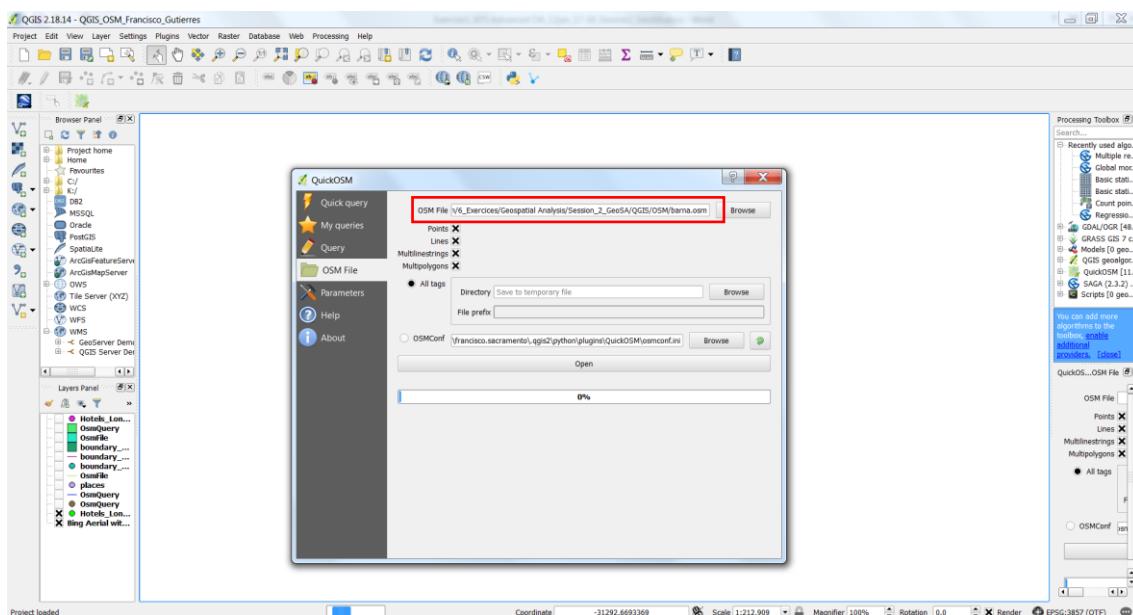
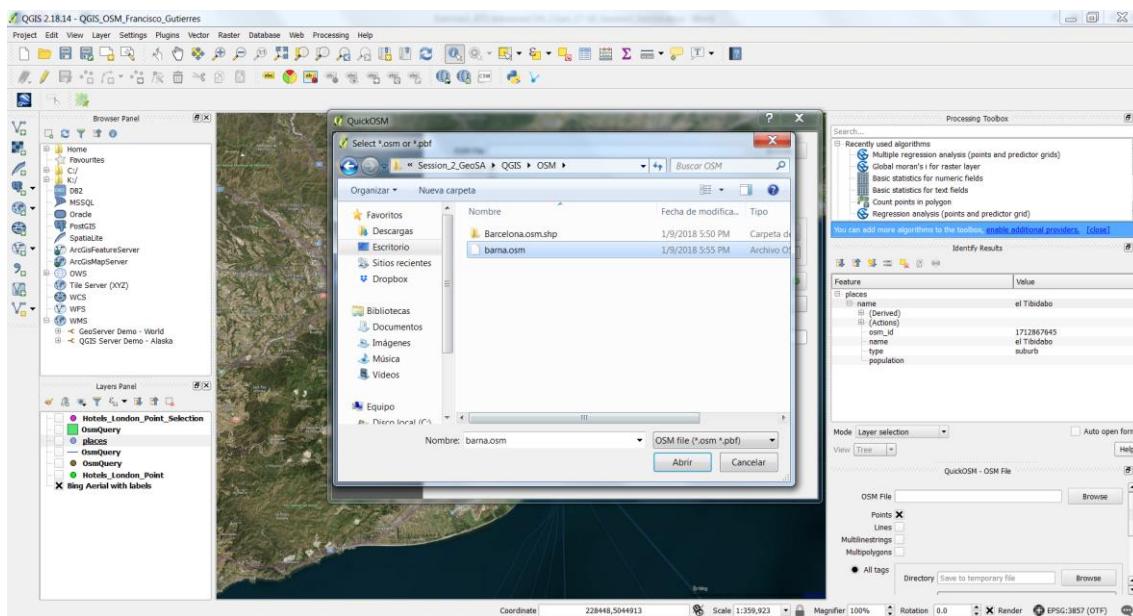
Import Type
The import is a One Time import as the users can add or remove buildings later.
The tools used will be QuantumGIS for the osm file preparation and JOSM for the actual importing

Data Preparation

Data Reduction & Simplification
Since the original files contain a LOT of redundant points just to define a line MapShaper will be used with a setting of ~33% to simplify the shapelines.
More so, internal tags only used by the Barcelona City Council will be removed leaving just the street address and number.

2.21. The file “barna” as the extension “.OSM”. We will import this file to QGIS Las Palmas using the “QuickOSM” plugin.





2.22. Also explore the following OSM websites. You will find country and city OSM data.

<http://learnosm.org/en/osm-data/getting-data/>

The screenshot shows a web browser window with the URL learnosm.org/en/osm-data/getting-data/. The page title is "Getting OSM Data". On the left, there's a sidebar with "OSM DATA" sections: "OSM Data Overview", "File Formats", "Getting OSM Data" (which is highlighted in green), "Using Geofabrik and HOT Export", "Using OSM Data in QGIS", "Setting up PostgreSQL", "osm2pgsql", and "Manipulating Data with Osmosis". Below this is an "OTHER GUIDES" section. The main content area has a "NOTE:" box stating "This guide may be downloaded as [Getting_OSM_Data_en.odt](#) or [Getting_OSM_Data_en.pdf](#)". It was reviewed on 2016-04-05. The text explains that getting the most recent OpenStreetMap data is easiest via a web service extract. It highlights "DOWNLOADING DATA EXTRACTS" and "GeoFabrik". The "GeoFabrik" section notes it's updated daily and provides a link to their download website.

<http://openstreetmapdata.com/>

The screenshot shows a web browser window with the URL openstreetmapdata.com. The page title is "OpenStreetMapData". It features a globe graphic and navigation tabs for "Info", "Data", "Processing", and "Contact". The "Data" tab is active. A "Last data update: 11 Jan 2018 04:17" message is displayed. The main content area includes sections for "Coastline data processing", "Generalized OpenStreetMap data", and "Other datasets". Each section has a "Get" button: "Get coastline data", "Get generalized data", and "Show all data". There are also links for "Find out more" and "Not what you're looking for? There are other OpenStreetMap data sources where you might find what you need." On the right, there are profiles for Jochen Topf and Christoph Hormann, both mentioned as members of the OSM community since 2006. The footer contains the copyright notice "© 2015-2016 Jochen Topf & Christoph Hormann - Impressum".

Great Job!