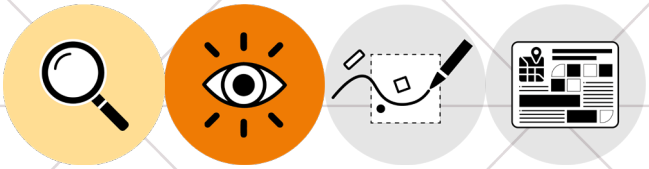
THE BARTLETT SCHOOL OF PLANNING

UCL

Graphic Skills Lab

Handout series

QGis



URBAN GRAPHICS SKILLS

Graphic Skills Lab
The Bartlett School of Planning, UCL

Coordinators

Valentina Giordano

Dimitrios Panayotopoulos-Tsiros

Development assistant

Irene Manzini Ceinar

Advisors

Dr Juliana Martins, Director of Education, Bartlett School of Planning

Dr Jess Ferm, Director for Undergraduate Programmes

Dr Ben Clifford, Director for Postgraduate Programmes

Dr Pablo Sendra, Programme Director for MSc Urban Design and City Planning

Dr Michael Short, Programme Director for MPlan City Planning

Prof Matthew Carmona, Professor of Planning and Urban Design

BUPS – Bartlett Urban Planning Society (Established in 2012, the Bartlett Urban Planning Society (BUPS) is a student-run organisation, subsumed under the Bartlett School of Planning (BSP). BUPS represents, reinforces and protects the interests of planning students while inspiring the community-at-large of our role in the Built Environment.)

CONTENTS

1. Introduction

QGis is a geographic information system (GIS) lets us visualize, question, analyse and interpret data to understand relationship, patterns and trends in space.

GI – Geographic Information	Map data
GIS – Geographic Information Science	Methods & Analysis
GIS – Geographic information Systems	Technology

2. Installation

Visit the following link and follow the instruction in videos to install QGis:

http://www.qgis.org/en/site/forusers/download.html

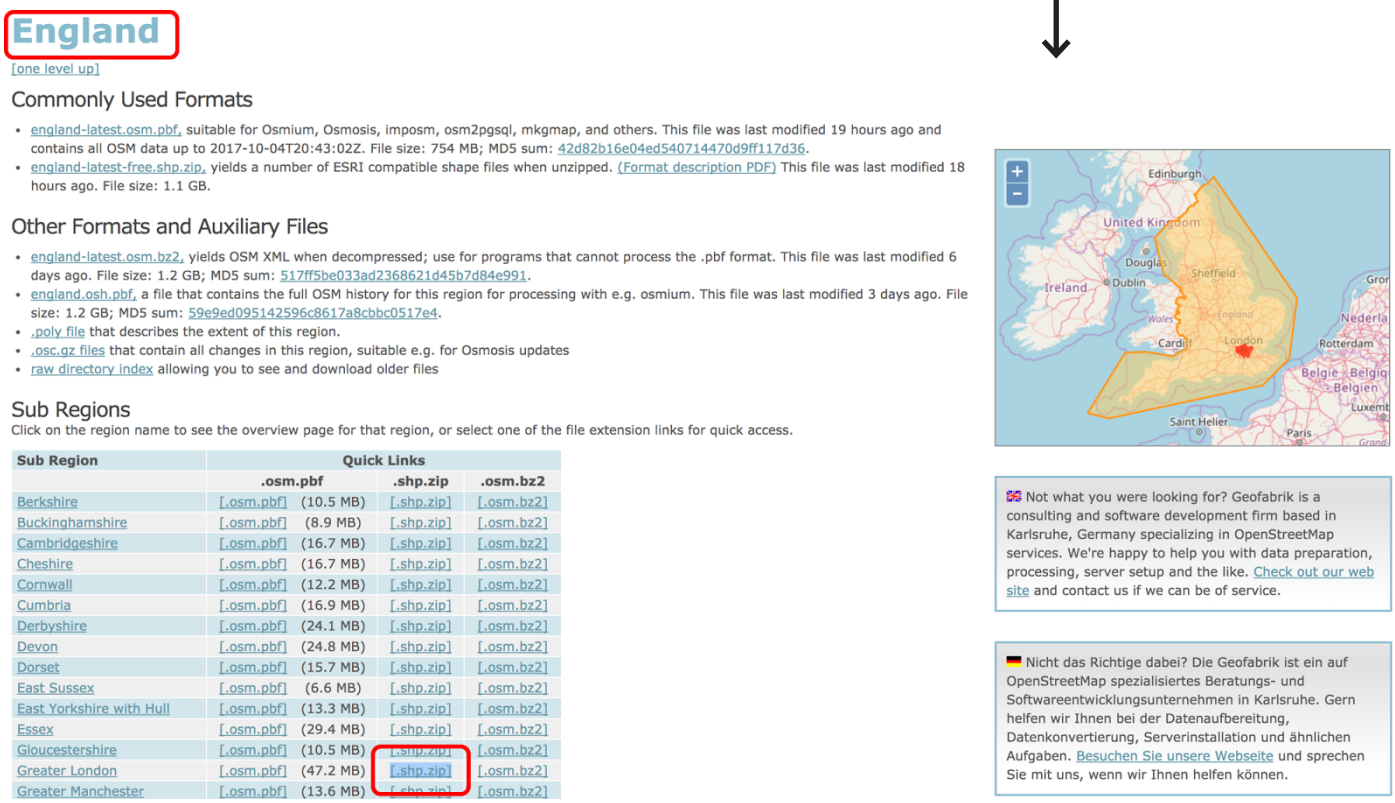
3. GIS data

Downloading data:

Use the following step to download the file (.shp) that you will use in QGis.

N.B. QGis works with links. This means that ll the file of one project should stay together in the same folder. For this reason, keeping track of your linked files is absolutely ESSENTIAL! We cannot stress this enough. **Ensure that all of the files that are placed in your document can be found in the same folder on your computer.**

1. To download geolocalised data visit : **http://download.geofabrik.de/**
2. Select Europe > Great Britain > England > Greater London , format [.shp.zip]
3. Wait for the file to download.
4. Create a new folder 1_Data_Unzipped and right- click to unzip the file.



England

[one level up]

Commonly Used Formats

- england-latest.osm.pbf, suitable for Osmium, Osmosis, imposm, osm2pgsql, mkgmap, and others. This file was last modified 19 hours ago and contains all OSM data up to 2017-10-04T20:43:02Z. File size: 754 MB; MD5 sum: 42d82b16e04ed540714470d9ff117d36.
- england-latest-free.shp.zip, yields a number of ESRI compatible shape files when unzipped. (Format description PDF) This file was last modified 18 hours ago. File size: 1.1 GB.

Other Formats and Auxiliary Files

- england-latest.osm.bz2, yields OSM XML when decompressed; use for programs that cannot process the .pbf format. This file was last modified 6 days ago. File size: 1.2 GB; MD5 sum: 517ff5be033ad2368621d45b7d84e991.
- england.osh.pbf, a file that contains the full OSM history for this region for processing with e.g. osmium. This file was last modified 3 days ago. File size: 1.2 GB; MD5 sum: 59e9ed095142596c8617a8cbbc0517e4.
- .poly file that describes the extent of this region.
- .osc.gz files that contain all changes in this region, suitable e.g. for Osmosis updates
- raw directory index allowing you to see and download older files

Sub Regions

Click on the region name to see the overview page for that region, or select one of the file extension links for quick access.

Sub Region	Quick Links		
	.osm.pbf	.shp.zip	.osm.bz2
Berkshire	[.osm.pbf] (10.5 MB)	[.shp.zip]	[.osm.bz2]
Buckinghamshire	[.osm.pbf] (8.9 MB)	[.shp.zip]	[.osm.bz2]
Cambridgeshire	[.osm.pbf] (16.7 MB)	[.shp.zip]	[.osm.bz2]
Cheshire	[.osm.pbf] (16.7 MB)	[.shp.zip]	[.osm.bz2]
Cornwall	[.osm.pbf] (12.2 MB)	[.shp.zip]	[.osm.bz2]
Cumbria	[.osm.pbf] (16.9 MB)	[.shp.zip]	[.osm.bz2]
Derbyshire	[.osm.pbf] (24.1 MB)	[.shp.zip]	[.osm.bz2]
Devon	[.osm.pbf] (24.8 MB)	[.shp.zip]	[.osm.bz2]
Dorset	[.osm.pbf] (15.7 MB)	[.shp.zip]	[.osm.bz2]
East Sussex	[.osm.pbf] (6.6 MB)	[.shp.zip]	[.osm.bz2]
East Yorkshire with Hull	[.osm.pbf] (13.3 MB)	[.shp.zip]	[.osm.bz2]
Essex	[.osm.pbf] (29.4 MB)	[.shp.zip]	[.osm.bz2]
Gloucestershire	[.osm.pbf] (10.5 MB)	[.shp.zip]	[.osm.bz2]
Greater London	[.osm.pbf] (47.2 MB)	[.shp.zip]	[.osm.bz2]
Greater Manchester	[.osm.pbf] (13.6 MB)	[.shp.zip]	[.osm.bz2]

Not what you were looking for? Geofabrik is a consulting and software development firm based in Karlsruhe, Germany specializing in OpenStreetMap services. We're happy to help you with data preparation, processing, server setup and the like. Check out our web site and contact us if we can be of service.

Nicht das Richtige dabei? Die Geofabrik ist ein auf OpenStreetMap spezialisiertes Beratungs- und Softwareentwicklungsunternehmen in Karlsruhe. Gern helfen wir Ihnen bei der Datenaufbereitung, Datenkonvertierung, Serverinstallation und ähnlichen Aufgaben. Besuchen Sie unsere Webseite und sprechen Sie mit uns, wenn wir Ihnen helfen können.

Data sources:

1. World

http://download.geofabrik.de/

https://www.openstreetmap.org/#map=13/51.5306/-0.0395

2. UK

https://www.ordnancesurvey.co.uk/opendatadownload/products.html

https://www.nomiweb.co.uk/

https://www.dft.gov.uk/traffic-counts/download.php

https://www.data.gov.uk/

https://www.data.london.gov.uk/

3. Mapping and visualisation

https://www.viewsofthewoorld.net

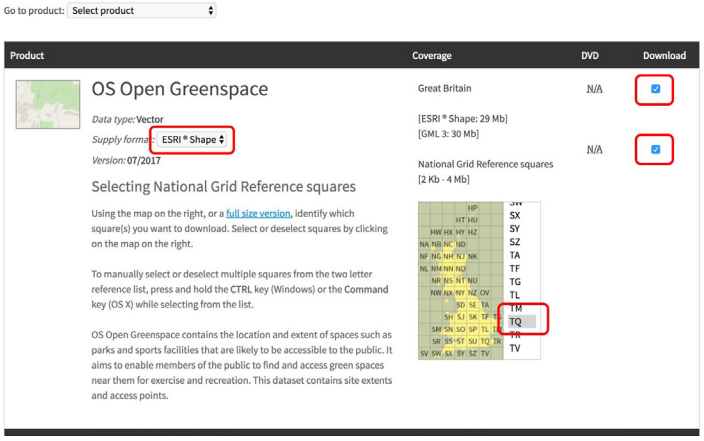
https://www.qgis.org/en/site/about/screenshots.html

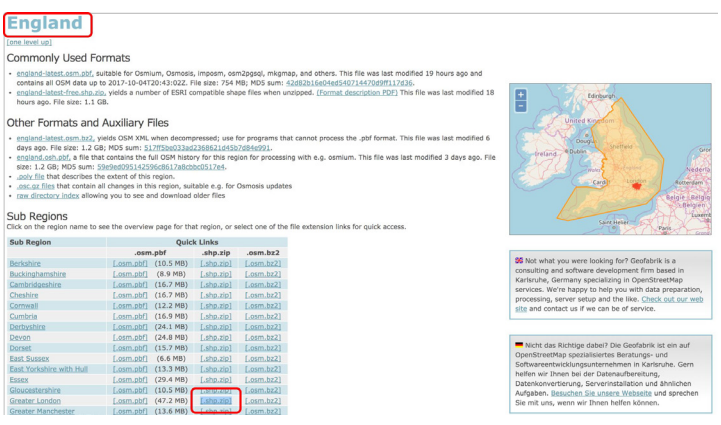
4. Projection

https://www.epsg-registry.org/

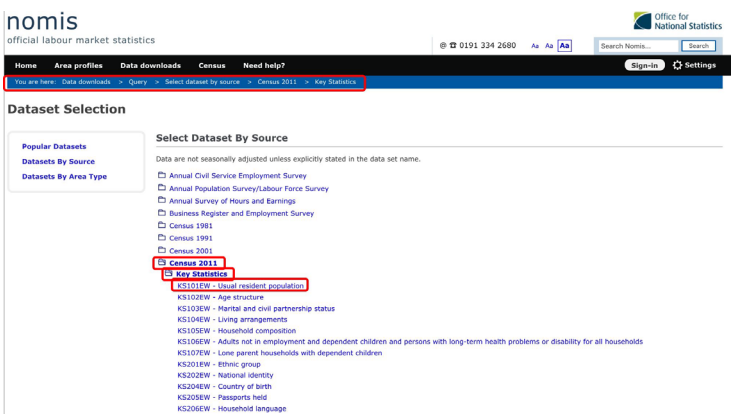
https://www.docs.qgis.org/2.0/en/docs/gentle_gis_introduction/coordinate_reference_system.html#on-the-fly-projection

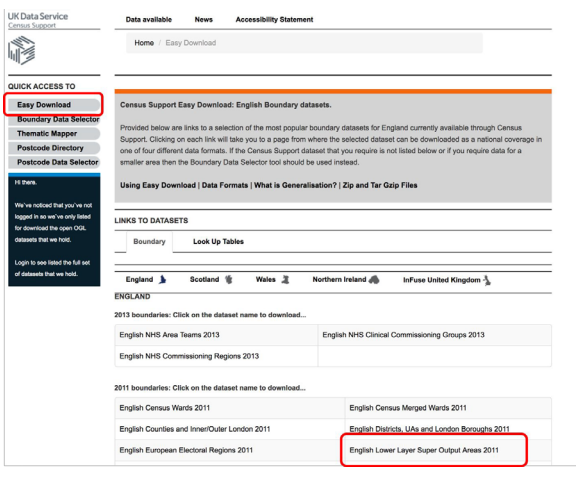
ORDNANCE SURVEY
GEOFABRIK





NOMIS WEB
CENSUS UK DATA SERVICE



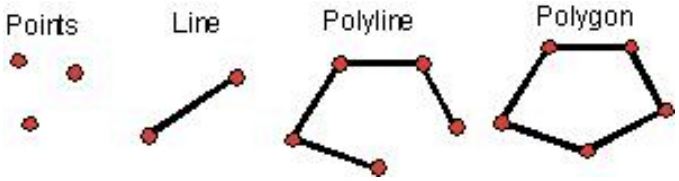


GIS types of data:

The three types of GIS Data are:

1. Spatial data

- ***Vector data***
  - Point Data — layers containing by points (or "events") described by x,y (lat,long; easting, northing)
  - Line/Polyline Data — layers that are described by x,y points (nodes, events) and lines (arcs) between points (line segments and polylines)
  - Polygon Data — layers of closed line segments enclosing areas that are described by attributes. Polygon data can be "multipart" like the islands of the state of Hawaii.



- ***Raster*** or grid data (matrices of numbers describing e.g., elevation, population, herbicide use, etc.
- ***Images*** or pictures such as remote sensing data or scans of maps or other photos. This is special "grid" where the number in each cell describes what color to paint or the spectral character of the image in that cell. (to be used, the "picture" must be placed on a coordinate system, or "rectified" or "georeferenced")
- ***TINs*** – Triangular Irregular Networks – used to discretise continuous data
- ***Terrain*** datasets built from lidar and other point clouds.Demo in ArcGIS

2. Attribute data

are non-spatial characteristics that are connected by tables to points, lines, "events" on lines, and polygons (and in some cases GRID cells)**.**

- **(a)** A point, vector or raster geologic map might describe a "rock unit" on a map with a single number, letter or name, but the associated attribute table might have
  - age
  - lithology
  - percent quartz
  - etc, for each rock type on the map.
- **(b)** Most GIS programs can either plot the polygon by the identifier or by one of the attributes.

3. Metadata

- **(a)** metadata are the most forgotten data type**.**
- **(b)** absolutely necessary if you're going to use data, or if someone is going to use your data later (or your derivative information).
- **(c)** contains information about
  - scale
  - accuracy
  - projection/datum
  - data source
  - manipulations
  - how to acquire data
- **(d)** many different "standards" for collection and presentation of metadata, such as FGDC used by US gov't agencies.

Vector vs. Raster:

Vector

Attributes(Fields)

Geometry

- Lines
- Points
- Polygons

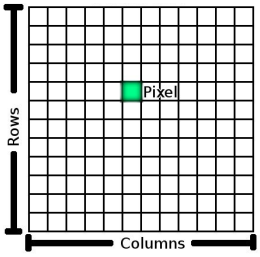
Examples

- Stations (point) - passenger usage
- Street (line) - length, name
- Transportation network (line) - name, time
- Open spaces (polygons) - area
- Urban blocks (polygons) - population density, built coverage
- Buildings (polygon) - height, floor area
- Municipalities(polygons) - population, unemployment rate

Raster

Attributes(Fields)

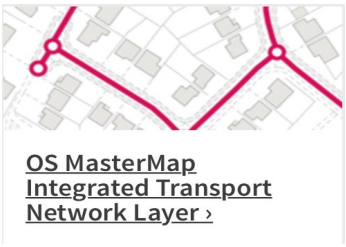
Cells/Pixels



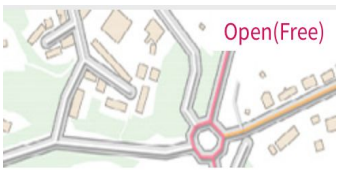
Examples

- Amount of greenery
- Temperature
- Cartographic image
- Satellite data

Vector



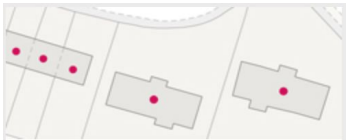
OS MasterMap Integrated Transport Network Layer ›



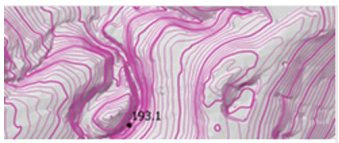
OS Open Roads ›

OS MasterMap Highways Network ›

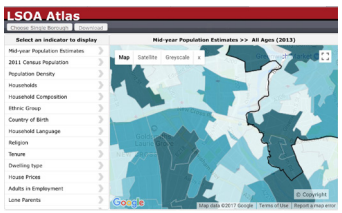
Raster

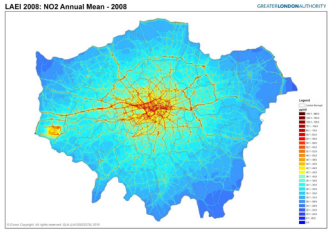


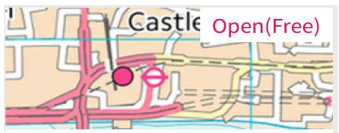
AddressBase Plus ›



OS Terrain 5 ›







OS VectorMap District ›

Sources: Ordnance Survey
London Datastore

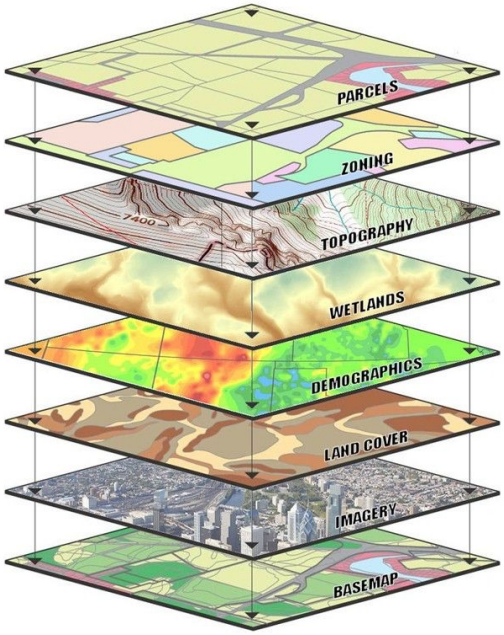
Working with RASTER data:

Raster data is quite different from vector data. Vector data has discrete features constructed out of vertices, and perhaps connected with lines and/or areas. Raster data, however, is like any image. Although it may portray various properties of objects in the real world, these objects don't exist as separate objects; rather, they are represented using pixels of various different colour values.

Working with VECTOR data:

Vector data is arguably the most common kind of data you will find in the daily use of GIS. The vector model represents the location and shape of geographic features using points, lines and polygons (and for 3D data also surfaces and volumes), while their other properties are included as attributes (often presented as a table in QGIS). It is usually used to store discrete features, like roads and city blocks. The objects in a vector dataset are called **features**, and contain data that describe their location and properties.

Real World



Slices of the world

GIS Data Layers

Where ? Why? How?

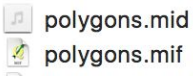
- **Where** is the best location to live in London ?
- **Why** is the crime rate high in an area?
- **How** walkable is a neighbourhood?

GIS Filetypes:

MEMORY LAYER

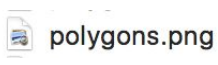
SHAPEFILE

MIF



TAB

PNG



CSV

4. Map projections

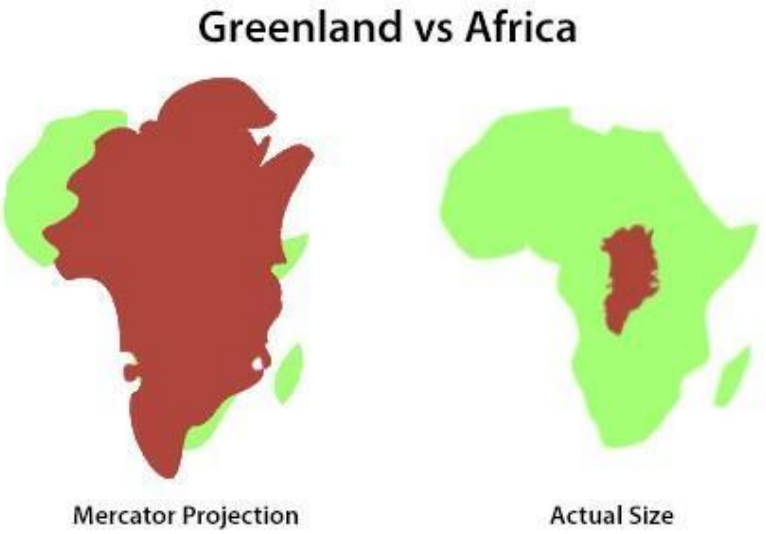
Projection, or map projection, is termed as the Coordinate Reference System (CRS) or Spatial Reference System (SRS) in QGIS. All coordinate systems used in GIS are classified into two types: Geographic coordinate system, and. Projected coordinate system.

Map projections - or Coordinate Reference System (CRS) - often cause a lot of frustration when working with GIS data. But a proper understanding of the concepts and access to the right tools will make it much easier to deal with projections.

The earth is **not** flat

Mercator projection source: https://en.wikipedia.org/wiki/Mercator_projection

Projecting a 3D spheroid surface into two dimensions is not an absolutely accurate representation



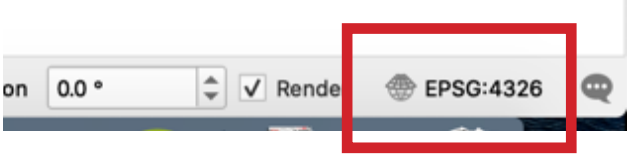
Coordinate reference system:

Geographic coordinate system:

- Degrees of latitude and longitude
- Degrees are divided into minutes (‘) and seconds (‘‘)
- Most popular WGS 84

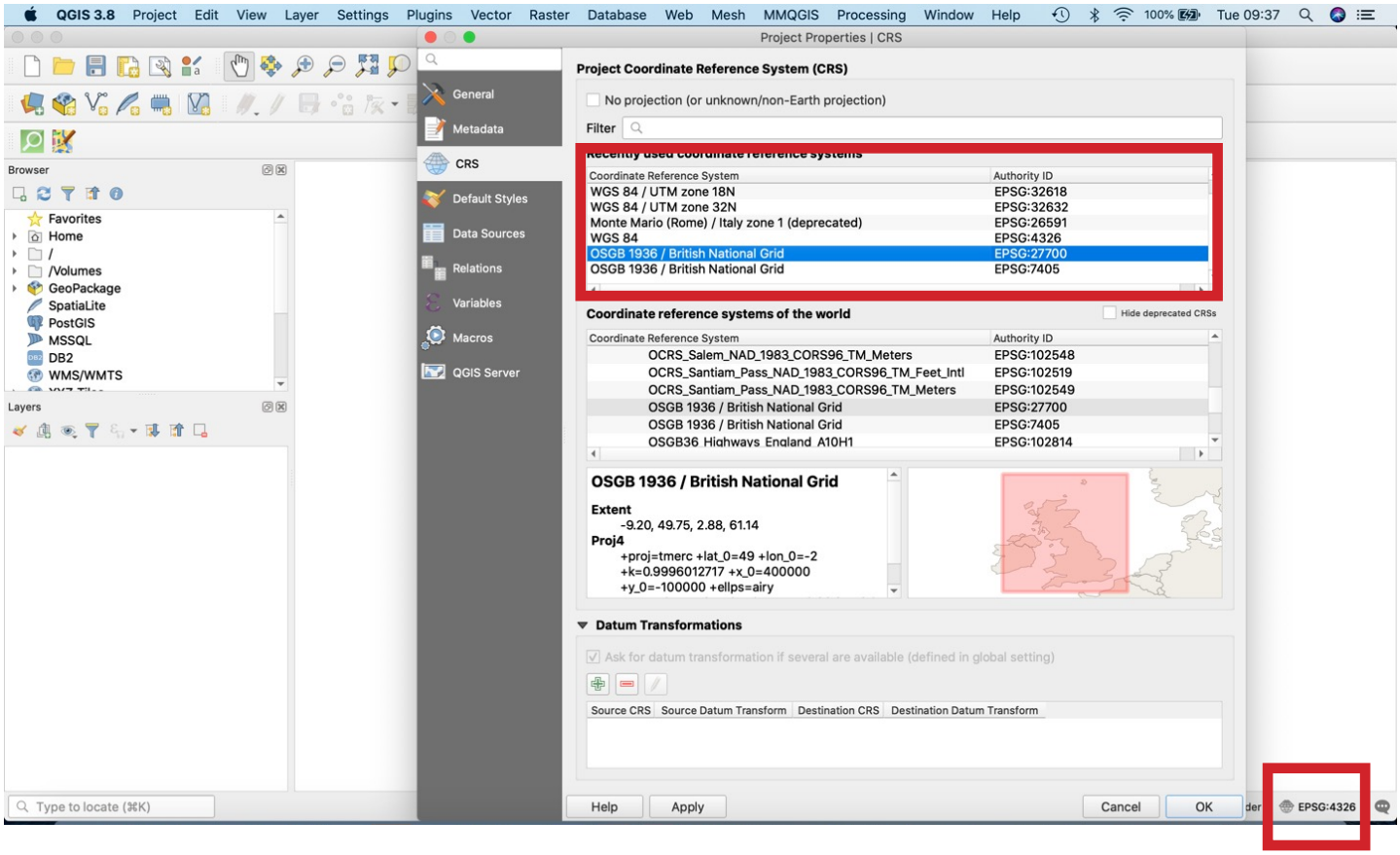
Projected coordinate system:

- XYZ coordinates
- Cartesian



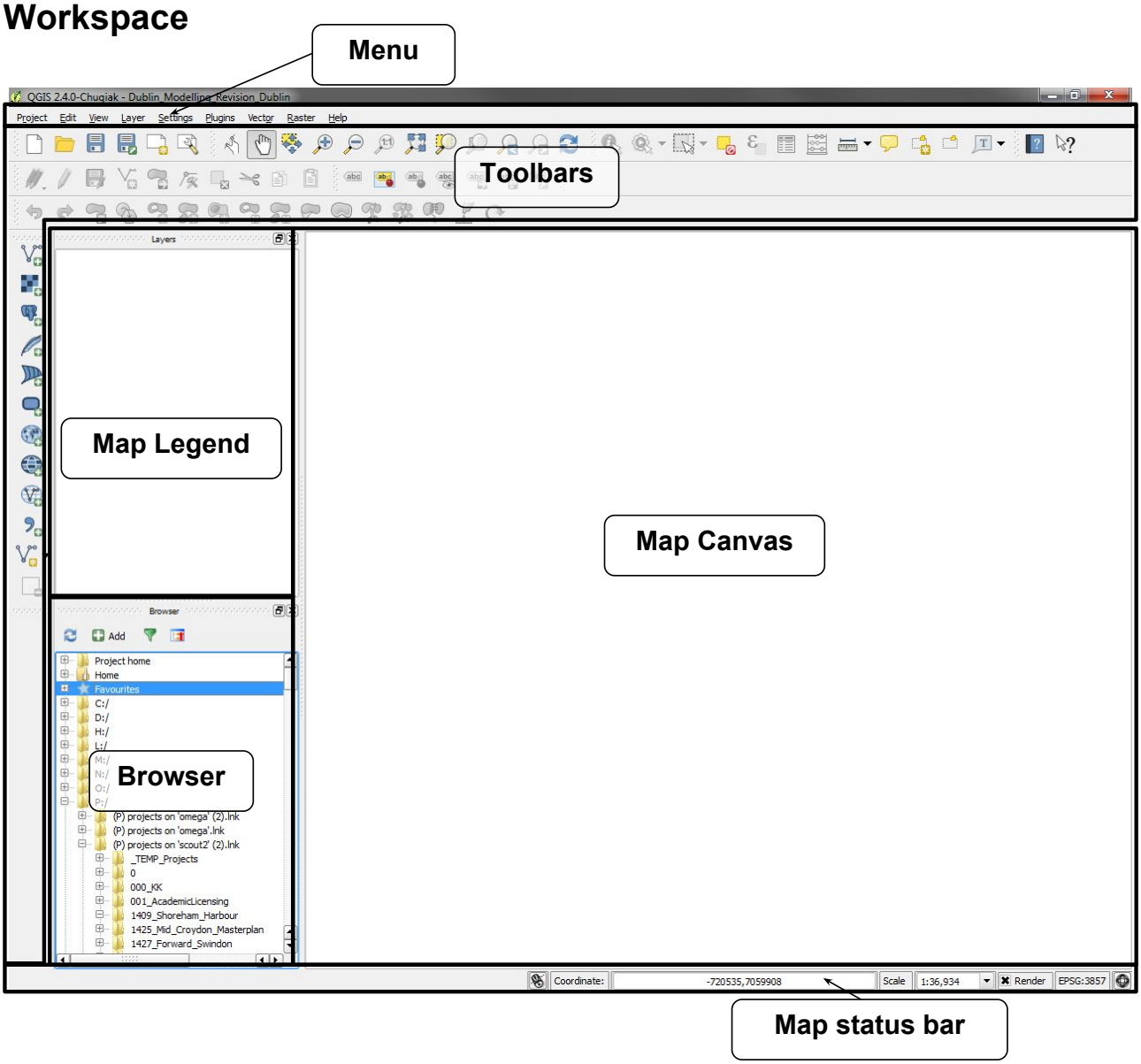
Coordinate reference system:

- WGS 84 most popular
- OSGB 1936 / British National Grid for England

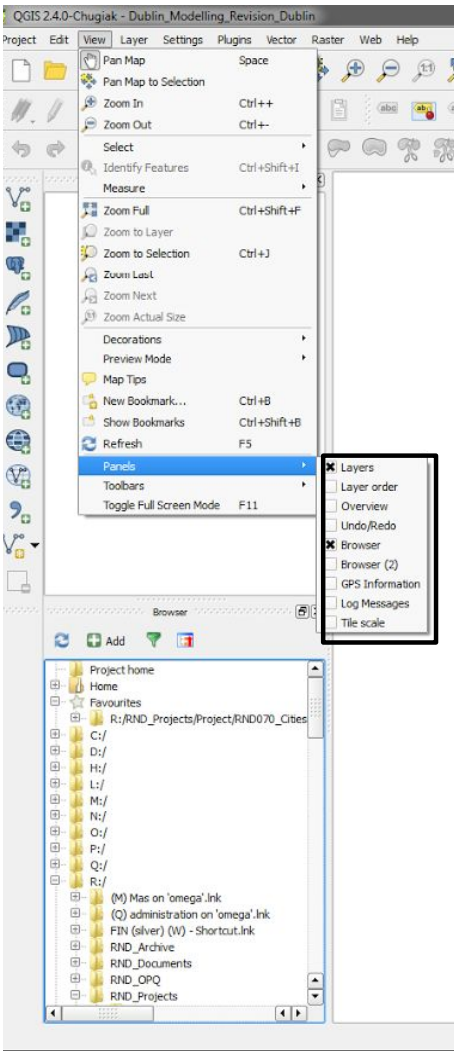


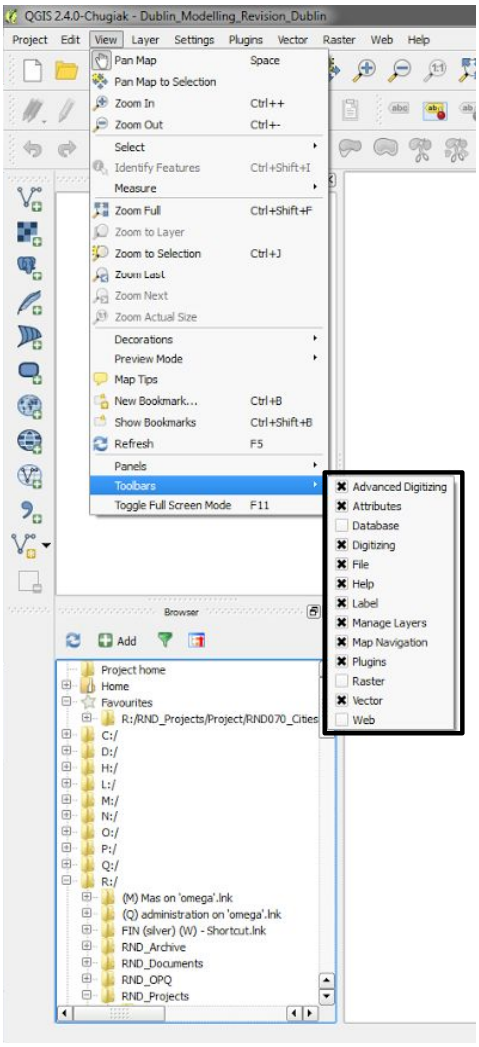
5. QGis interface

Workspace

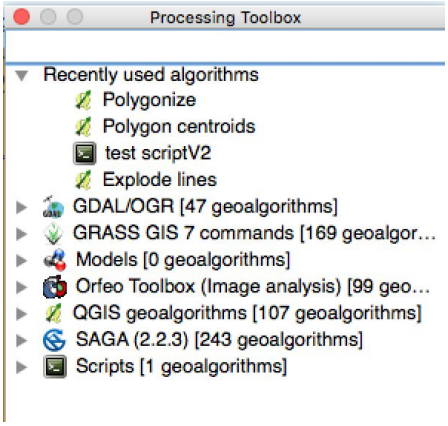


Panels and toolbars



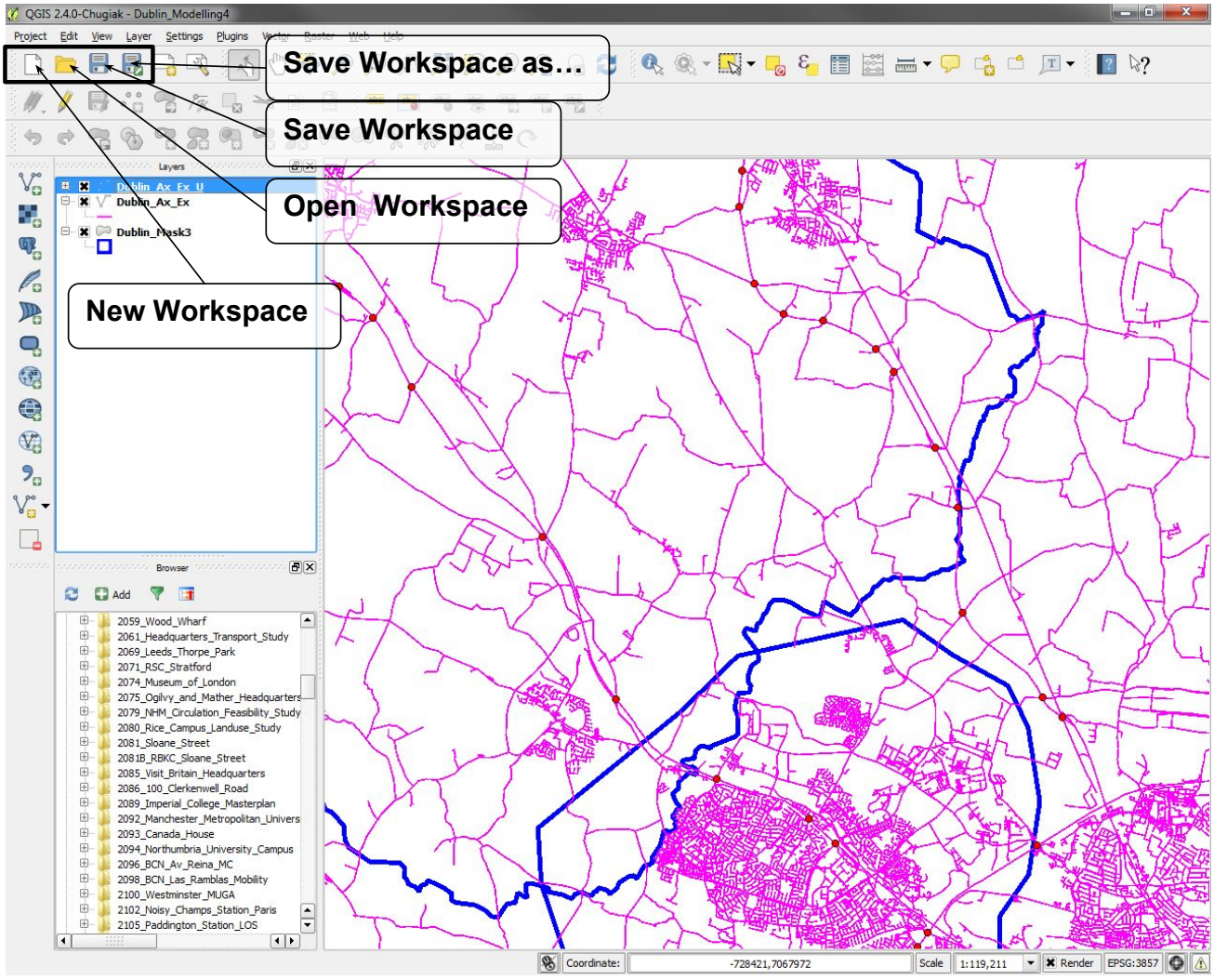


Toolbox

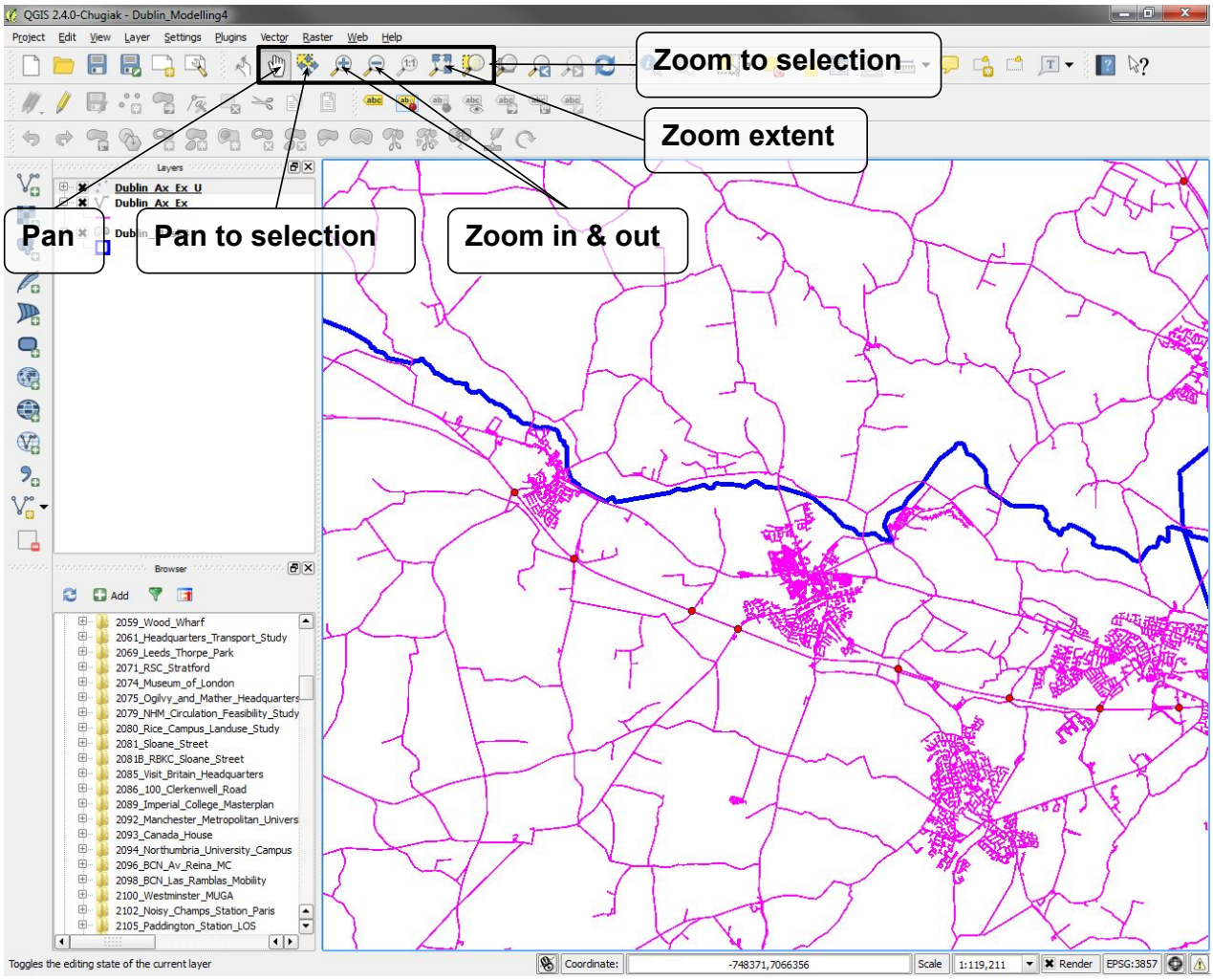


Workspaces

Workspace file does not contain any data. It is a file which tells QGis which files to open, in what order and how they are visualised. It also saves print composers.

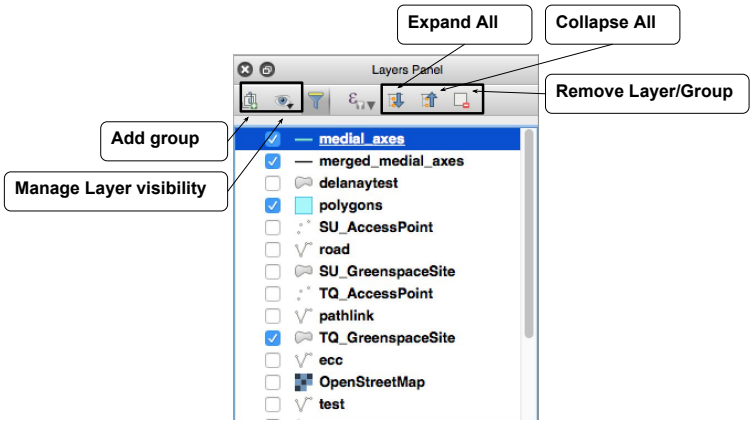


Navigation Map canvas



Navigation Active layer

The layer selected in the layer panel is the active layer, meaning that you can select its features or edit it.

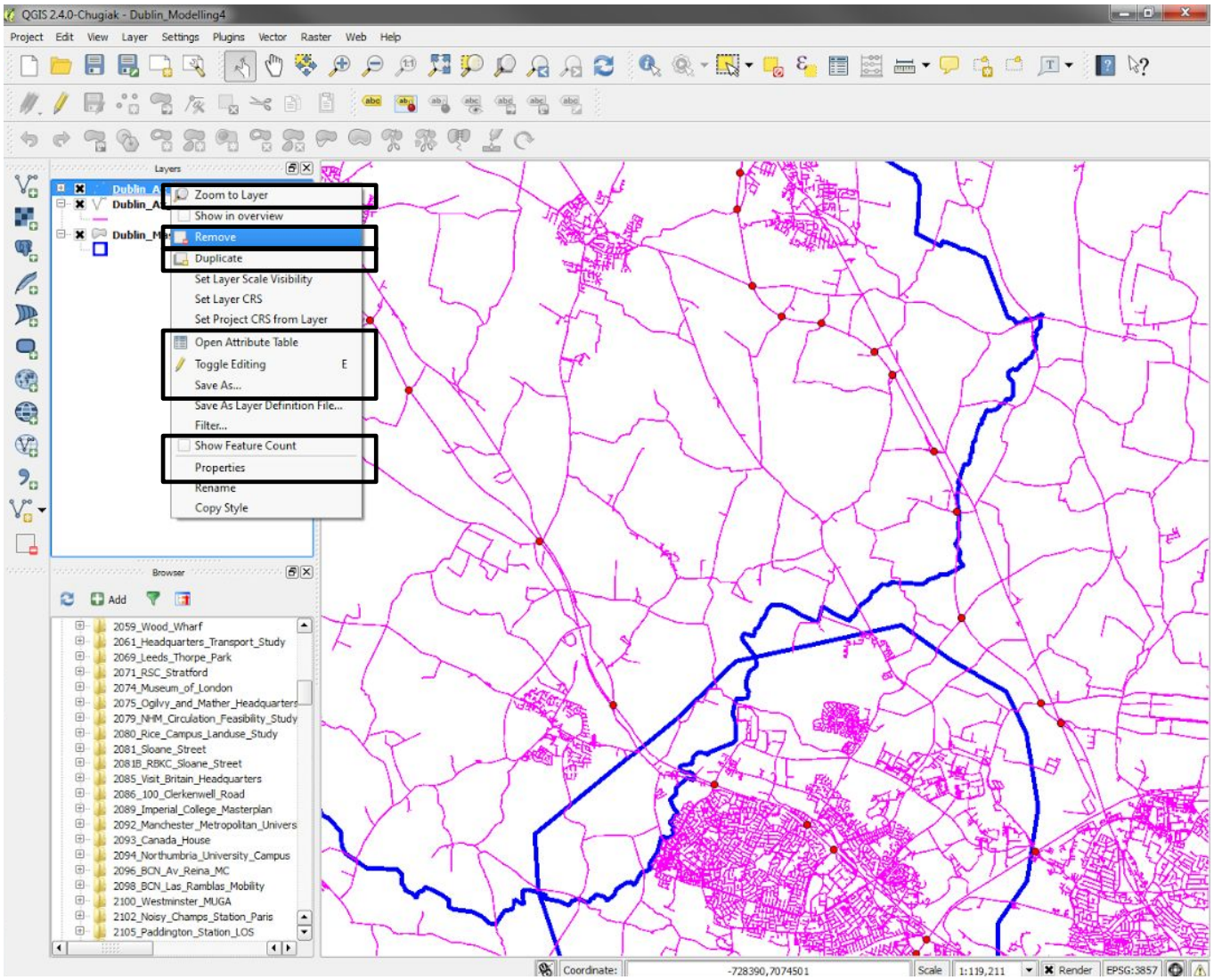


Once files are open, they appear in the map legend as layers. Note that a layer is not the file which is stored.

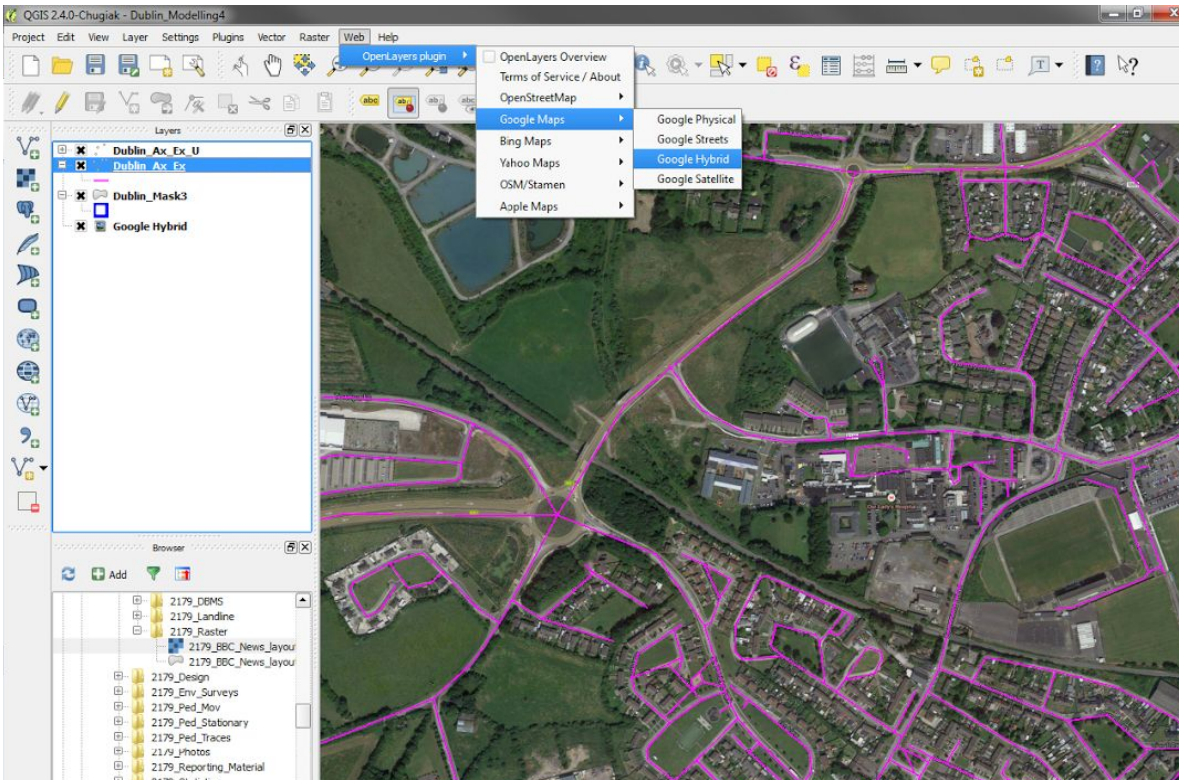
Layers can be duplicated in order to show different visualisation of the same file.

If you made any changes to the layers and save it the changes are saved with it.

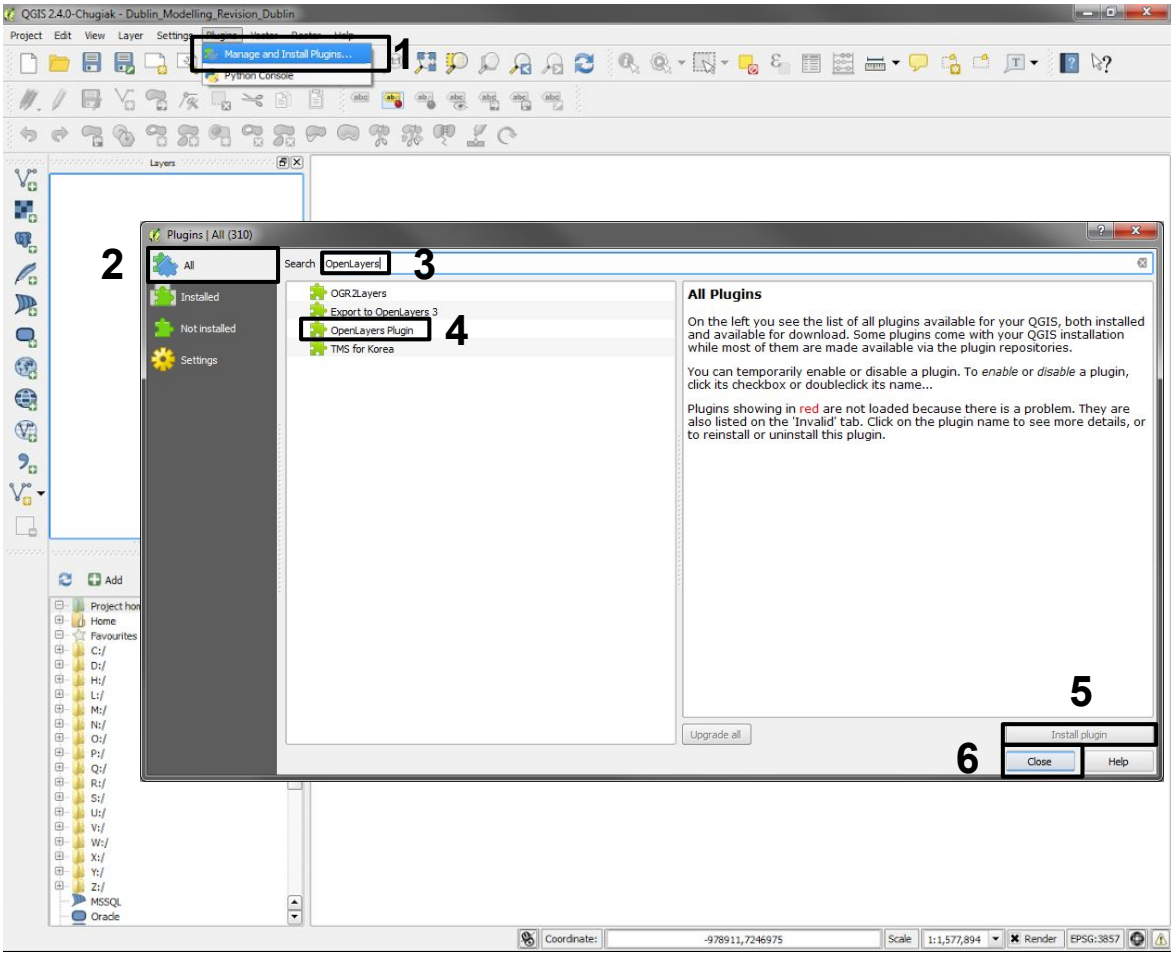
Removing a layer, removes it from the workspace but does not delete it from your hard drive.



Navigation Background map

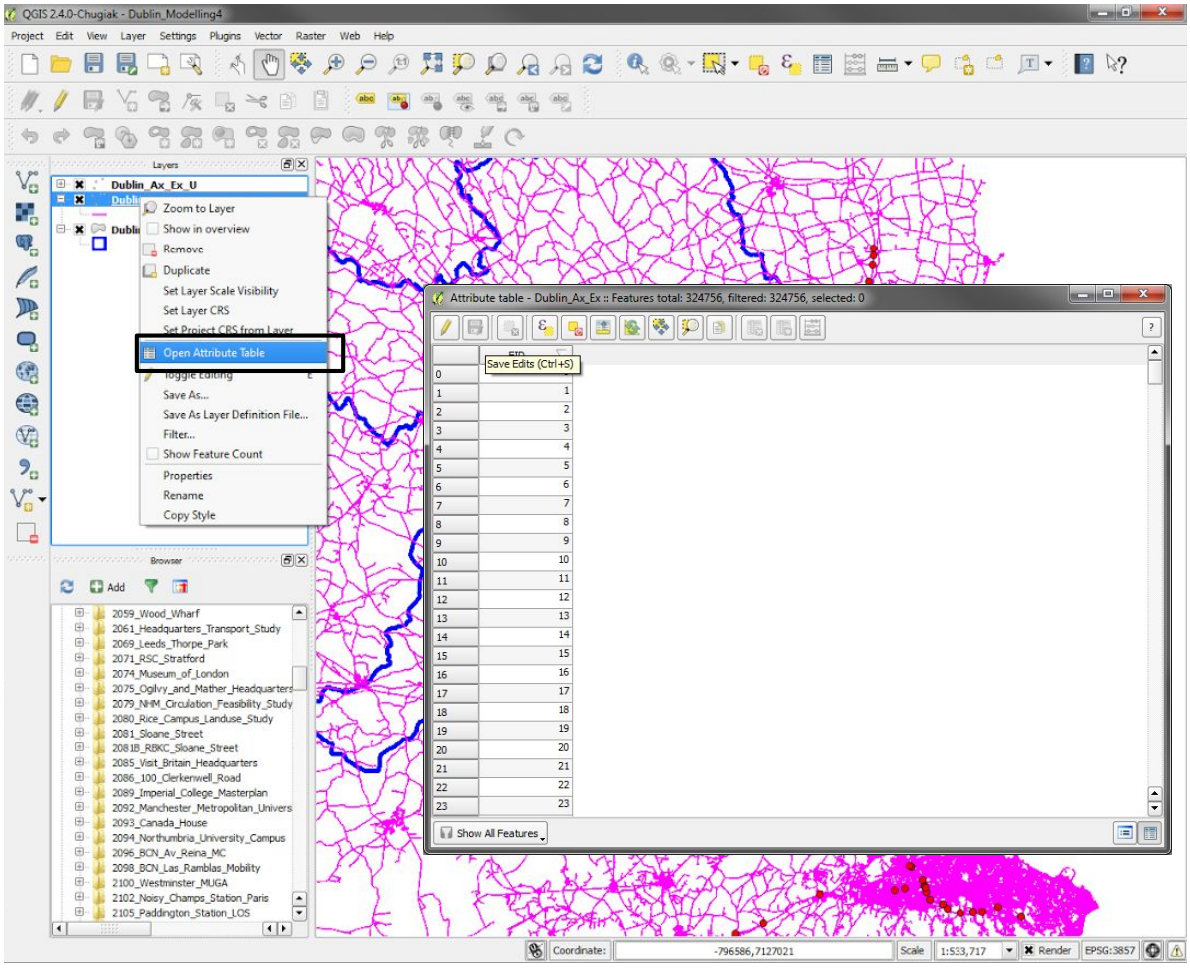


Plugins OpenLayers

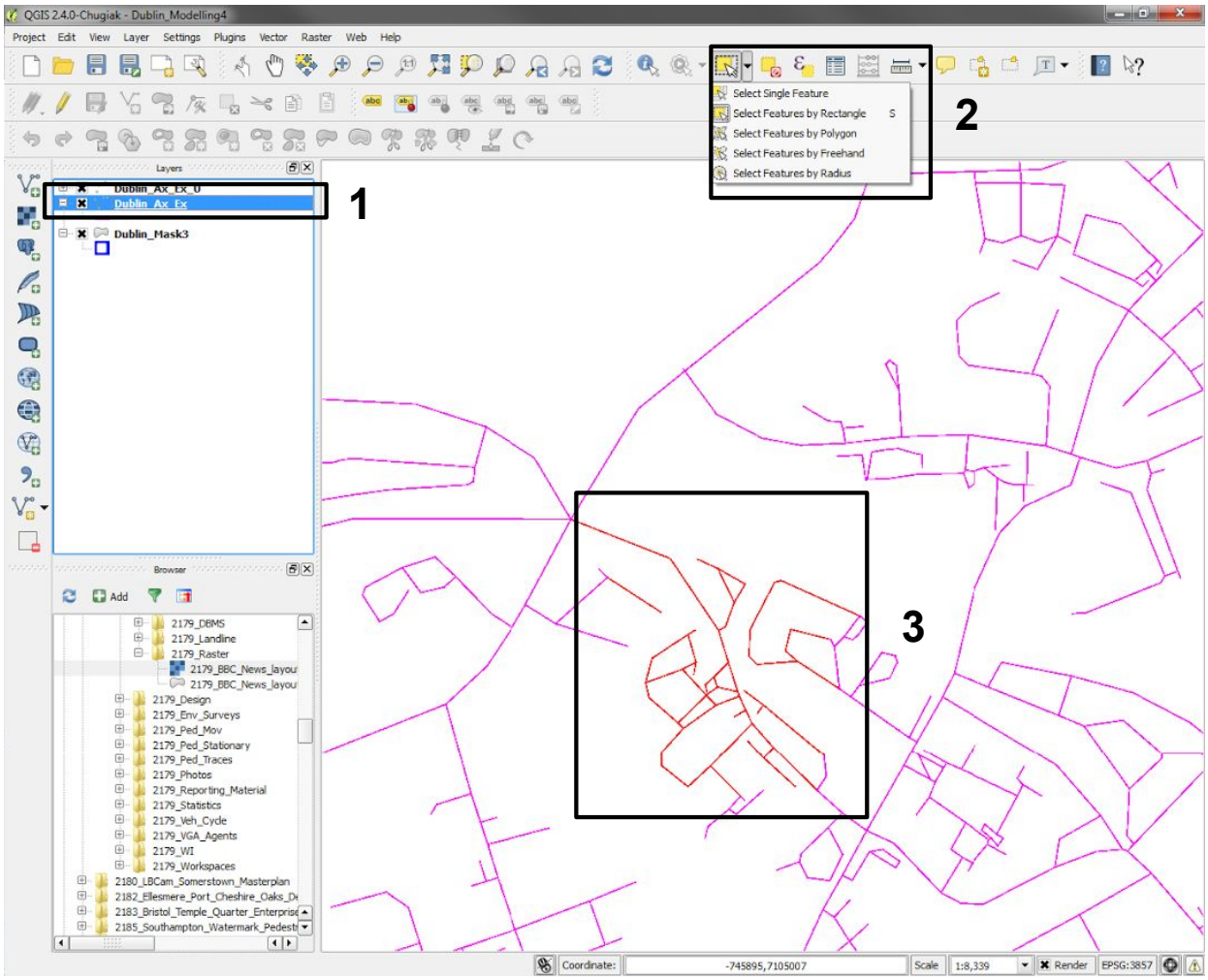


Navigation Attribute table

Right-click on layer to Open attribute table.



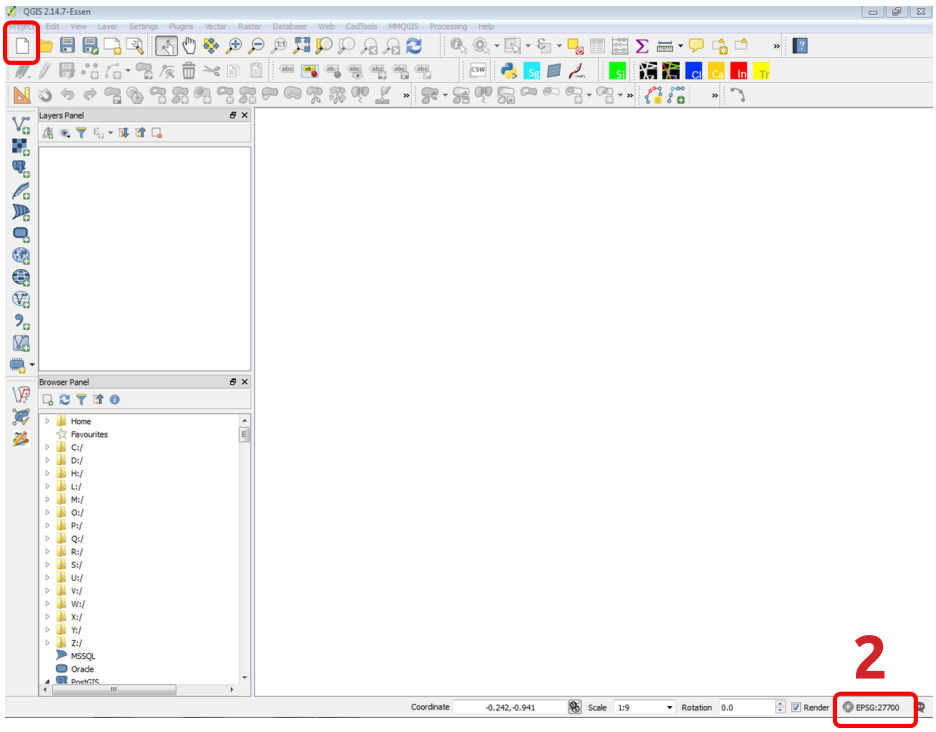
Selection Map canvas

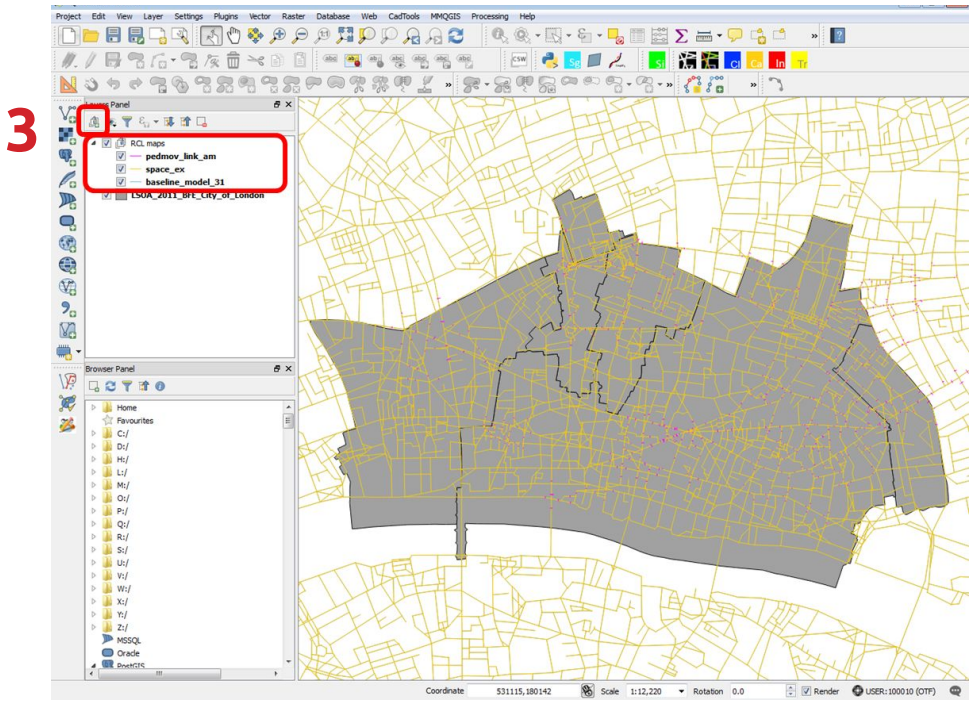


6. Starting a map

The next steps will guide through the basic process to start a project in QGis:

1. Create a new workspace and add all the street network data Project > **New**
2. Specify the project CRS: Tick enable on-the-fly CRS transformation and select **British National Grid EPSG:27700**.
3. Add group in the layer panel called “RCL maps”.
4. Add the openstreetmap data that you previously downloaded. Select Add Vector Layer >
5. Navigate in Data > 1_Data_Unzipped> From the **Fyles of types** list select ESRI shapefile.

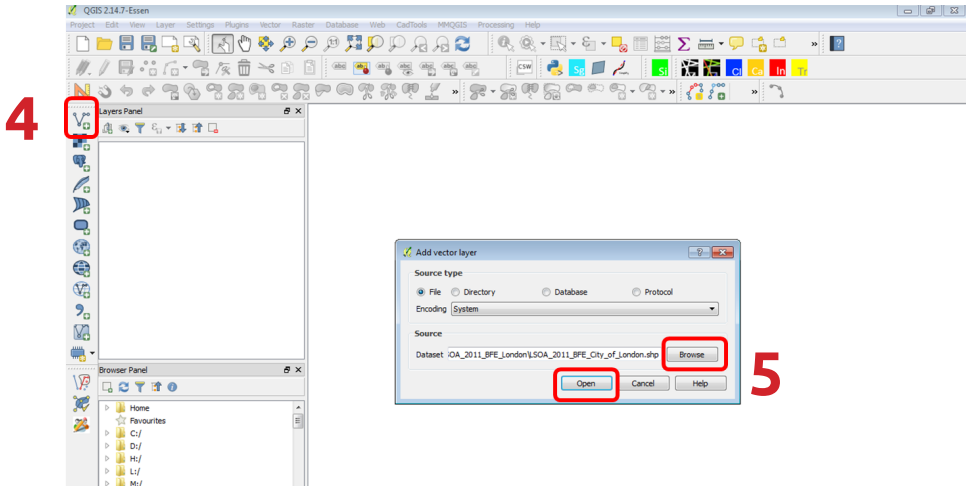


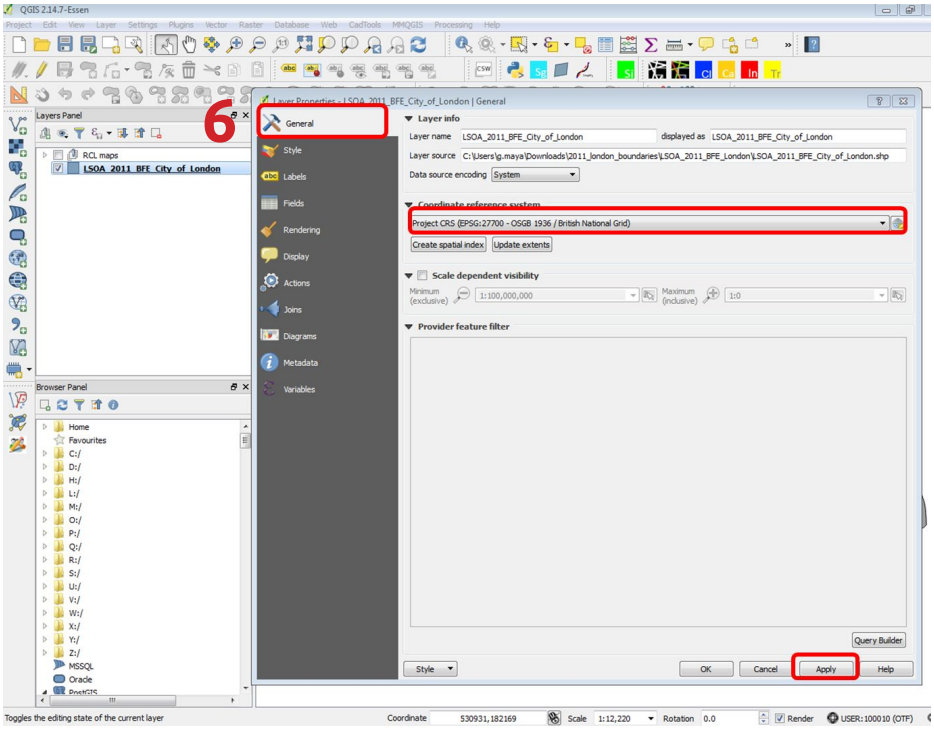


Open gis.osm_roads_free_1.shp . To add a layer you can also drag and drop the .shp file into your map canvas. Drag the layer to the 'RCL maps' group.

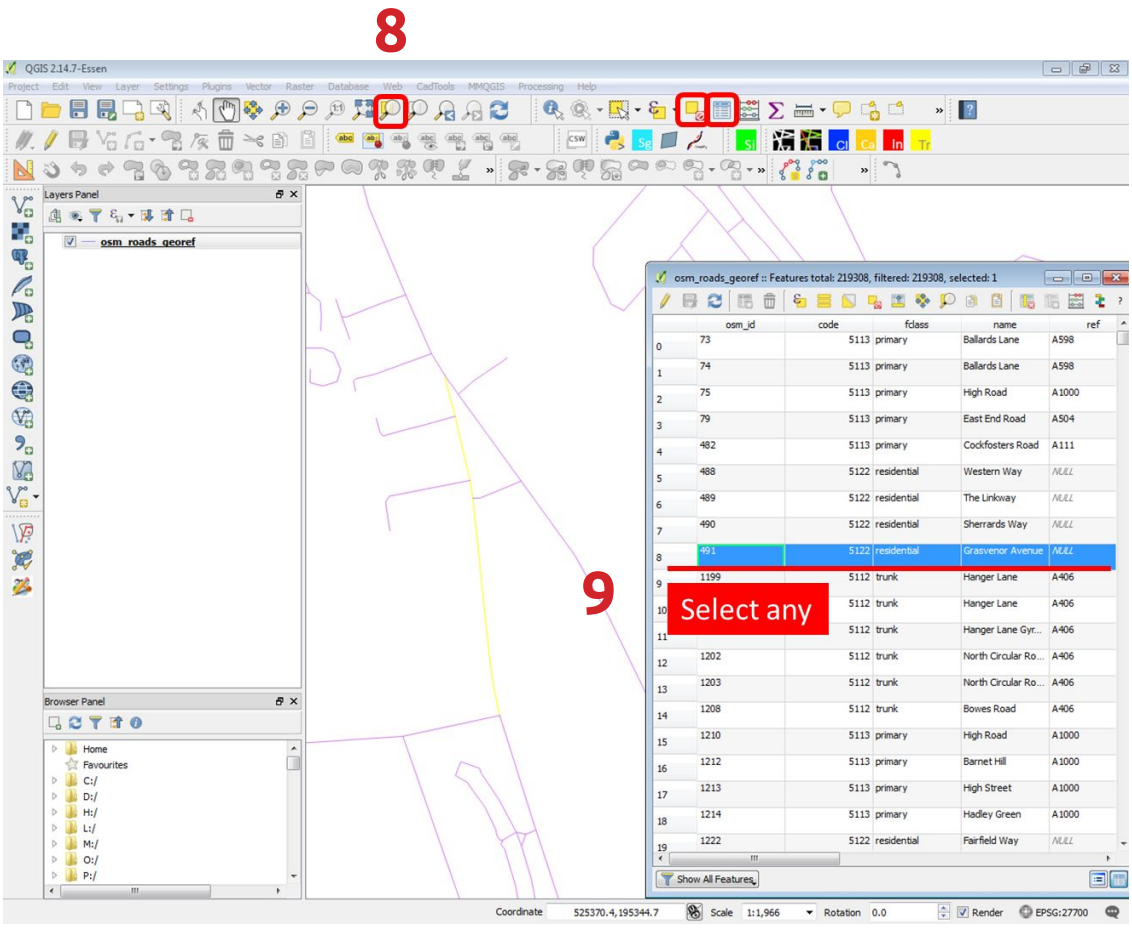
- ***[NOTE]: a shapefile consists of 4 files (.shp, .prj, dbf, .shx) and renaming just one of them will cause issues. To rename a shapefile you need to rename all 4 files.***
- All OpenStreetMap datasets are projected in a world CRS (**WGS 84**) which is a geographic CRS for the whole world. If you look at the map, it looks slightly distorted. We need to re-project our layer to use the project CRS 27700 defined earlier (**EPSG:27700, OSGB 1936/British National Grid**) .

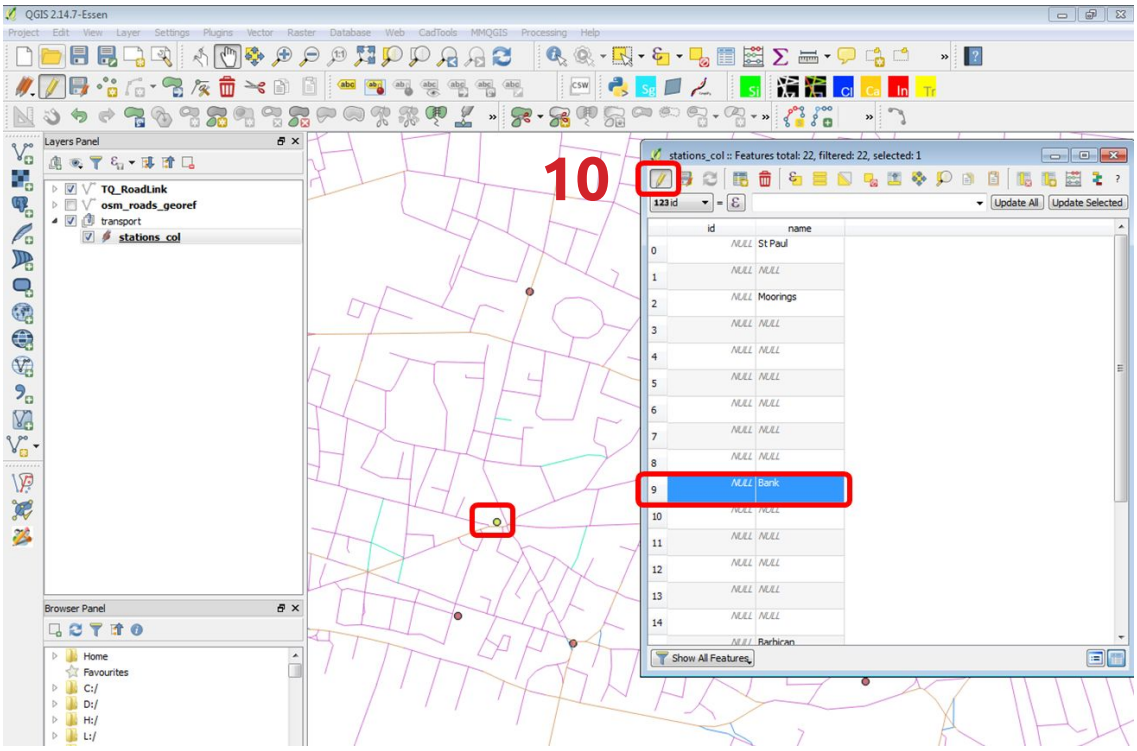
6. Explore layer properties: right-click on the Layer > Properties. General > set Coordinate reference system to **EPSG:4326** > **OK**. This is the file's native CRS. The layer is re-projected according to the project CRS we have defined previously **(EPSG:27700)**.

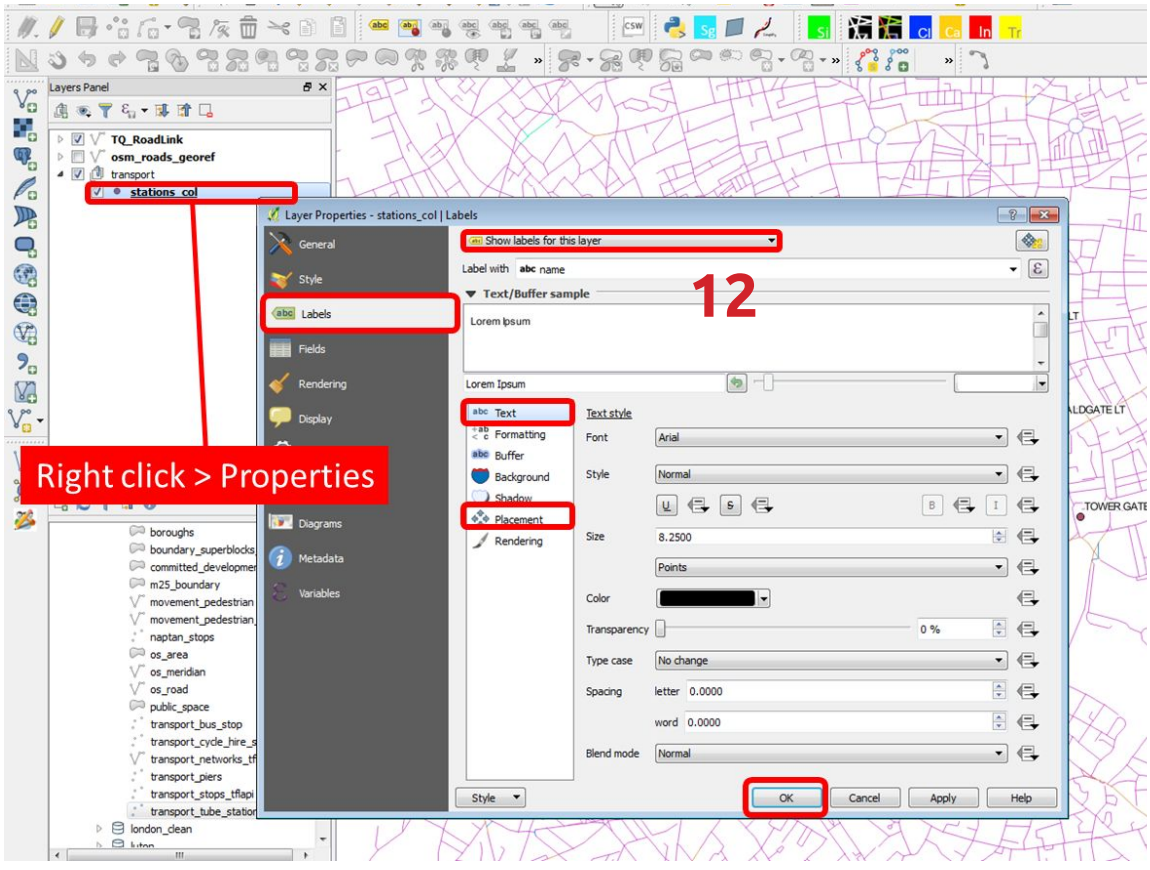




7. It is recommended that all layers in your workspace are saved with the same CRS. To do that for a layer right-click Save layer as > Format: ESRI Shapefile > Browse to select the desired location and save as > CRS: **Selected CRS (EPSG:27700, OSGB 1936/ British National Grid).** Tick Add saved file to map.
8. To explore the attributes table: Select a Layer > **Open Attribute Table**. Select one random row and then go to the main Qgis window and select **zoom to selection** .
9. Then press Deselect Features from All Layers . Select the info tool and check the feature' s attribute. 4.2.2 Now select one feature on the map and look at the table. Select **Move selection to Top** to bring the rows with the attributes of the selected features on top of the attribute table.
10. Select the layer to edit > **Toggle editing.** Right-click > Layer properties > Fields > Add Field with name '**name**' , type **text** and length **20** .
11. Right-click > **Open Attribute table** . Set this windows aside and update each point data with the name of the stations. Save the changes > **Toggle editing**.
12. Right-click on the layer and go to Labels. Labels visualise the selected attributes of features in the map canvas. Select **Show labels for this layer**. Select **Label with** 'name'. You may want to adjust text and placement options.




10
Layers Panel
TQ_RoadLink
osm_roads_georef
transport
stations_col
Browser Panel
stations_col :: Features total: 22, filtered: 22, selected: 1
Update All
Update Selected
Show All Features


11
Layers Panel
TQ_RoadLink
osm_roads_georef
transport
stations_col
Right click > Properties
Layer Properties - stations_col | Labels
General
Style
Labels
Fields
Rendering
Display
Diagrams
Metadata
Variables
Show labels for this layer
Label with
name
12
Text/Buffer sample
Lorem Ipsum
Text
Formatting
Buffer
Background
Shadow
Placement
Rendering
Text style
Font
Arial
Style
Normal
Size
8.2500
Points
Color
Transparency
0 %
Type case
No change
Spacing
letter 0.0000
word 0.0000
Blend mode
Normal
Style
OK
Cancel
Apply
Help

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