

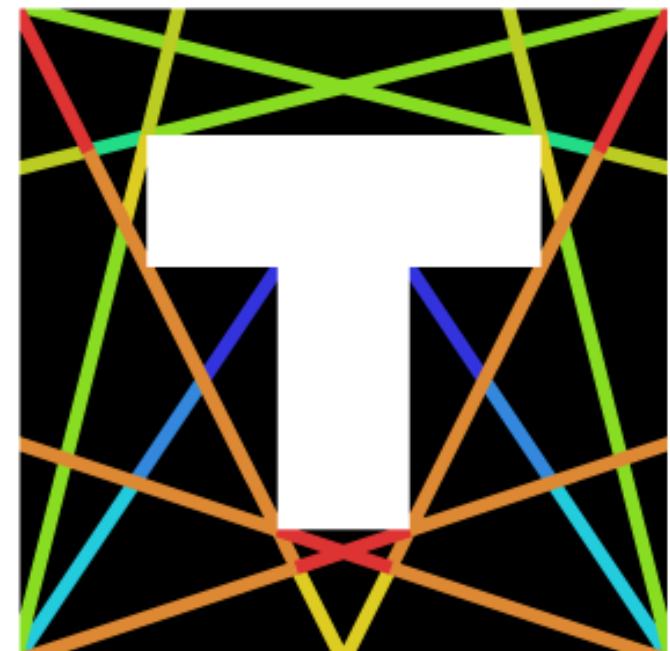
Workshop Análise Espacial Urbana: QGIS e 'Space Syntax Toolkit'

Jorge Gil

Investigador honorário, The Bartlett, UCL

29 e 30/10/2015

Sala 4.41, Departamento de Engenharia Civil, IST



- Instructor
- Participants
- Objectives
- Outline

- Author 'Space Syntax Toolkit' for QGIS (2013 -)
- Author 'Confeego' for MapInfo (2004 - 09)
- MSc Virtual Environments, The Bartlett, UCL
- PhD Researcher, Urbanism, TU Delft (2009 - 16)
- Work on assessing the sustainability of neighbourhoods in city-regions: focus on multi-modal mobility and accessibility
- Research on City Information Modelling
- Use and development of open source GIS and statistical analysis packages

- Who are you?
 - Name and affiliation

	Yes / Some	No
space syntax	18	8
depthmapX	15	11
GIS	12	14
QGIS	9	17

Note: based on 26 participant's responses!

1. Introduce the QGIS software environment;
2. Demonstrate and learn how to use the 'Space Syntax Toolkit' (SST) for QGIS;
3. Demonstrate how to use QGIS for other space syntax analyses in depthmapX;
4. Explore ways in which QGIS (and GIS) is used in space syntax research and practice.

- Learn about space syntax theory and methods:
 - <http://www.spacesyntax.net/online-training-platform/>
 - ‘Space Syntax methodology’ (2015) by Al-Sayed, K; Turner, A; Hillier, B; Iida, S; Penn, A. <http://discovery.ucl.ac.uk/1415080/>
- Learn about space syntax applications in research:
 - <http://www.spacesyntax.net/symposia/>
- Learn about depthmapX:
 - <https://varoudis.github.io/depthmapX/>
 - <https://github.com/SpaceGroupUCL/Depthmap/tree/master/docs>

Dia 1

09:30 – Apresentação

10:00 – Introdução ao QGIS

11:00 – Intervalo

11:15 – Exercícios práticos

13:00 – Intervalo para almoço

14:00 – Apresentação do SST

15:00 – Intervalo

15:15 – Exercício prático

17:00 – Encerramento

Dia 2

09:30 – Integração de análises de depthmapX em QGIS

11:30 – Intervalo

11:45 – Apresentação e discussão de casos de estudo

13:00 – Intervalo para almoço

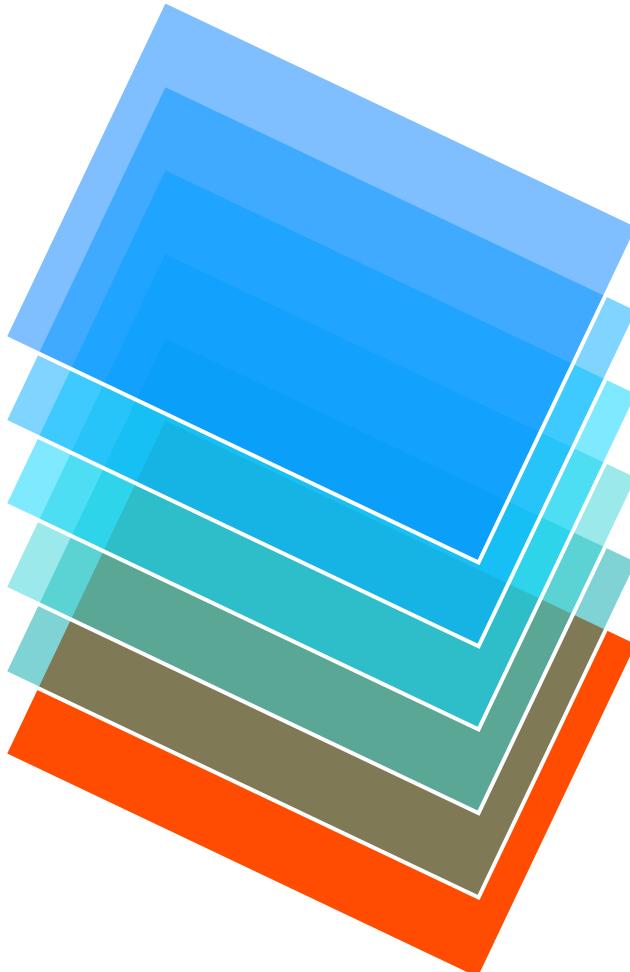
14:00 – Aplicação de QGIS a problemas identificados

17:00 – Encerramento

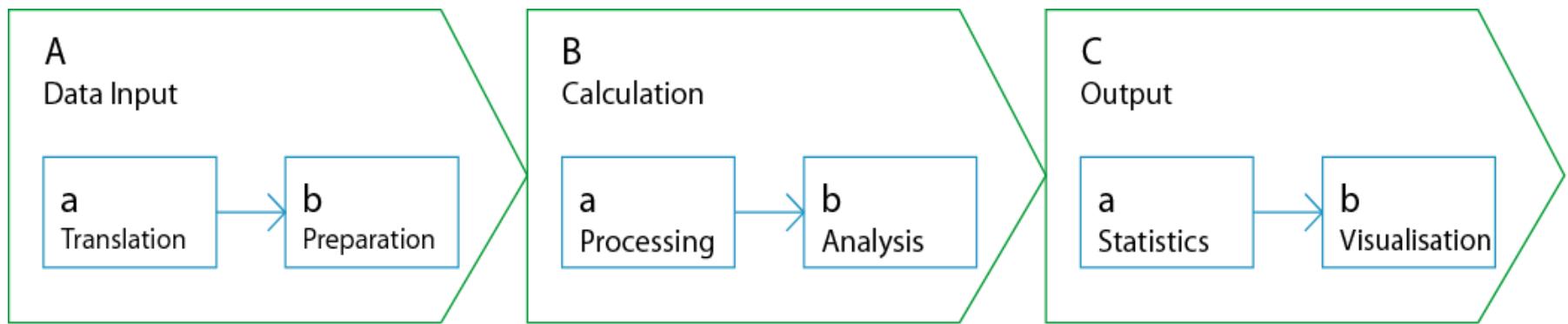
Introduction to QGIS

The study of the urban environment is highly complex given the multiplicity and dynamic nature of the phenomena acting on it, and the interactions between those phenomena:

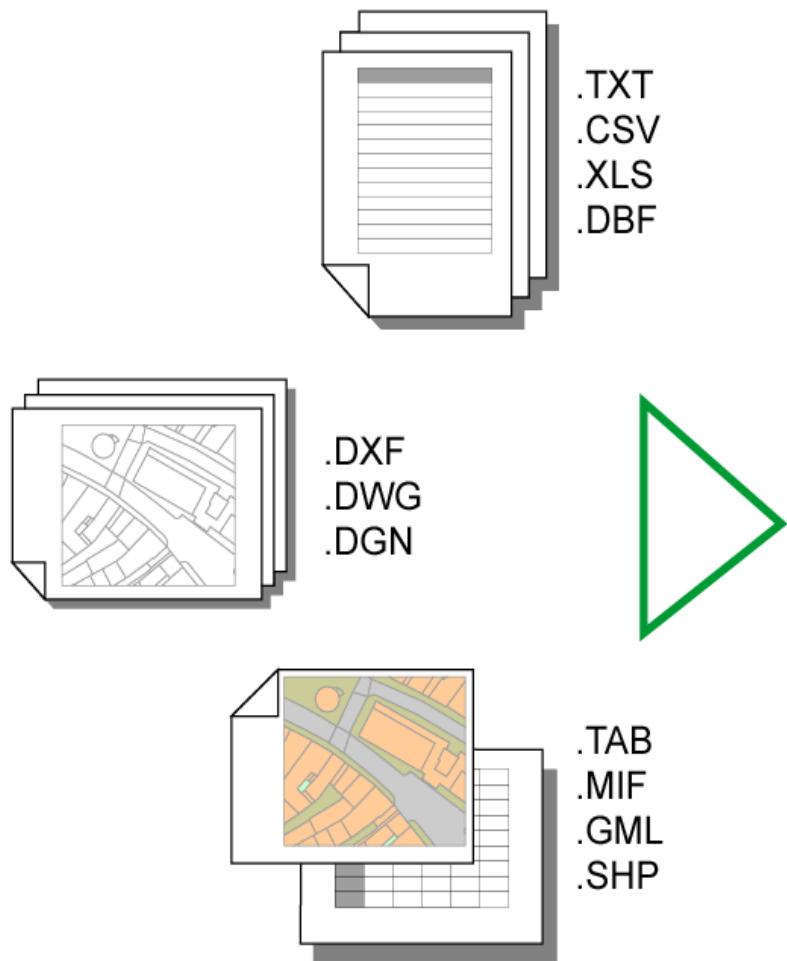
- Geographic
- Political
- Economic
- Social
- Environmental
- Technological
- Cultural
- Psychological...



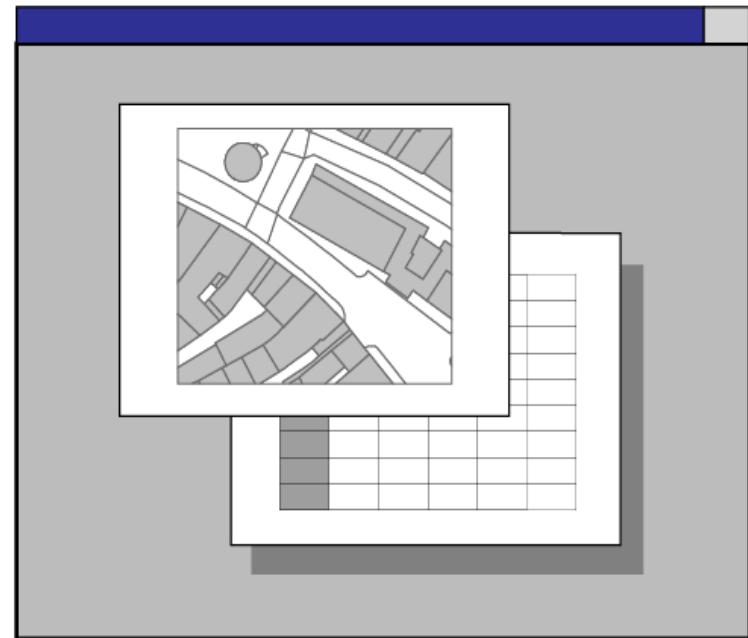
- n. ...
- 6. CCTV location
- 5. crime patterns
- 4. pedestrian movement
- 3. land value/use
- 2. building morphology
- 1. network analysis



Why use GIS?



MapInfo Professional GIS - .TAB



Spatial Links



Spatial Joins

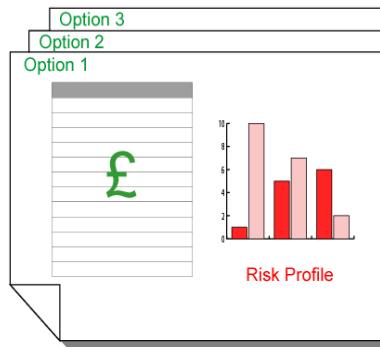


Spatial Accessibility

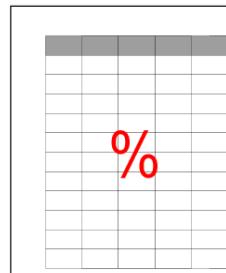


Why use GIS?

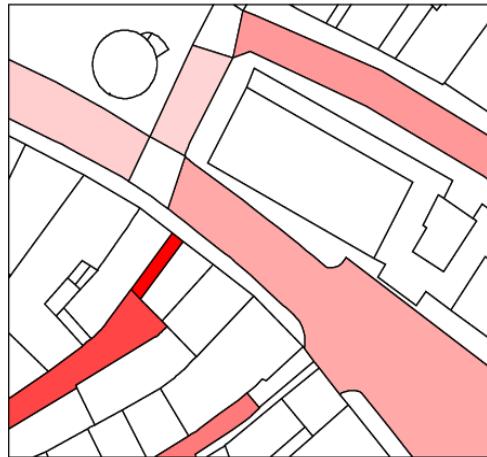
Option Value comparison



Street and Building Risk



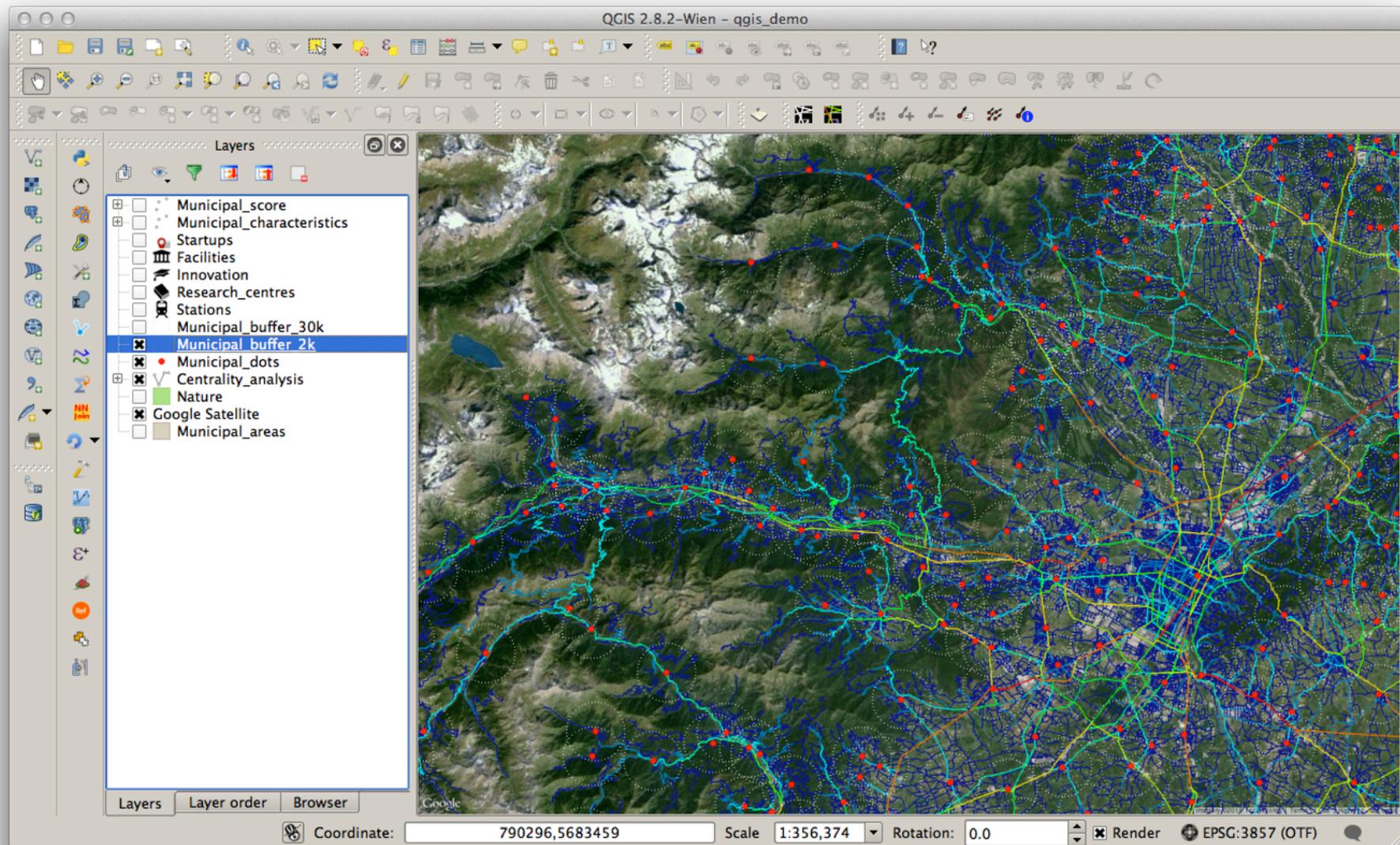
Street Cost



Building Cost



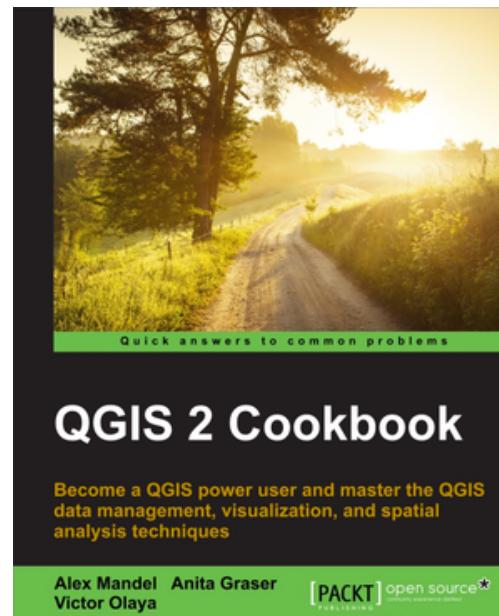
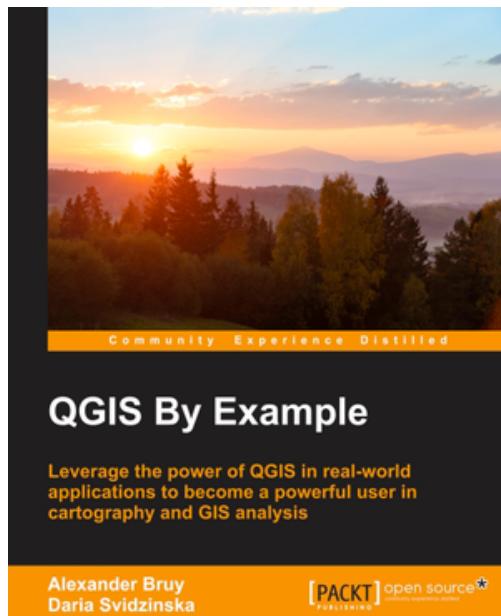
Why choose QGIS?



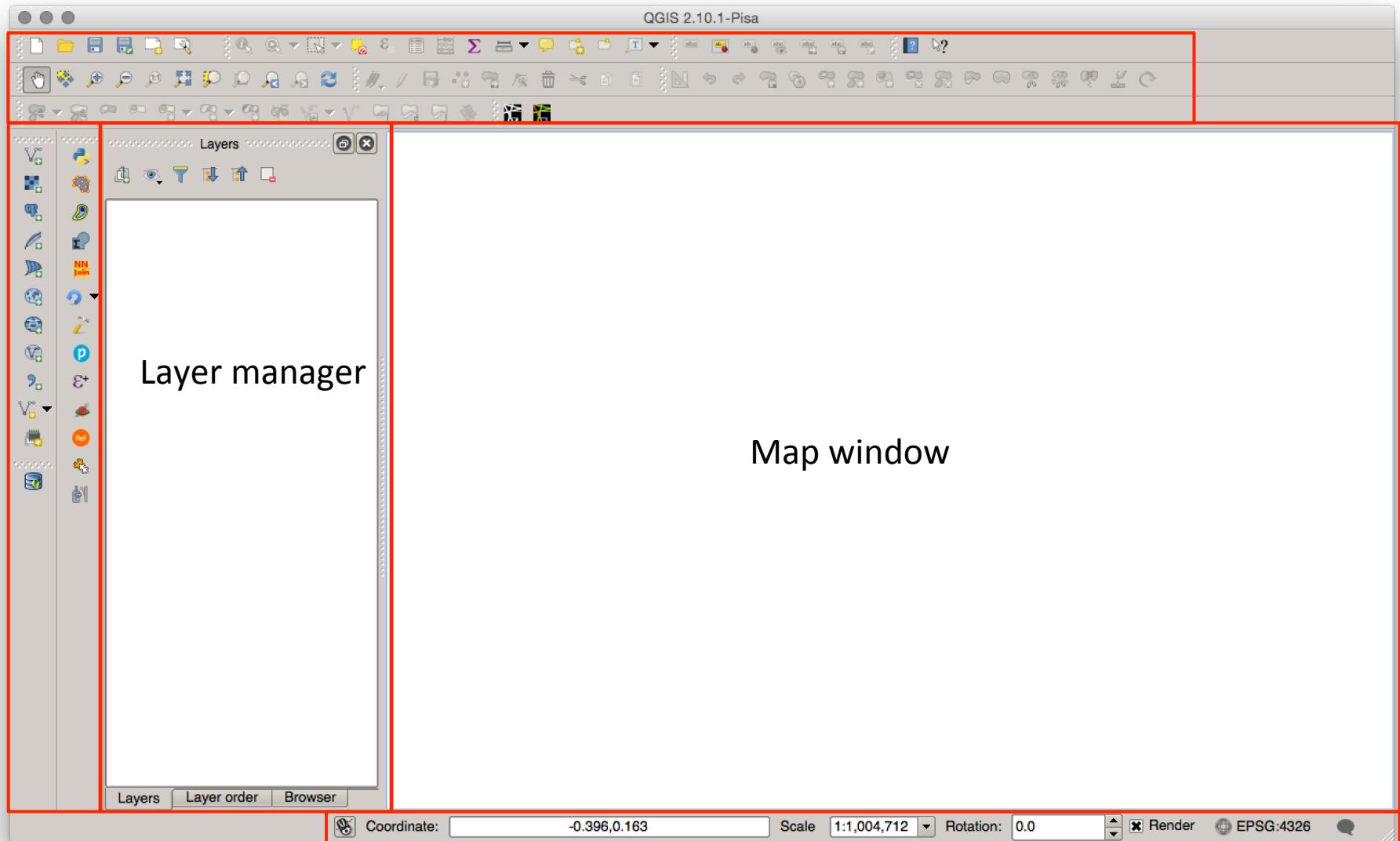
- Free and open source
- Cross-platform (Windows, Linux, Mac OSX)
- User friendly interface
- Well documented (in English and other languages)
- Growing user and developer community
- Extensive input/output data formats, tools and plugins
- Managed installation and maintenance of plug-ins
- Based on open standards and packages
- Automation tools and customisation with Python

- QGIS download:
<http://www.qgis.org/en/site/forusers/download.html>
- Learn about QGIS:
 - <http://docs.qgis.org/2.8/en/docs/index.html>
- QGIS tutorials:
 - <http://www.qgistutorials.com/en/>
 - <http://qgis-tutorials.mangomap.com/>

- QGIS books:

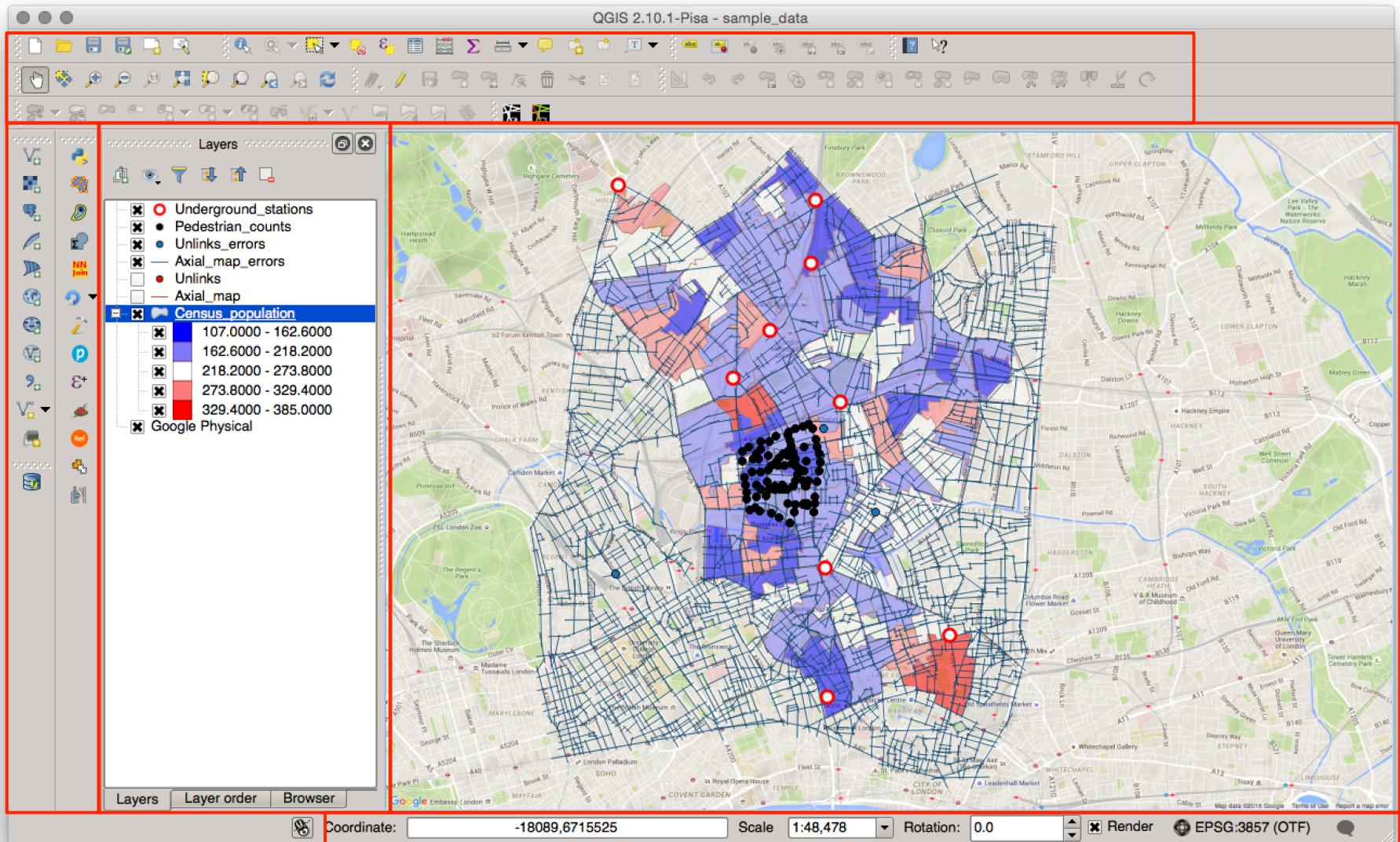


QGIS interface



QGIS interface

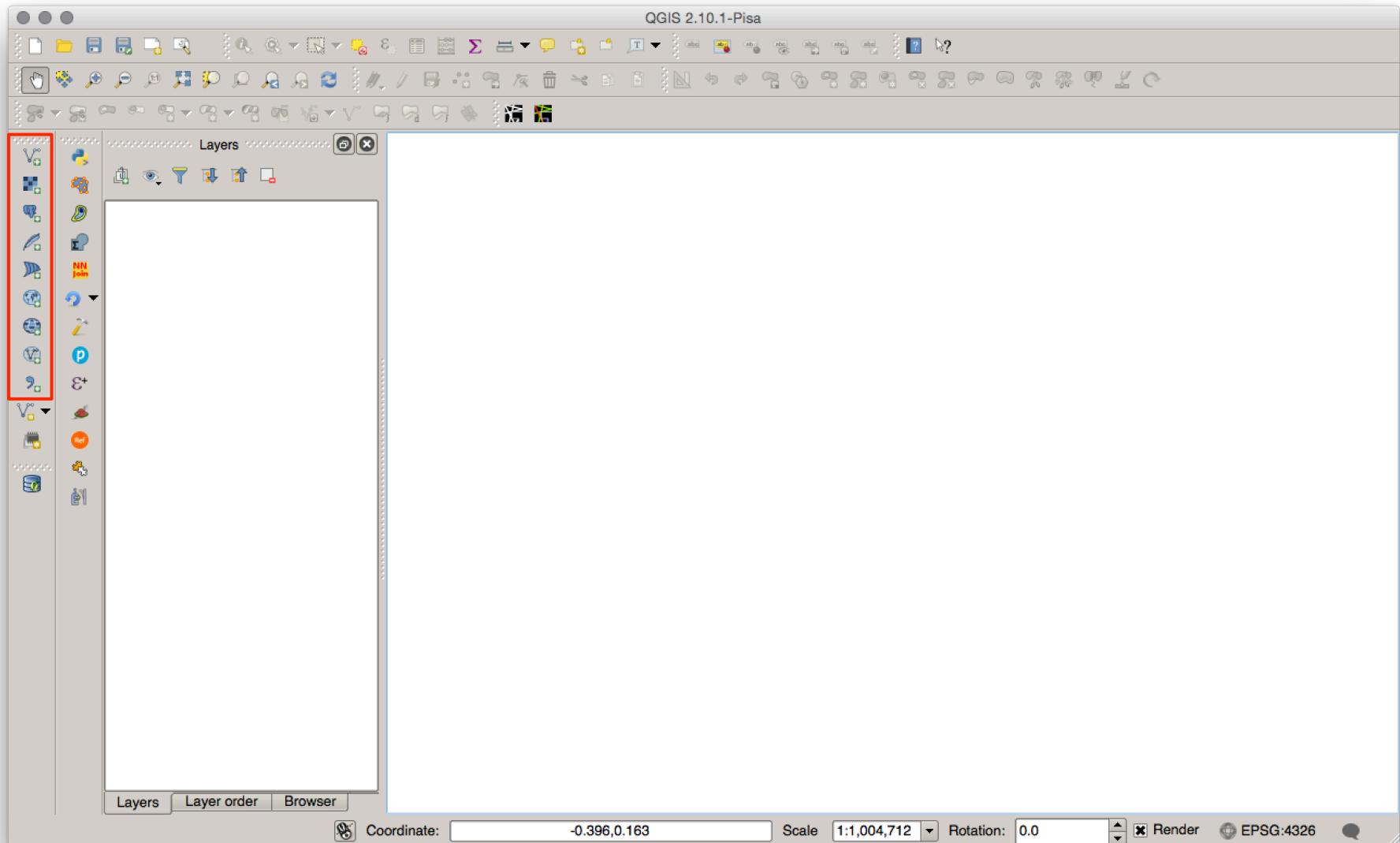
UCL



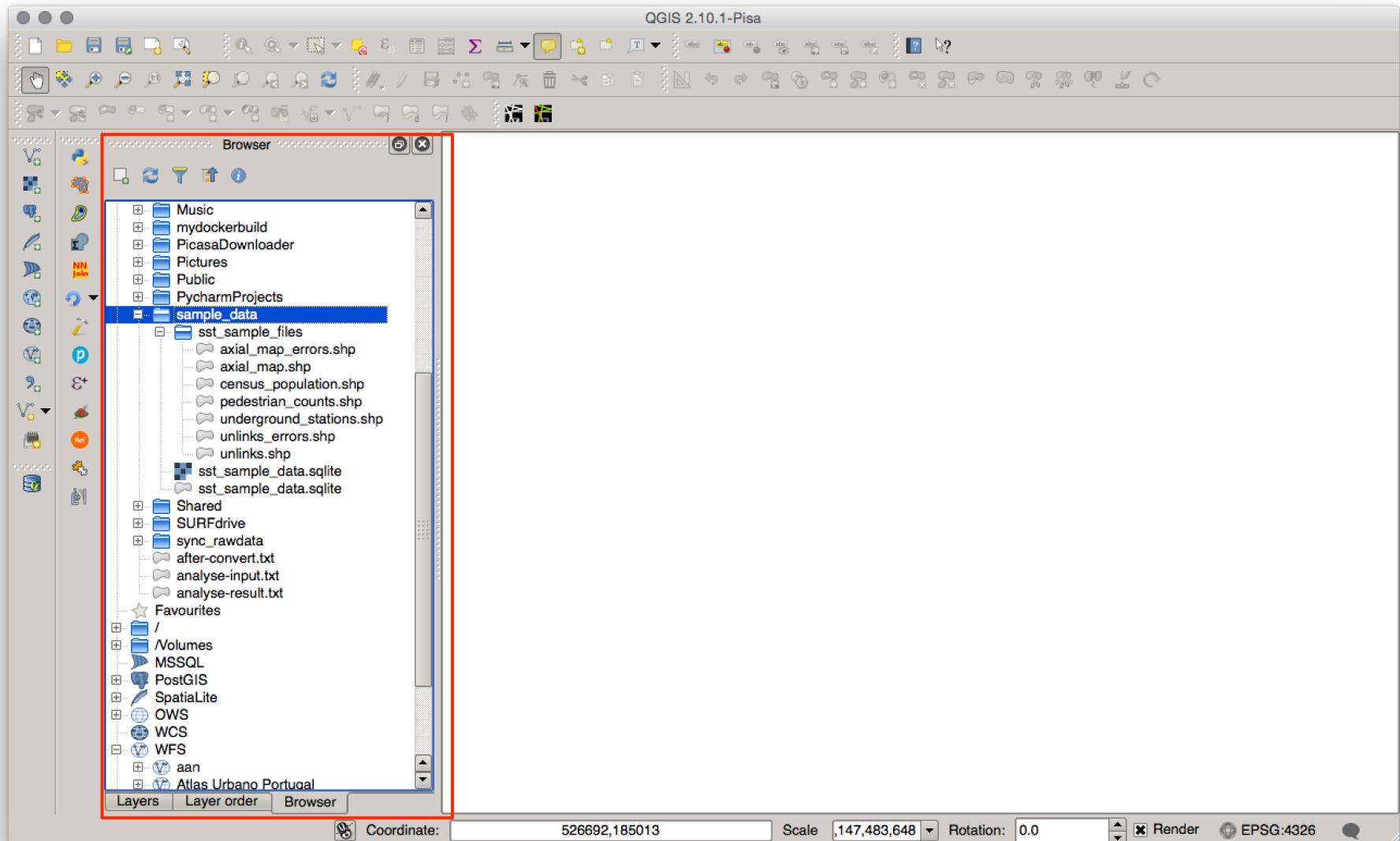
- <http://www.igeo.pt/DadosAbertos/Listagem.aspx>
- <http://mapas.ine.pt/download/>
- <http://www.dados.gov.pt/pt/catalogodados/catalogodados.aspx>
- <http://www.lisboaparticipa.pt/pages/apresentacaoDados.php>

- CSV, XLS and text
- Vector formats:
 - file based: SHAPE, TAB, MIF, DXF
 - GIS versus CAD format
 - data base: Spatialite, Postgis
 - Web service: WFS
- Raster formats:
 - TIFF, JPEG
 - Web service: WMS

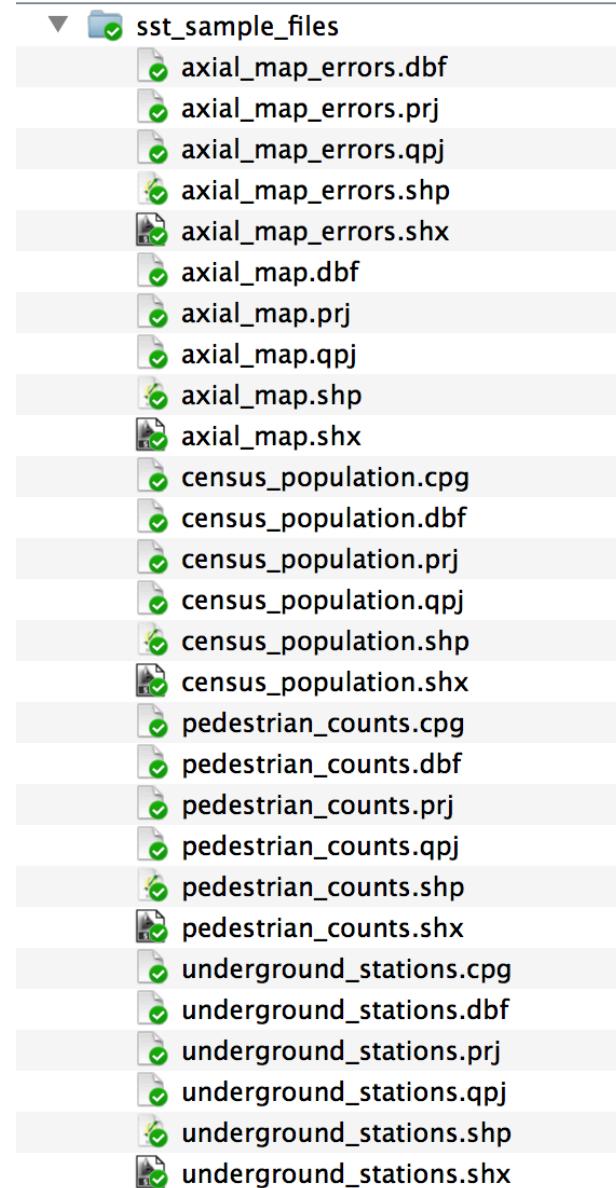
Opening files



Opening files



Native file formats



+

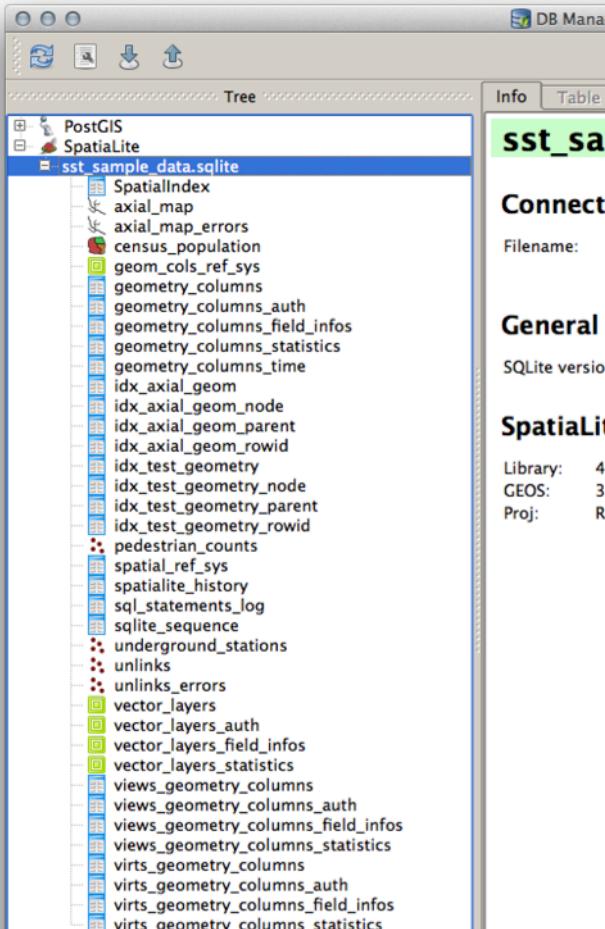
- “standard” GIS format used for distributing/sharing;
- most software reads these files;
- uses the standard file and folder approach for storage that every user is familiar with.

-

- easy to lose components when moving things around;
- limited to 10 characters in attribute names;
- limited to 2GB in the dbf (attributes) file;
- leads to huge folders with many files;
- depends solely on the QGIS API for querying and analysis.

DB Manager

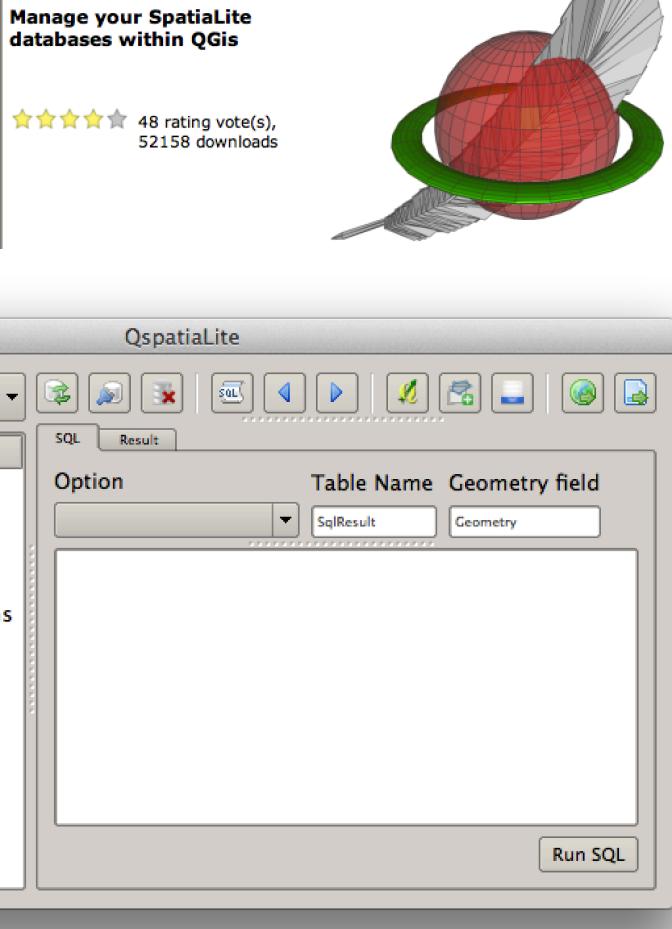
Manage your databases within QGis



QSpatiaLite

Manage your SpatiaLite databases within QGis

48 rating vote(s), 52158 downloads



General i

SQLite version

SpatiaLite

Library: 4.1
GEOS: 3.4
Proj: Re

Tables

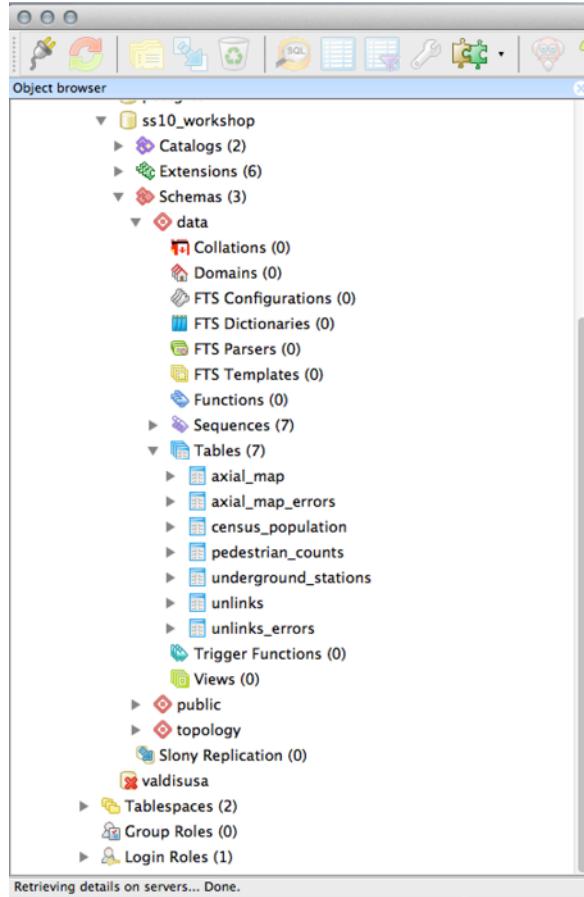
- My Tables
 - axial_map
 - axial_map_errors
 - census_population
 - pedestrian_counts
 - underground_stations
 - unlinks
 - unlinks_errors
 - vector_layers
 - vector_layers_auth
 - vector_layers_field_infos
 - vector_layers_statistics
 - views_geometry_columns
 - views_geometry_columns_auth
 - views_geometry_columns_field_infos
 - views_geometry_columns_statistics
 - virts_geometry_columns
 - virts_geometry_columns_auth
 - virts_geometry_columns_field_infos
 - virts_geometry_columns_statistics
- Spatial Index
- Sys. Table

+

- data is stored in a single file, easy to backup and share;
- embedded SQL allows data query and analysis;
- embedded functions are many times faster than QGIS equivalents;
- no restrictions on table and attribute names;
- QGIS offers user-friendly data manager interfaces.

-

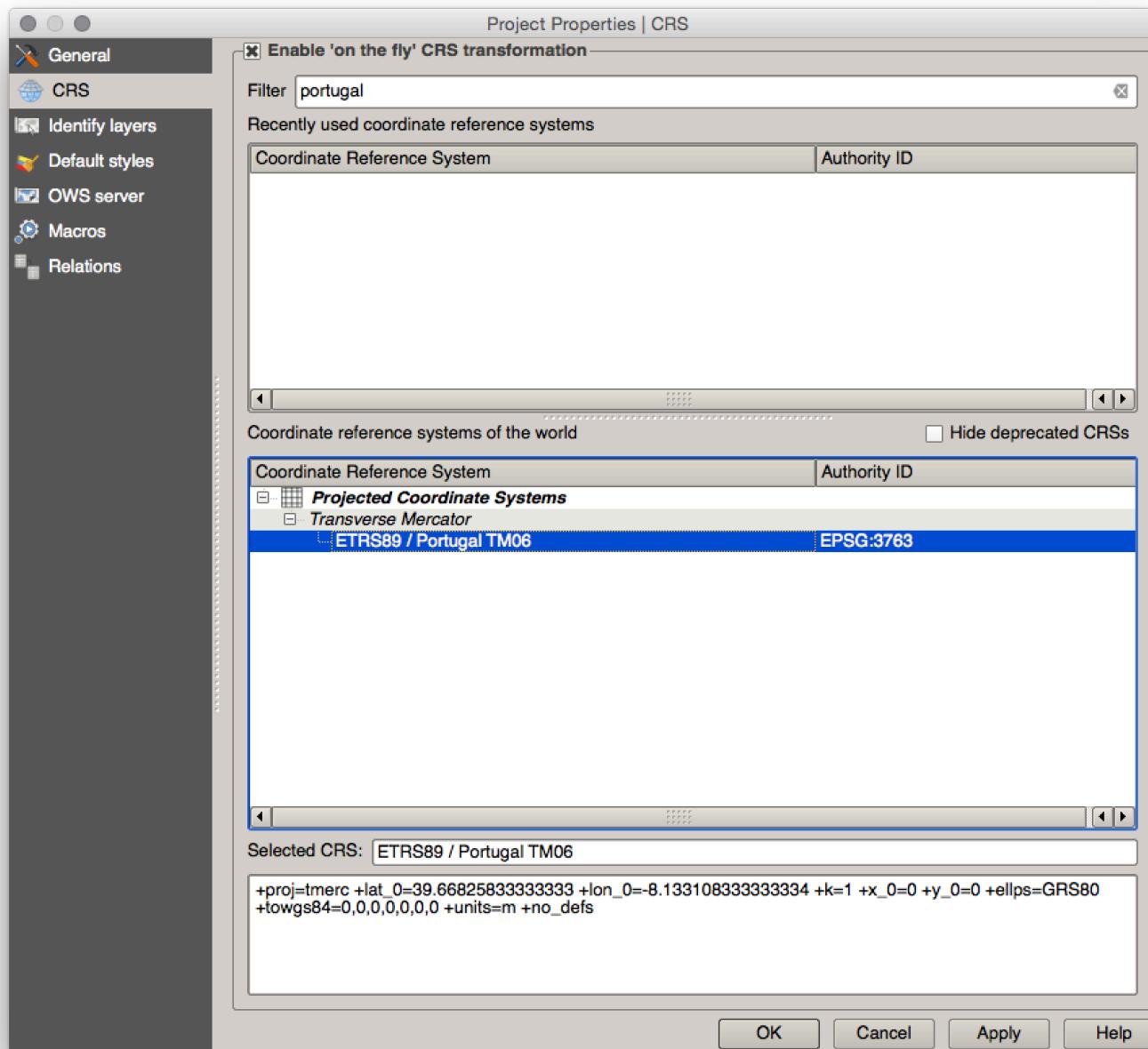
- requires familiarity with database principles to manage;
- database can quickly grow to have many tables;
- can be temperamental;
- the SQLite SQL standard has some limitations;
- only supports vector data.

A screenshot of the pgAdmin interface showing the "Object browser". The tree view displays the database schema for the "ss10_workshop" database. The schema includes catalogs, extensions, schemas (such as "data", "public", "topology", and "valdisusa"), tables (including "axial_map", "census_population", "pedestrian_counts", "underground_stations", "unlinks", and "unlinks_errors"), and various other objects like sequences, triggers, and tablespaces. The status bar at the bottom indicates "Retrieving details on servers... Done.".

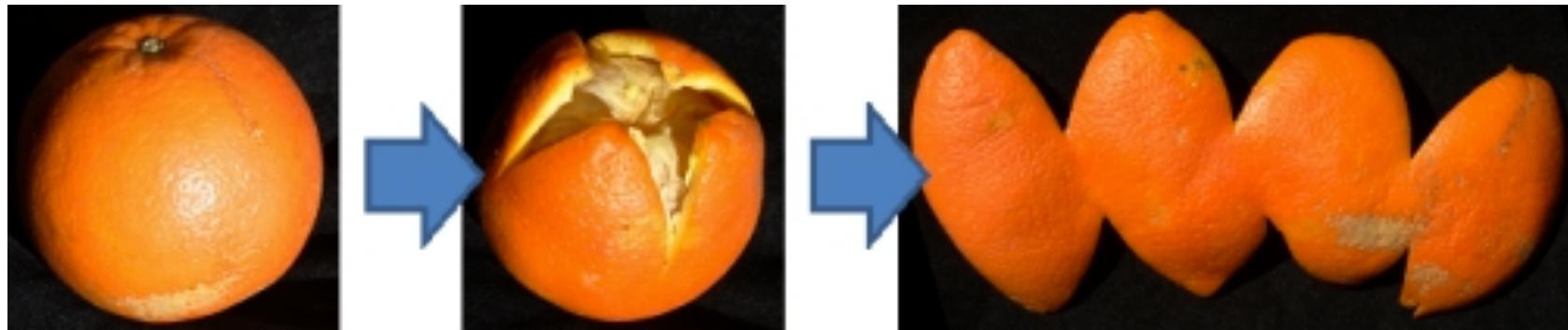
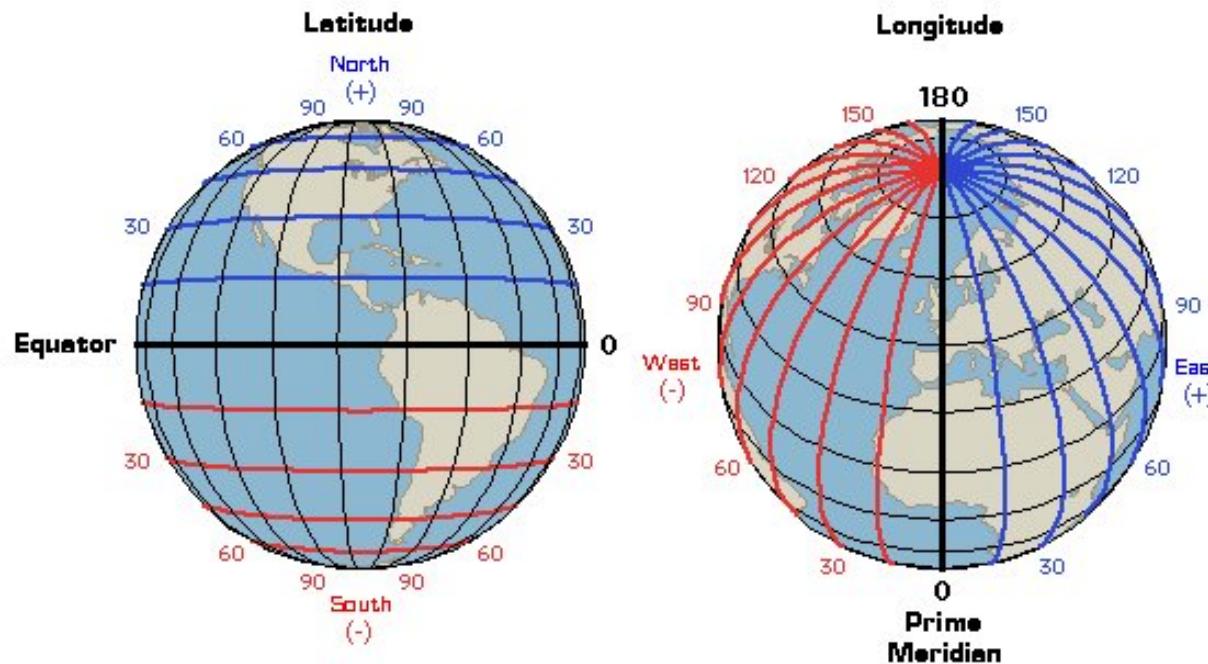
+

- no data size limit;
- full and enhanced SQL support;
- rich set of analysis functions;
- extremely fast operations;
- supports vector and raster data;
- has “schemas” that help keep the database organised;
- possible to have multiple users collaborating.

-
- requires installation of server and/or client platform;
- for personal use it requires knowledge of database systems and management;
- data sharing using shape files, when others don't have access to the server.



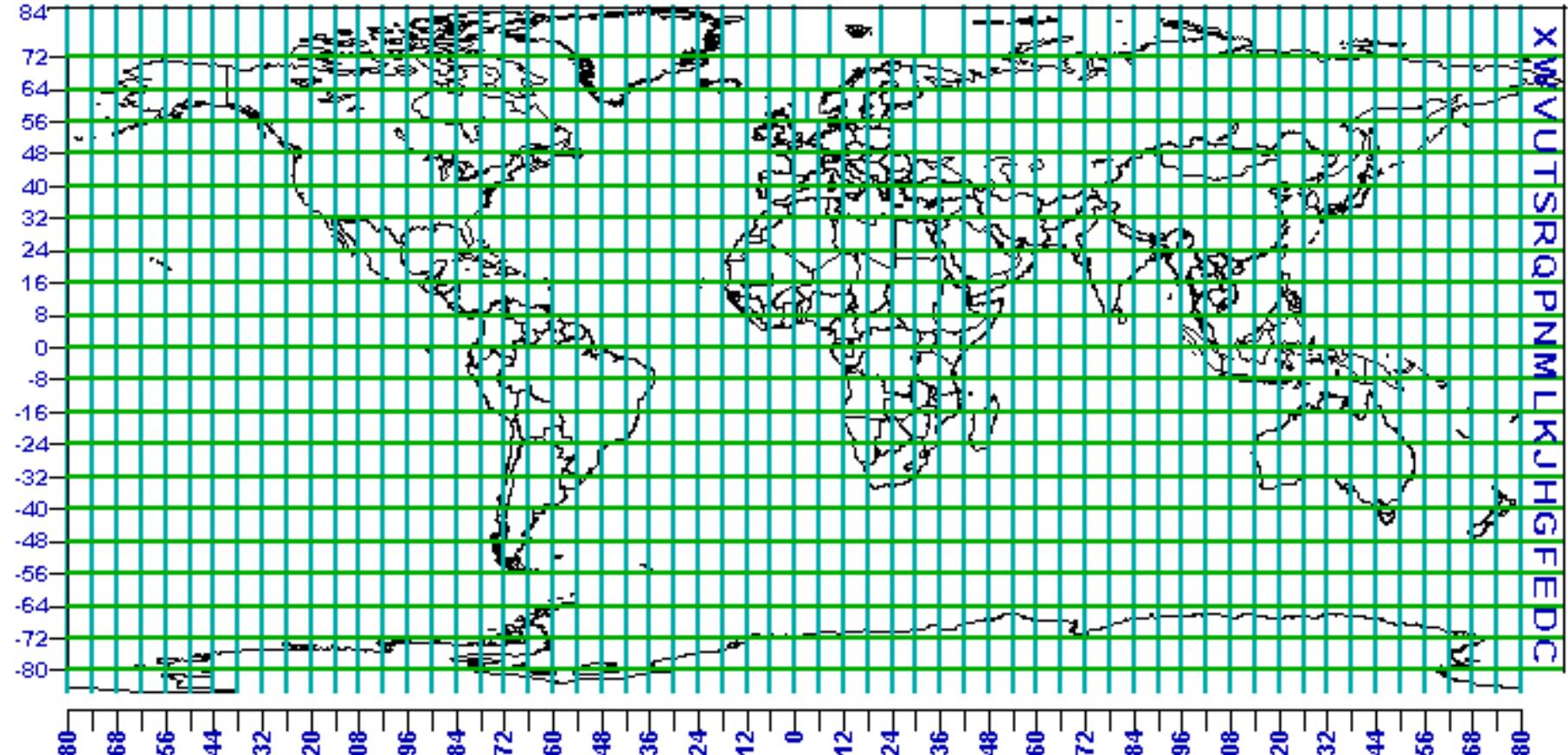
Geographic Coordinate Systems



<http://www.learnz.org.nz/highcountry152/finding-your-way-in-the-high-country>

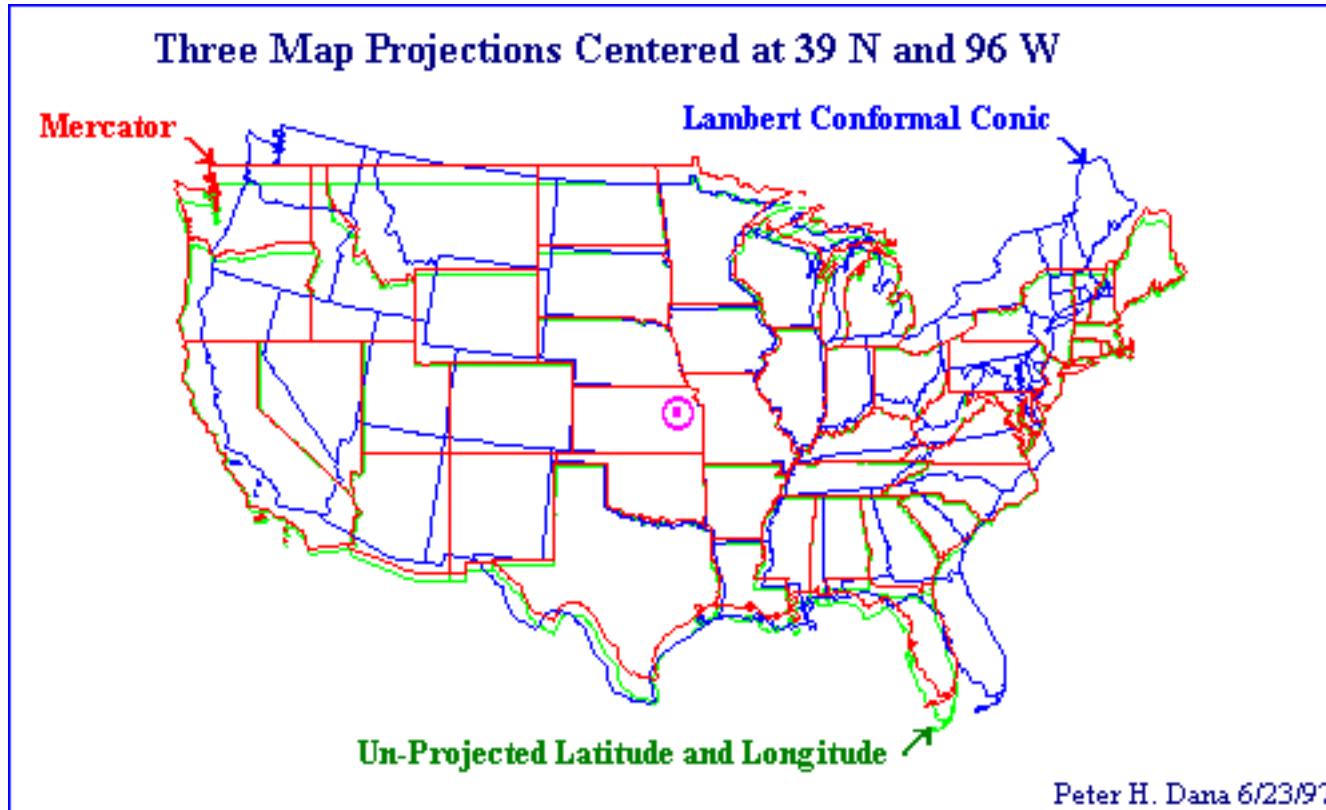
UTM Zone Numbers

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60



Peter H. Dana 9/7/94

<http://maps.unomaha.edu/Peterson/gis/notes/MapProjCoord.html>



- http://mapas.igeo.pt/igp/epsg_codes.html

Portugal Continental - Sistemas Globais

- EPSG: 4936 (ETRS89/ Coordenadas Geocêntricas)
- EPSG: 4937 (ETRS89/ Coordenadas Geográficas 3D)
- EPSG: 4258 (ETRS89/ Coordenadas Geográficas 2D)
- EPSG: 3763 (ETRS89/ PT-TM06)

Portugal Continental - Sistemas Locais

- EPSG: 4274 (Datum 73/ Coordenadas Geográficas 2D)
- EPSG: 27493 (Datum 73/ Hayford-Gauss)
- EPSG: 4207 (Datum Lisboa/ Coordenadas Geográficas 2D)
- EPSG: 5018 (Datum Lisboa/ Hayford-Gauss)
- EPSG: 20790 (Datum Lisboa/ Hayford-Gauss com falsa origem - Coordenadas Militares)

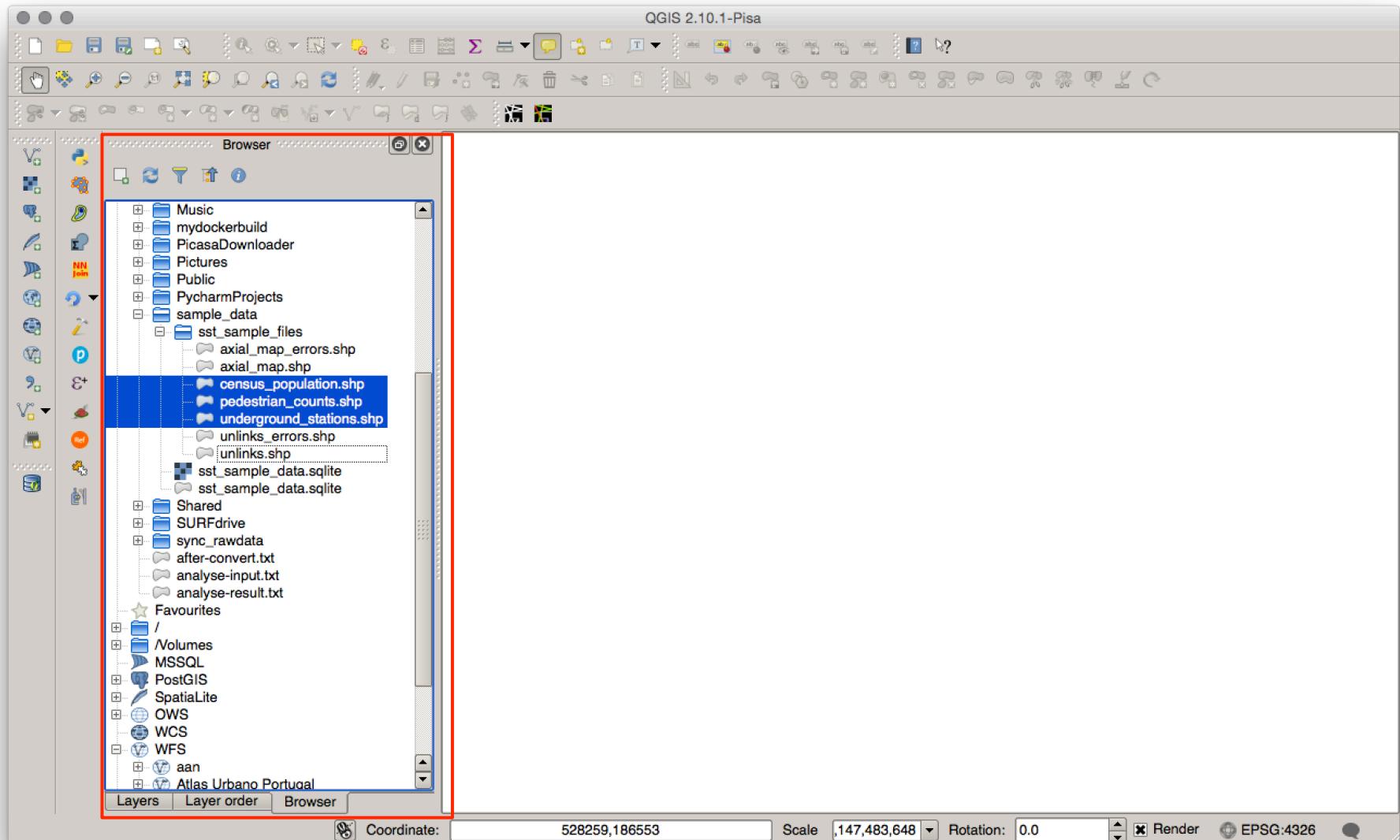
Arquipélagos dos Açores e da Madeira - Sistemas Globais

- EPSG: 5011 (ITRF93/ Coordenadas Geocêntricas)
- EPSG: 5012 (ITRF93/ Coordenadas Geográficas 3D)
- EPSG: 5013 (ITRF93/ Coordenadas Geográficas 2D)
- EPSG: 5014 (ITRF93/ PTRA08 - UTM zona 25N) - Grupo Ocidental do Arquipélago dos Açores
- EPSG: 5015 (ITRF93/ PTRA08 - UTM zona 26N) - Grupo Central e Oriental do Arquipélago dos Açores
- EPSG: 5016 (ITRF93/ PTRA08 - UTM zona 28N) – Madeira, Porto Santo, Desertas e Selvagens

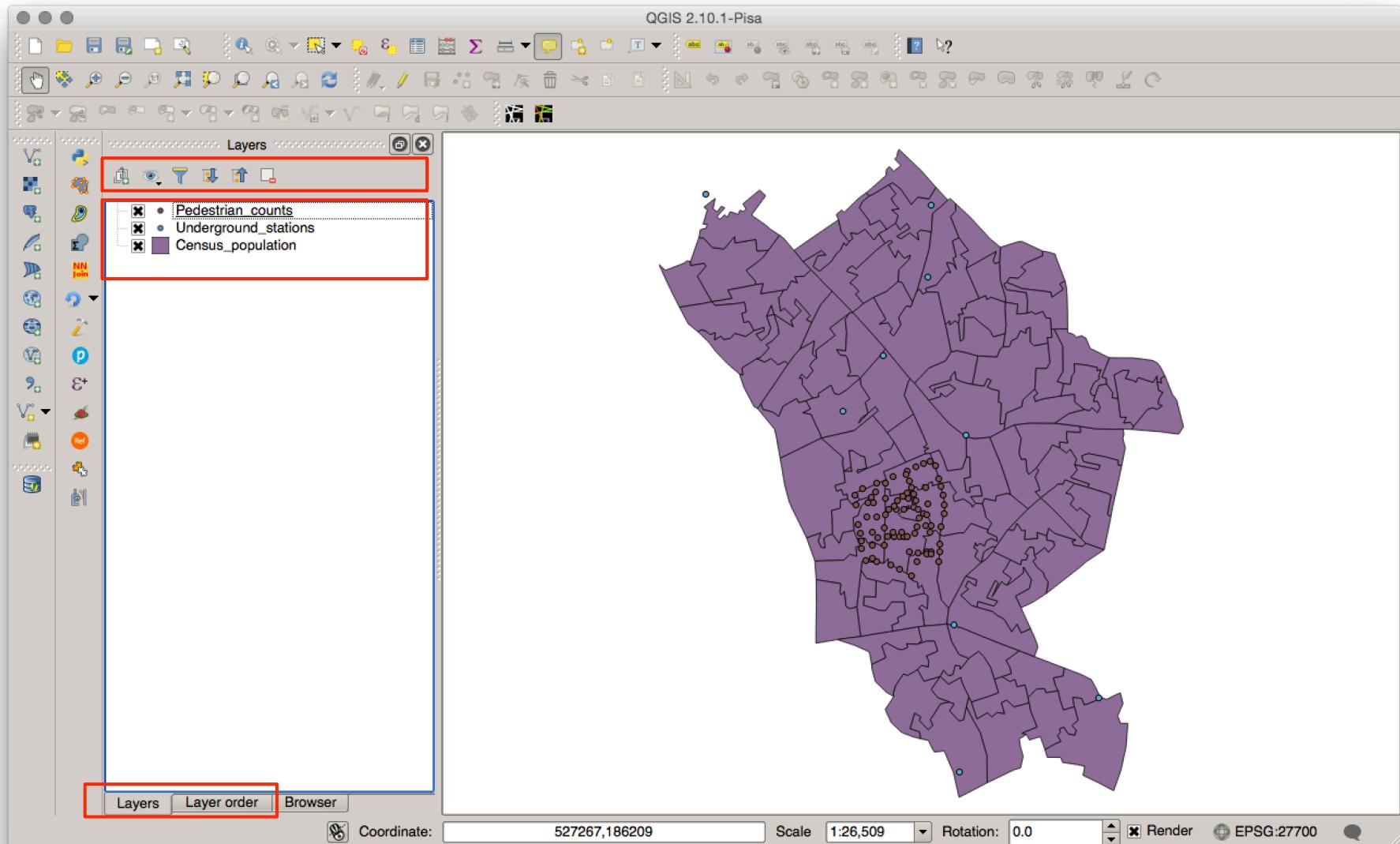
Arquipélagos dos Açores e da Madeira - Sistemas Locais

- EPSG: 2188 (Datum Observatório - Flores (Grupo Ocidental do Arquipélago dos Açores) / UTM zona 25N)
- EPSG: 2189 (Datum Base SW - Graciosa (Grupo Central do Arquipélago dos Açores) / UTM zona 26N)
- EPSG: 2190 (Datum S. Braz - S. Miguel (Grupo Oriental do Arquipélago dos Açores) / UTM zona 26N)
- EPSG: 2942 (Datum Base SE - Porto Santo (Madeira) / UTM zona 28N)

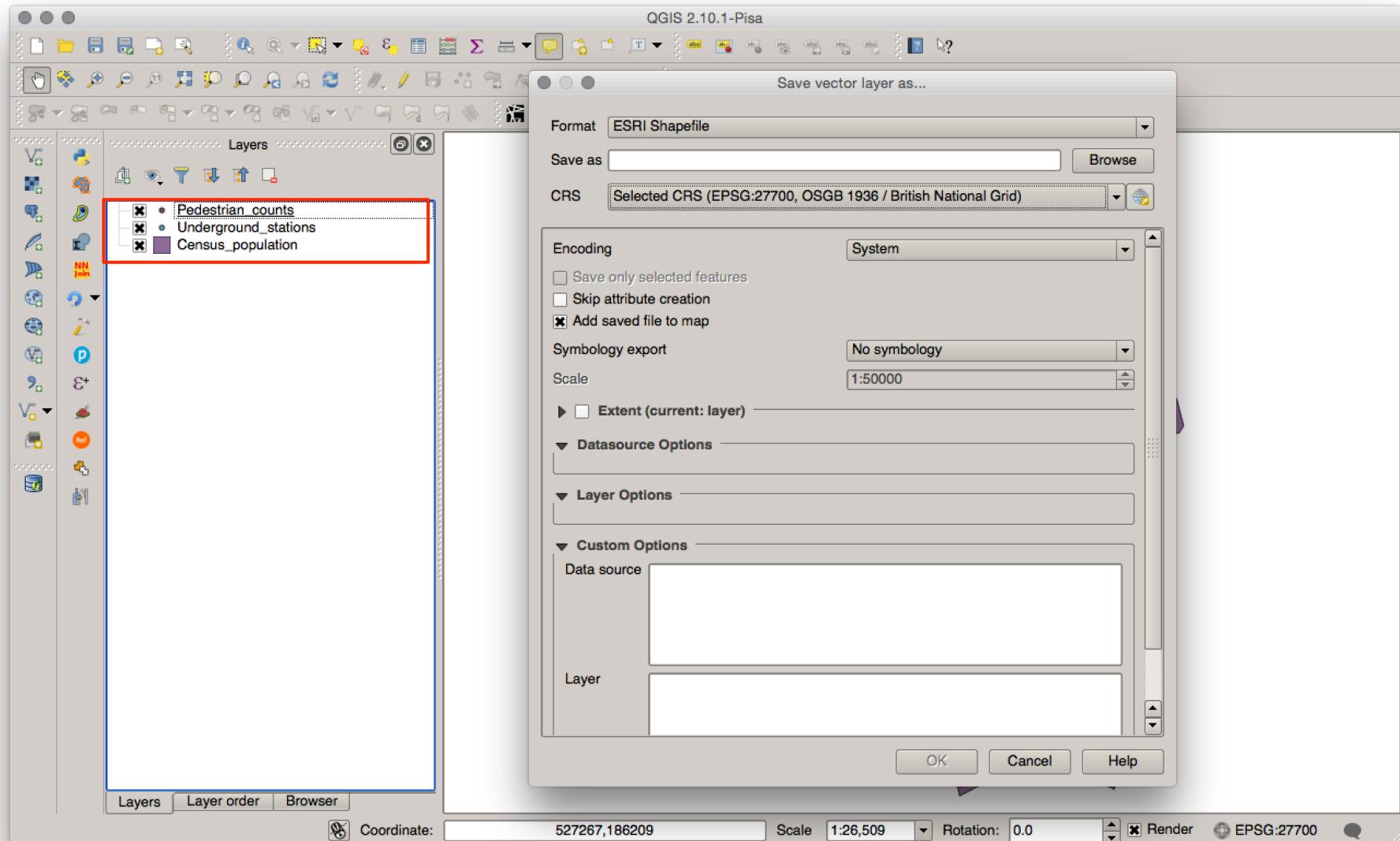
Opening files



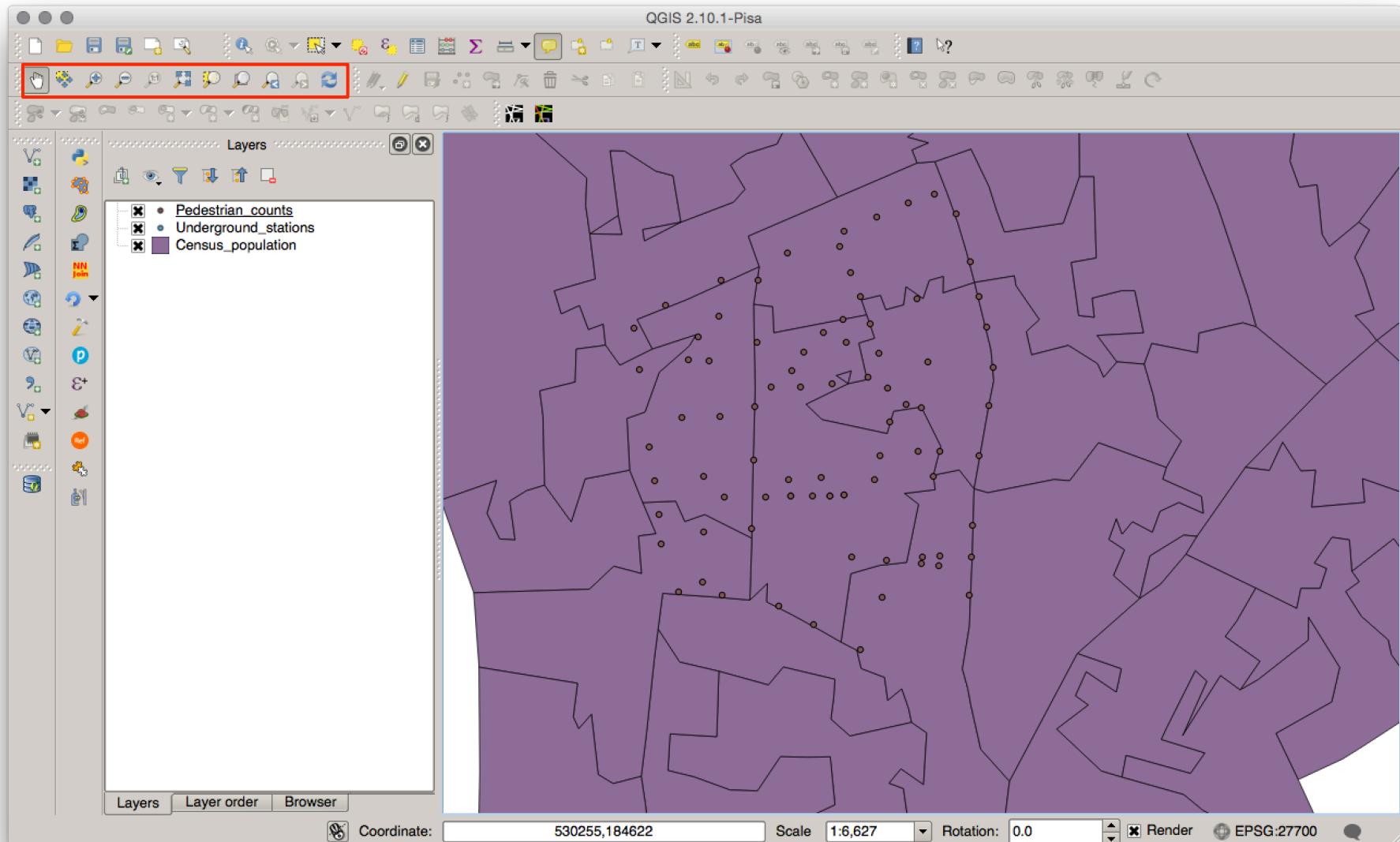
Managing layers



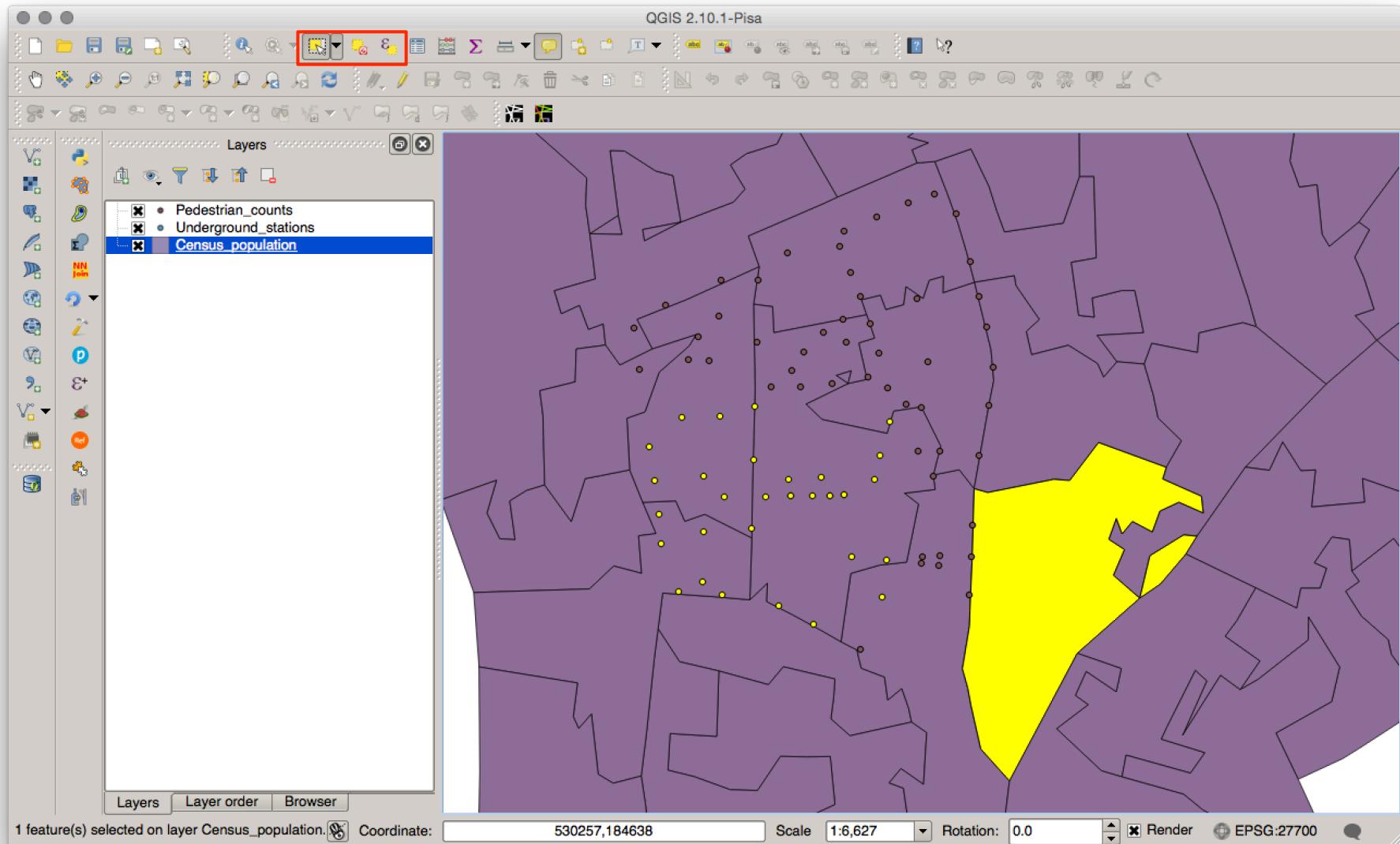
Saving layers



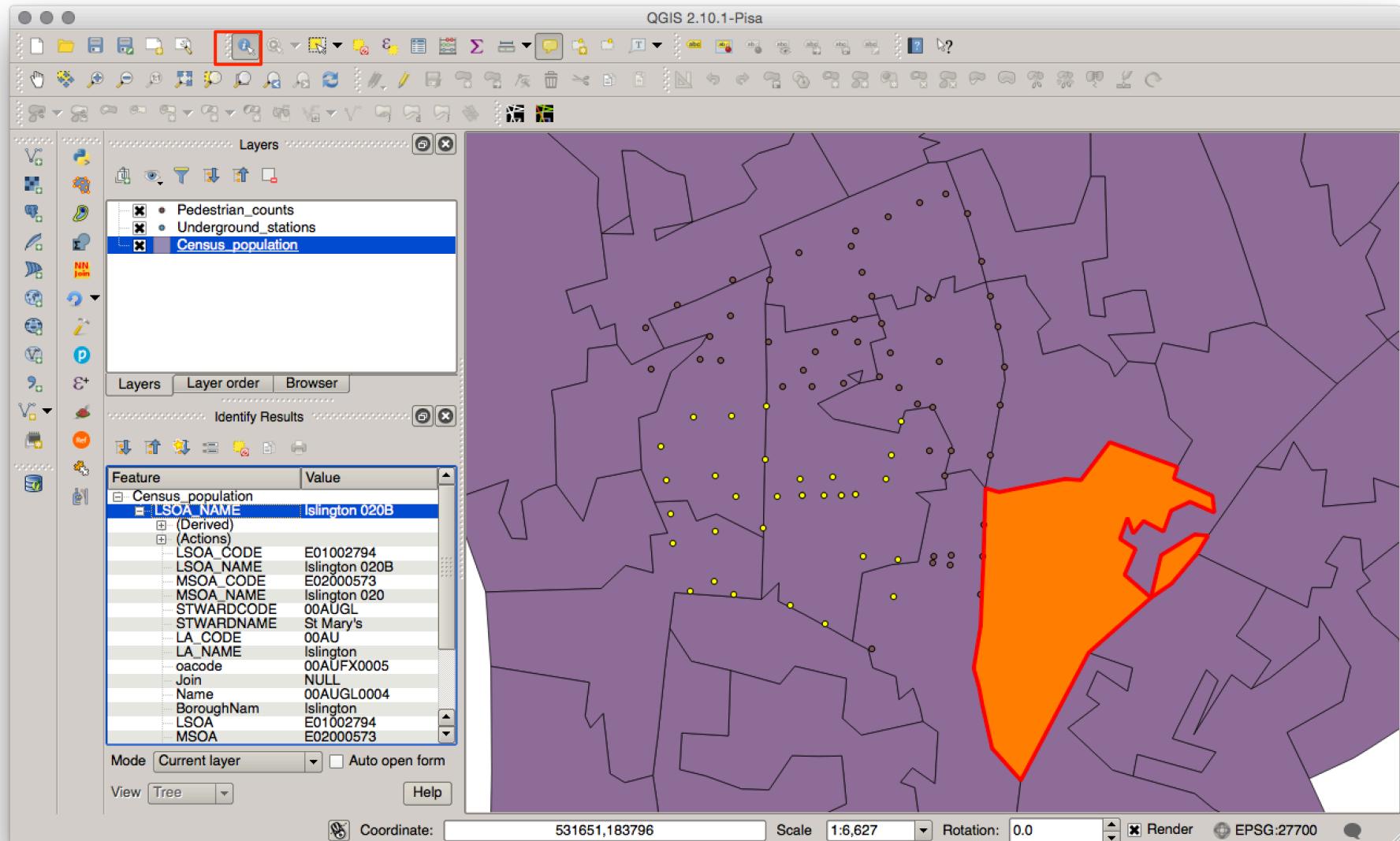
Zooming and panning



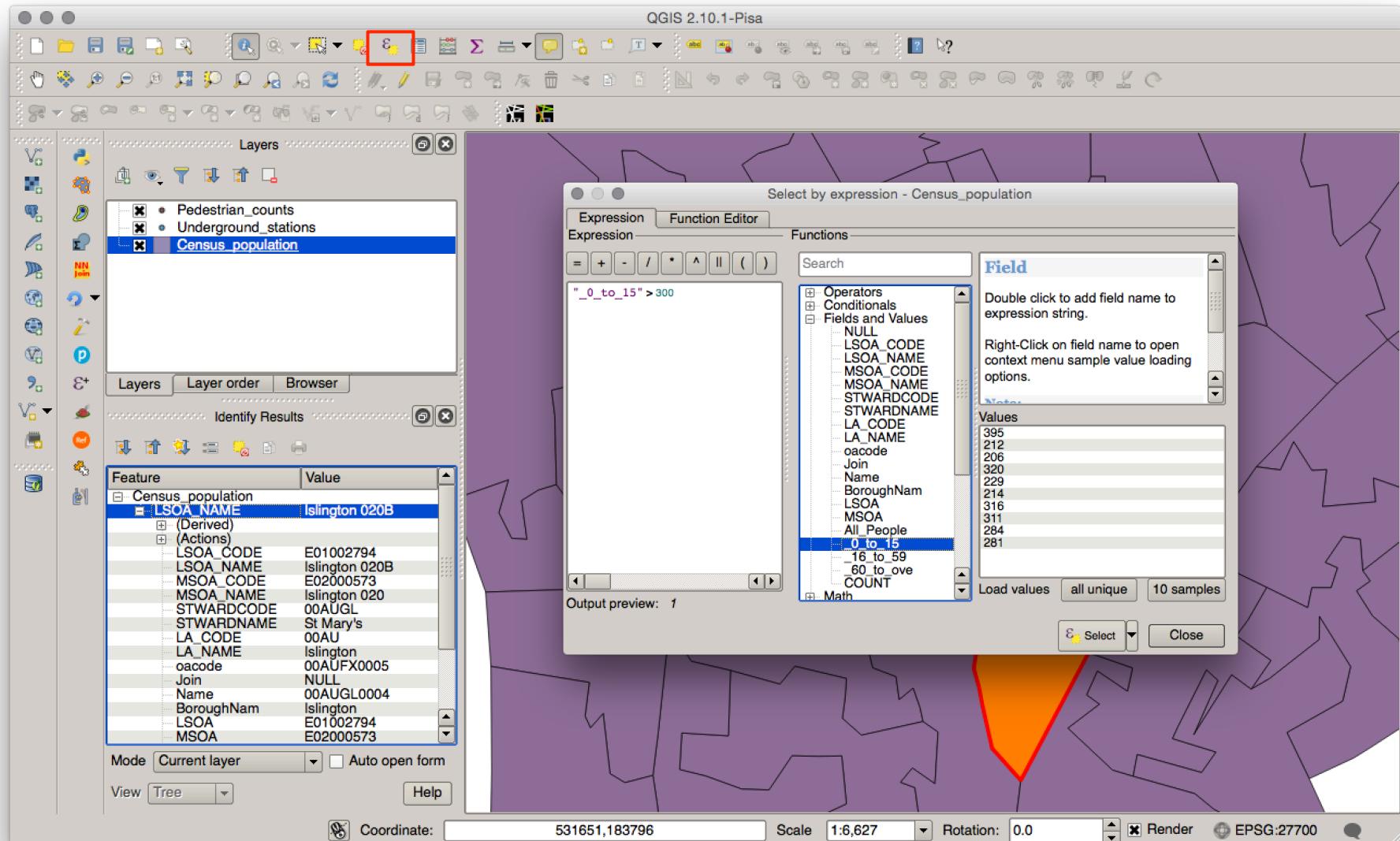
Selection tools



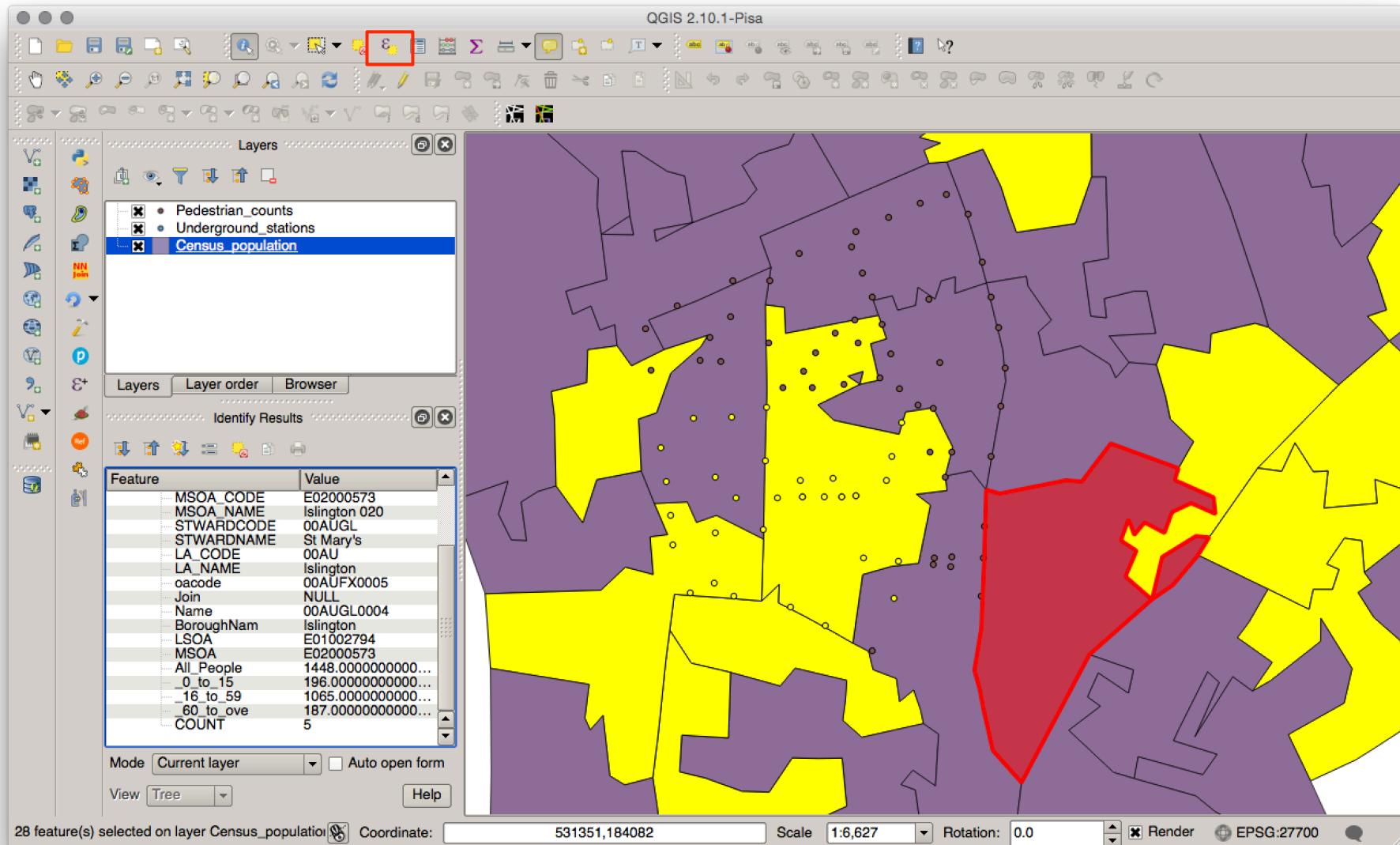
Identify features tool



Select by attribute



Select by attribute

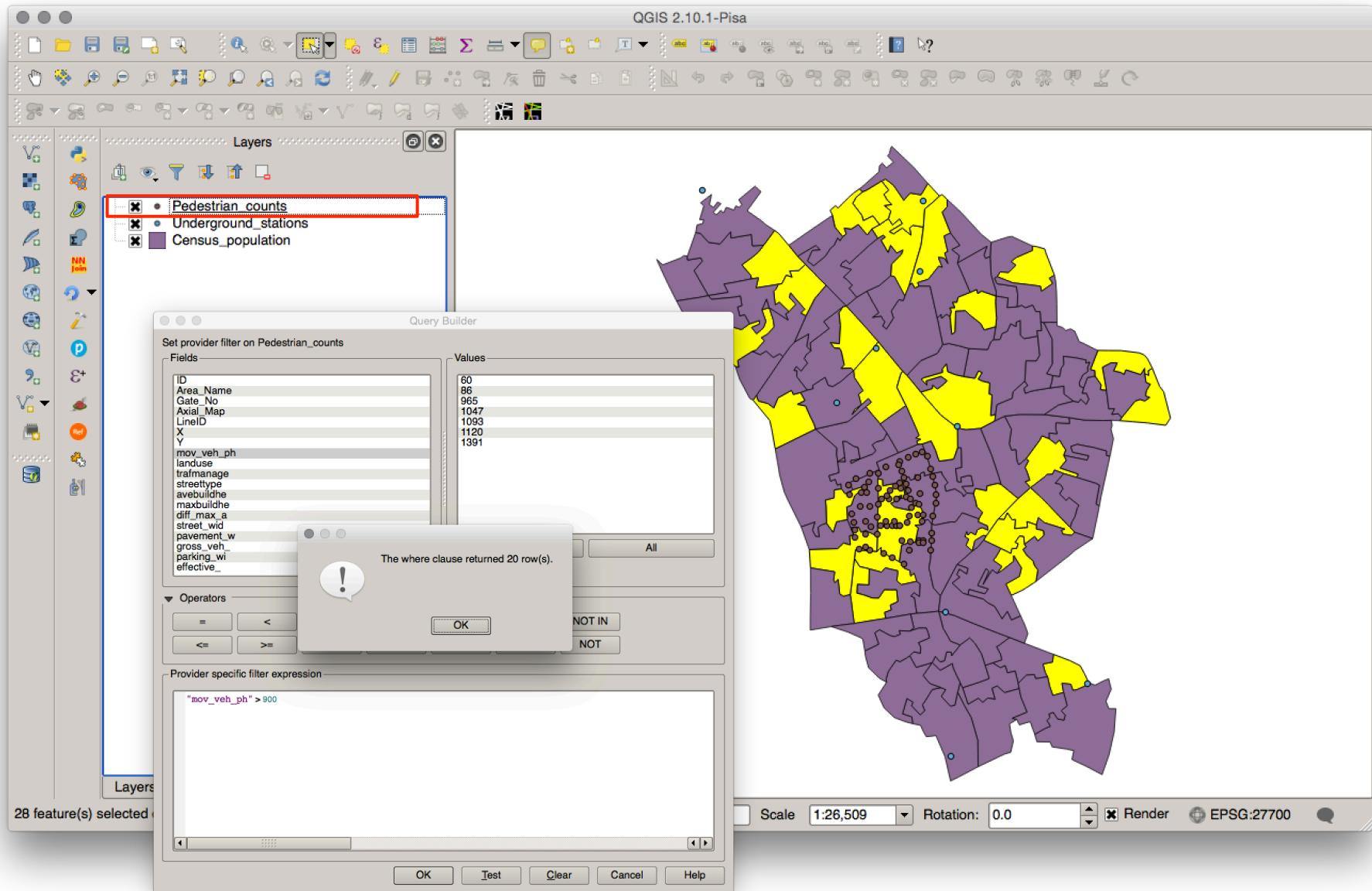


Attribute Table selection

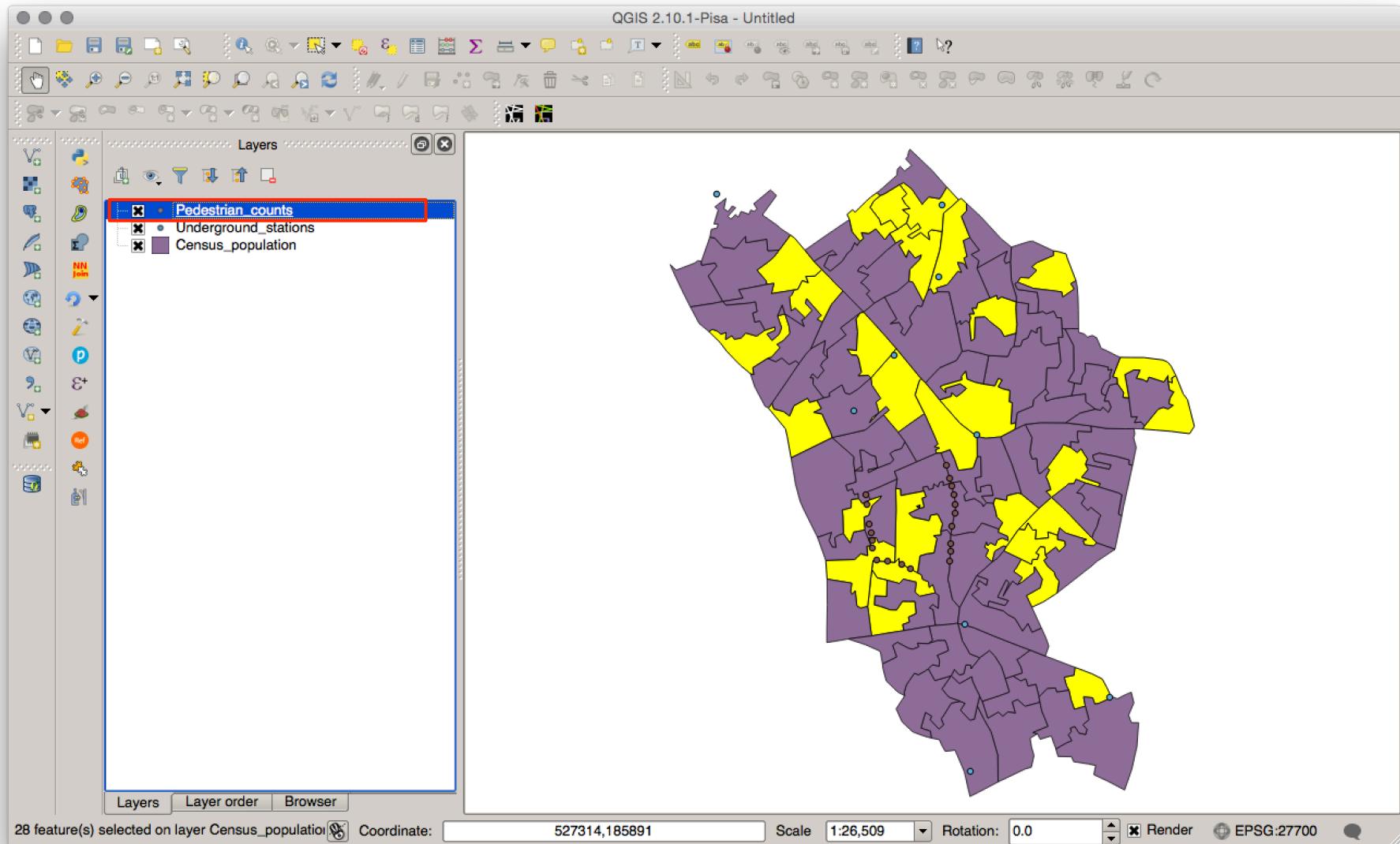
Attribute table - Pedestrian_counts :: Features total: 85, filtered: 85, selected: 8

ID	Area_Name	Gate_No	Axial_Map	LineID	X	Y	mov_veh_ph	landuse	trafmanage	streettype	avebuildhe	max
0	1 Barnsbury		1 Barnsbury	3	1017.248000...	-1669.21499...	606	residential	twoway	primary	3	
1	2 Barnsbury		2 Barnsbury	3	1084.500000...	-1639.30500...	589	residential	twoway	primary	3	
2	3 Barnsbury		3 Barnsbury	3	1144.724999...	-1612.51500...	892	residential	twoway	primary	3	
3	4 Barnsbury		6 Barnsbury	3	1209.914999...	-1583.52500...	759	residential	twoway	primary	5	
4	5 Barnsbury		7 Barnsbury	3	1244.630000...	-1568.08500...	652	school	twoway	primary	4	
5	6 Barnsbury		8 Barnsbury	3	1278.470000...	-1553.02999...	673	residential	twoway	primary	4	
6	7 Barnsbury		9 Barnsbury	3	1301.365000...	-1542.84999...	675	residential	twoway	primary	3	
7	8 Barnsbury		11 Barnsbury	24	1088.845000...	-1670.27999...	59	residential	twoway	local	4	
8	9 Barnsbury		14 Barnsbury	7	1208.980000...	-1674.75000...	53	residential	twoway	local	3	
9	10 Barnsbury		15 Barnsbury	7	1289.430000...	-1653.47499...	414	residential	twoway	local	3	
10	11 Barnsbury		16 Barnsbury	57	1173.130000...	-1710.01999...	49	mixed	twoway	local	3	
11	12 Barnsbury		17 Barnsbury	57	1217.079999...	-1700.94499...	18	residential	twoway	local	3	
12	13 Barnsbury		22 Barnsbury	42	1138.755000...	-1752.73499...	249	residential	twoway	local	3	
13	14 Barnsbury		23 Barnsbury	42	1170.125000...	-1752.86999...	217	residential	twoway	local	3	
14	15 Barnsbury		24 Barnsbury	22	1202.420000...	-1747.53999...	232	residential	twoway	local	4	
15	16 Barnsbury		25 Barnsbury	22	1238.934999...	-1738.01500...	233	school	twoway	local	4	
16	17 Barnsbury		26 Barnsbury	22	1302.279999...	-1721.49000...	189	residential	twoway	local	3	
17	18 Barnsbury		28 Barnsbury	5	1278.755000...	-1766.49000...	98	residential	twoway	local	4	
18	19 Barnsbury		38 Barnsbury	16	1092.115000...	-1872.56999...	114	residential	twoway	local	3	
19	20 Barnsbury		39 Barnsbury	16	1135.634999...	-1871.13499...	113	residential	twoway	local	3	
20	21 Barnsbury		40 Barnsbury	16	1163.039999...	-1870.23000...	112	residential	twoway	local	3	
21	21 Barnsbury		40 Barnsbury	16	1163.039999...	-1870.23000...	112	residential	twoway	local	3	

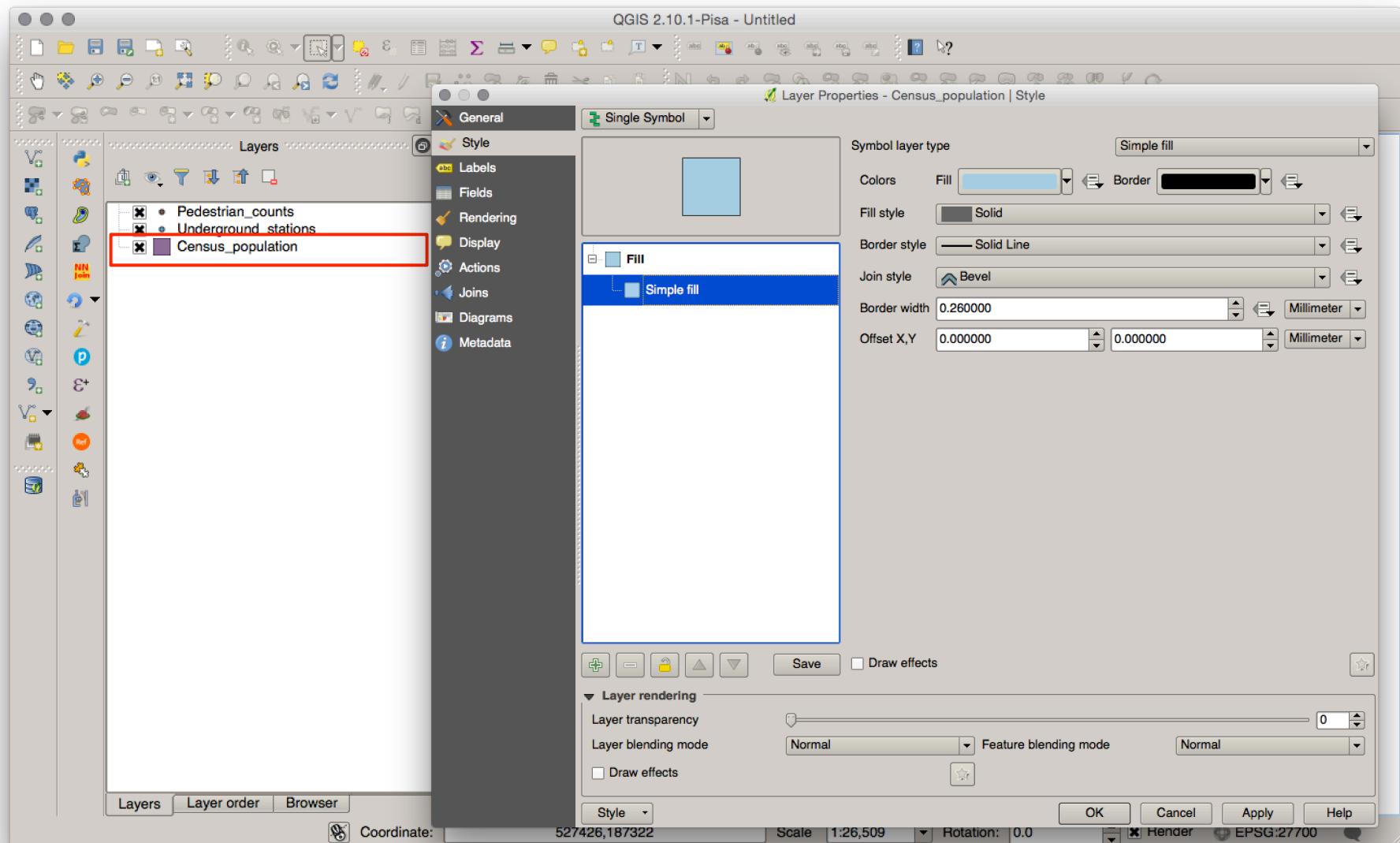
Filter by attribute



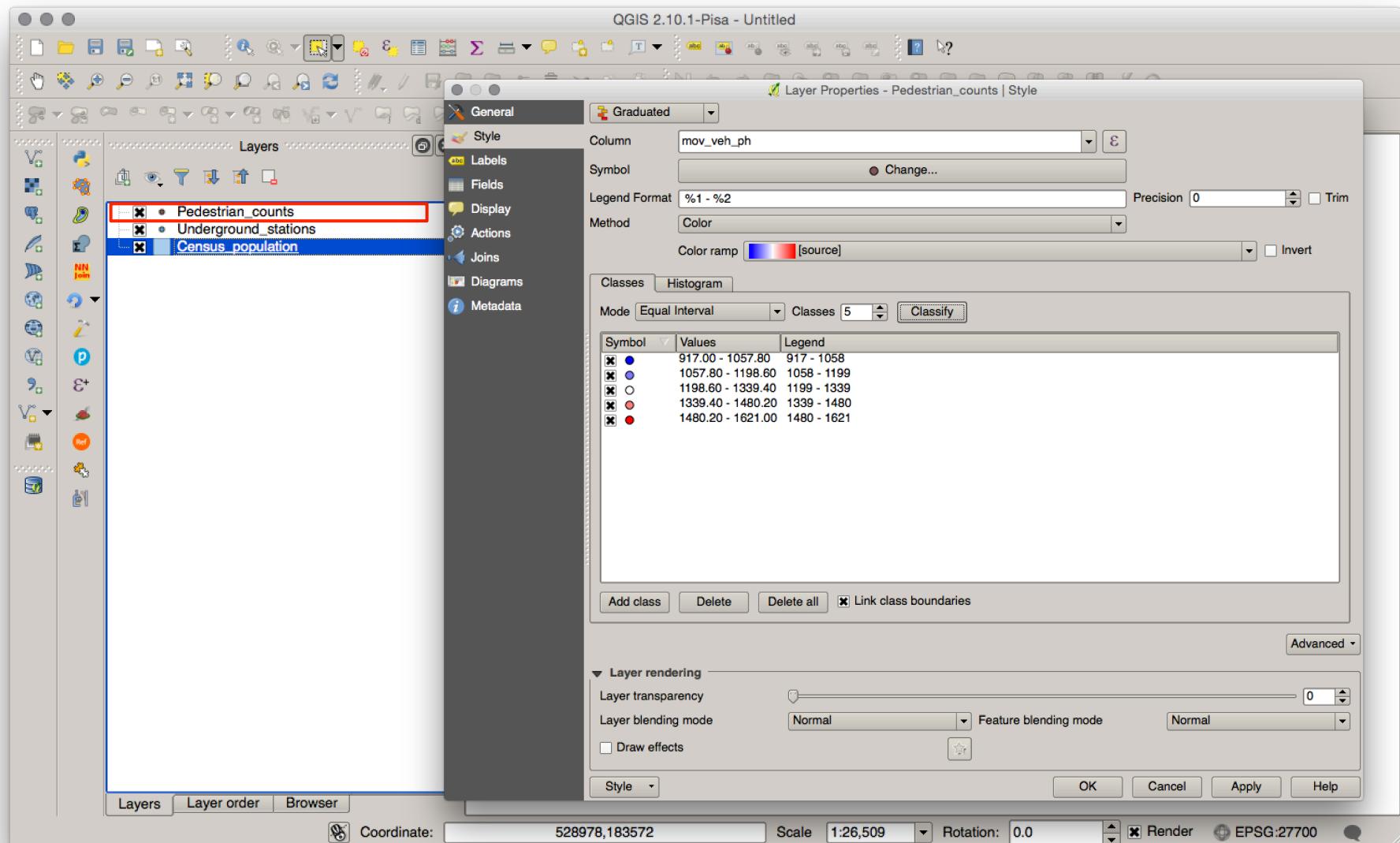
Filter by attribute



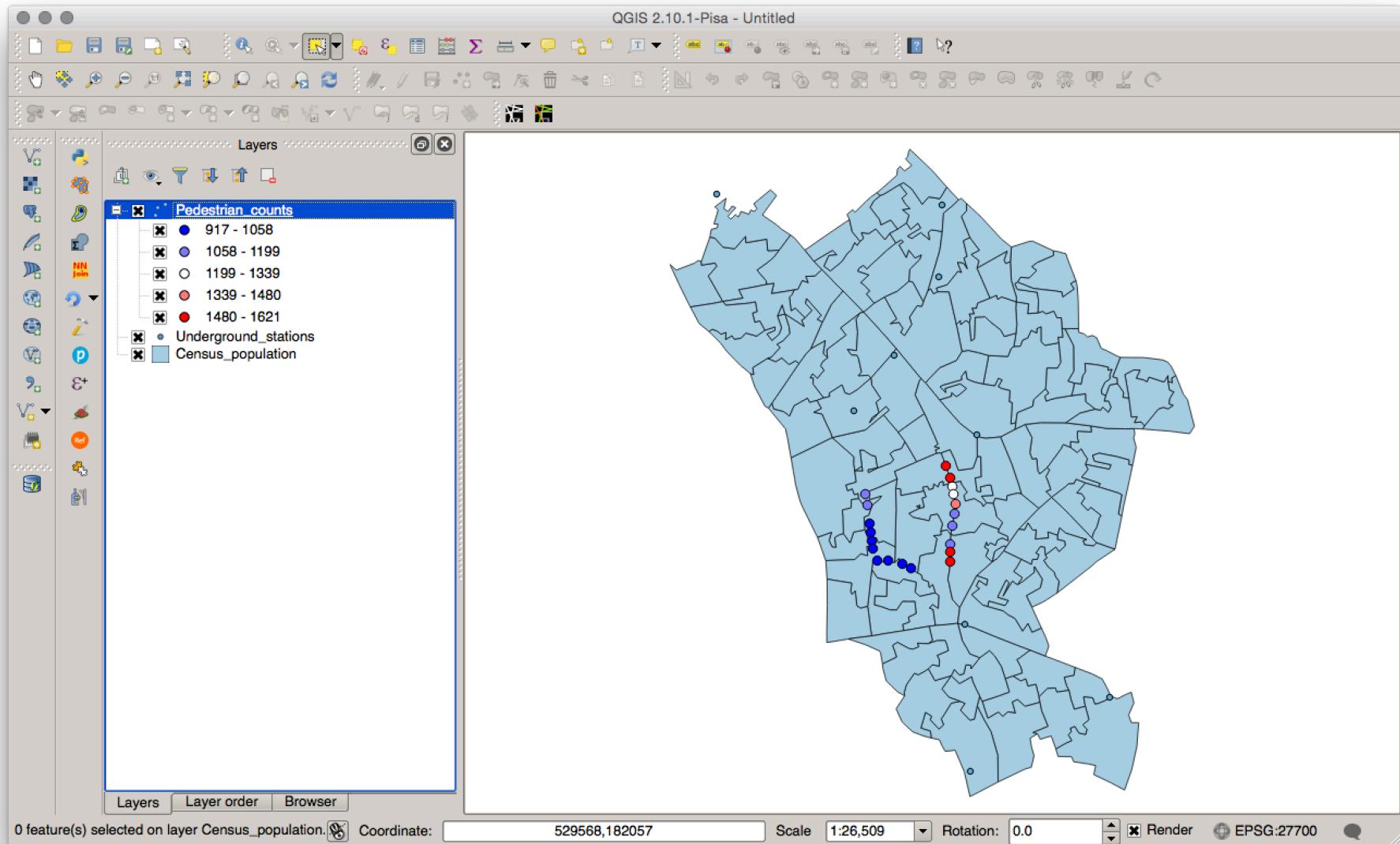
Layer styles



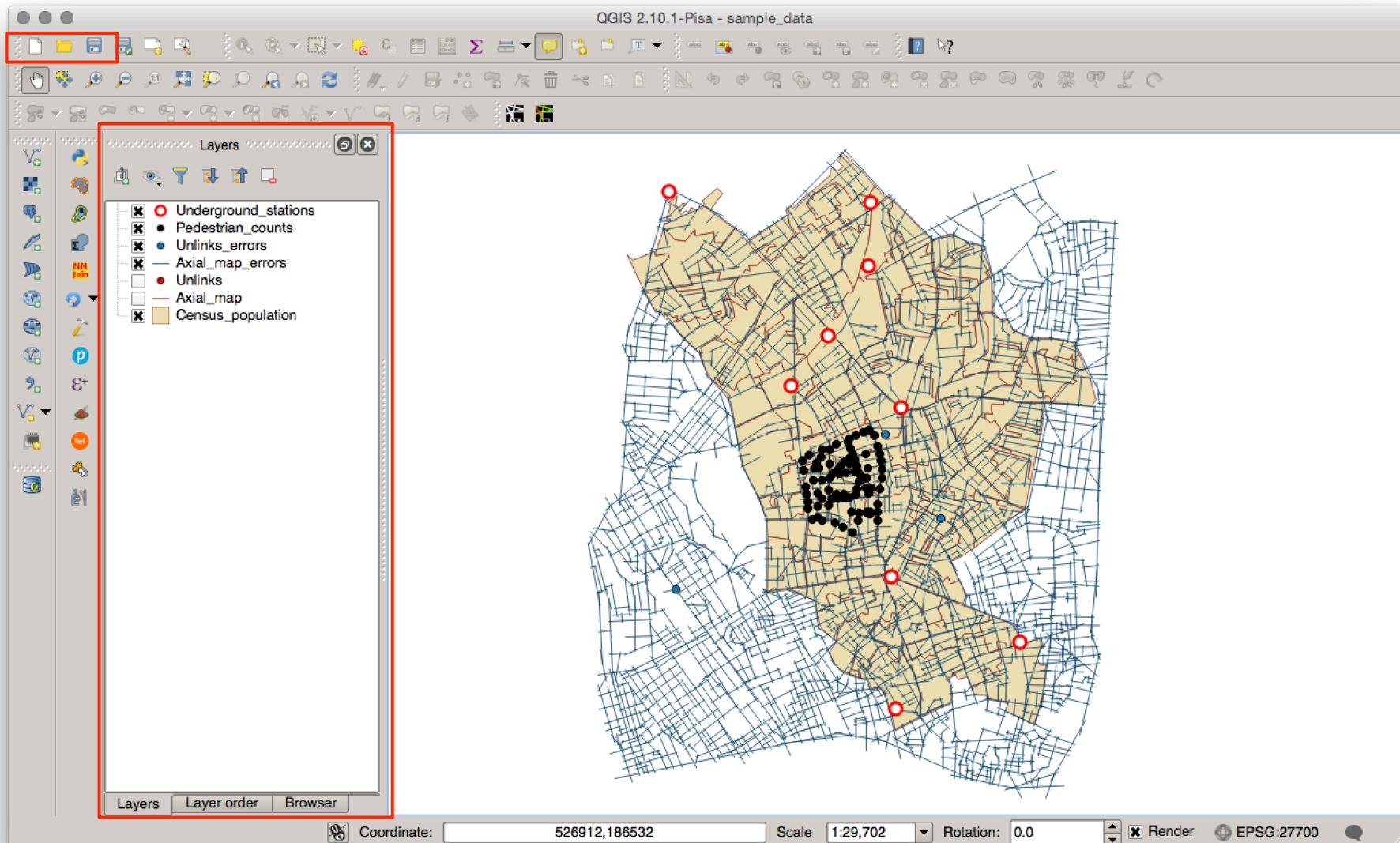
Layer styles



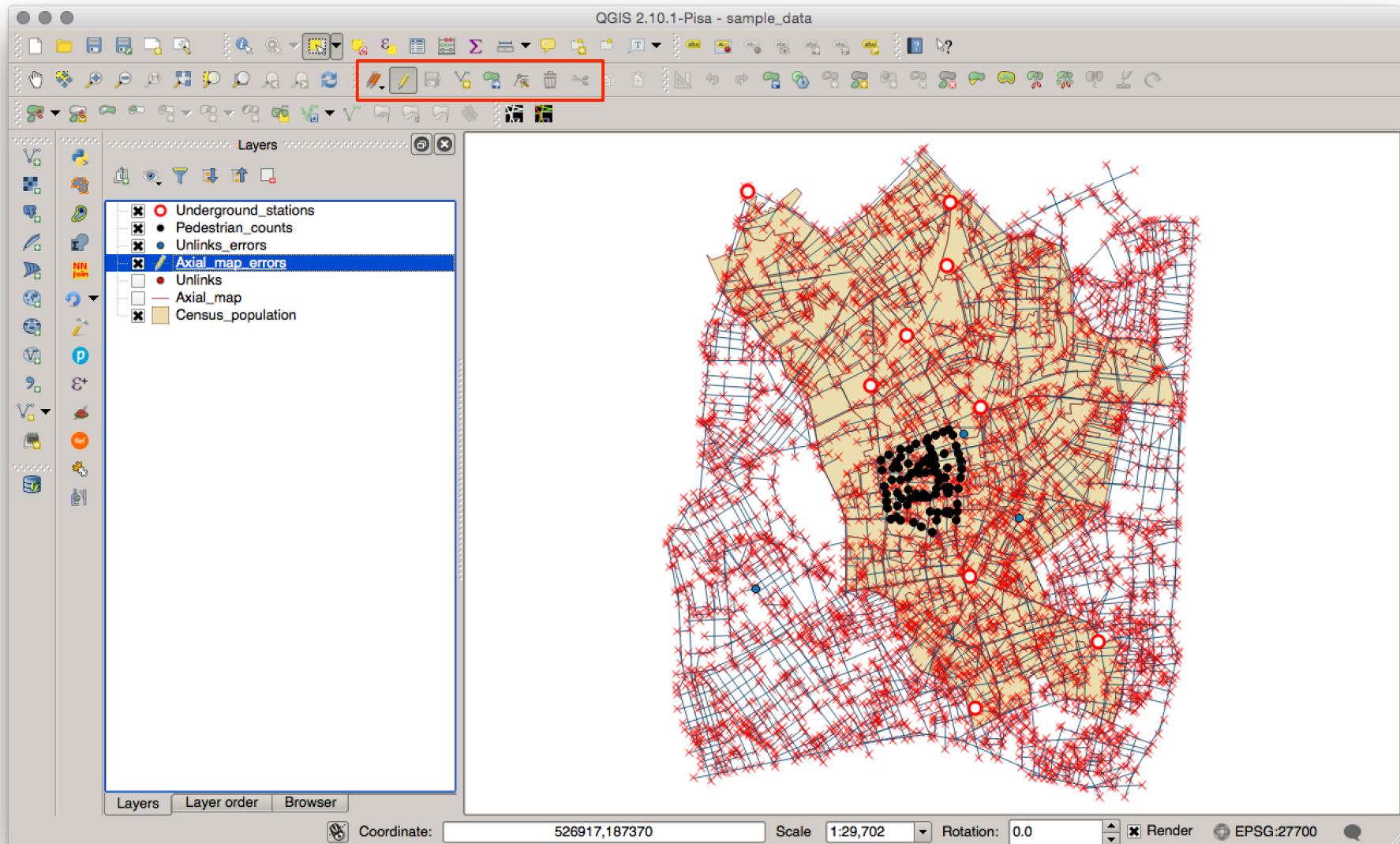
Saving an image



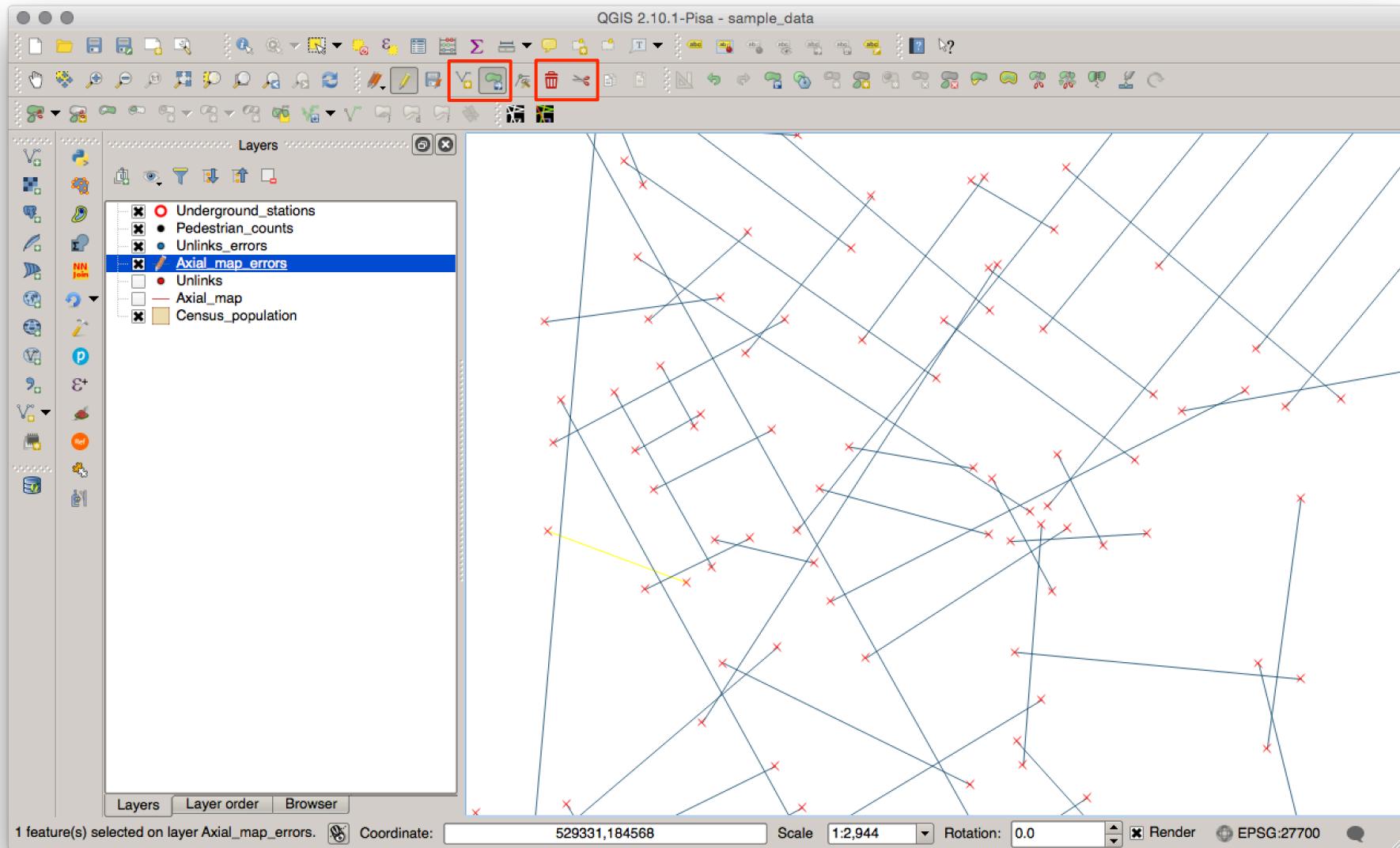
Opening/saving a project



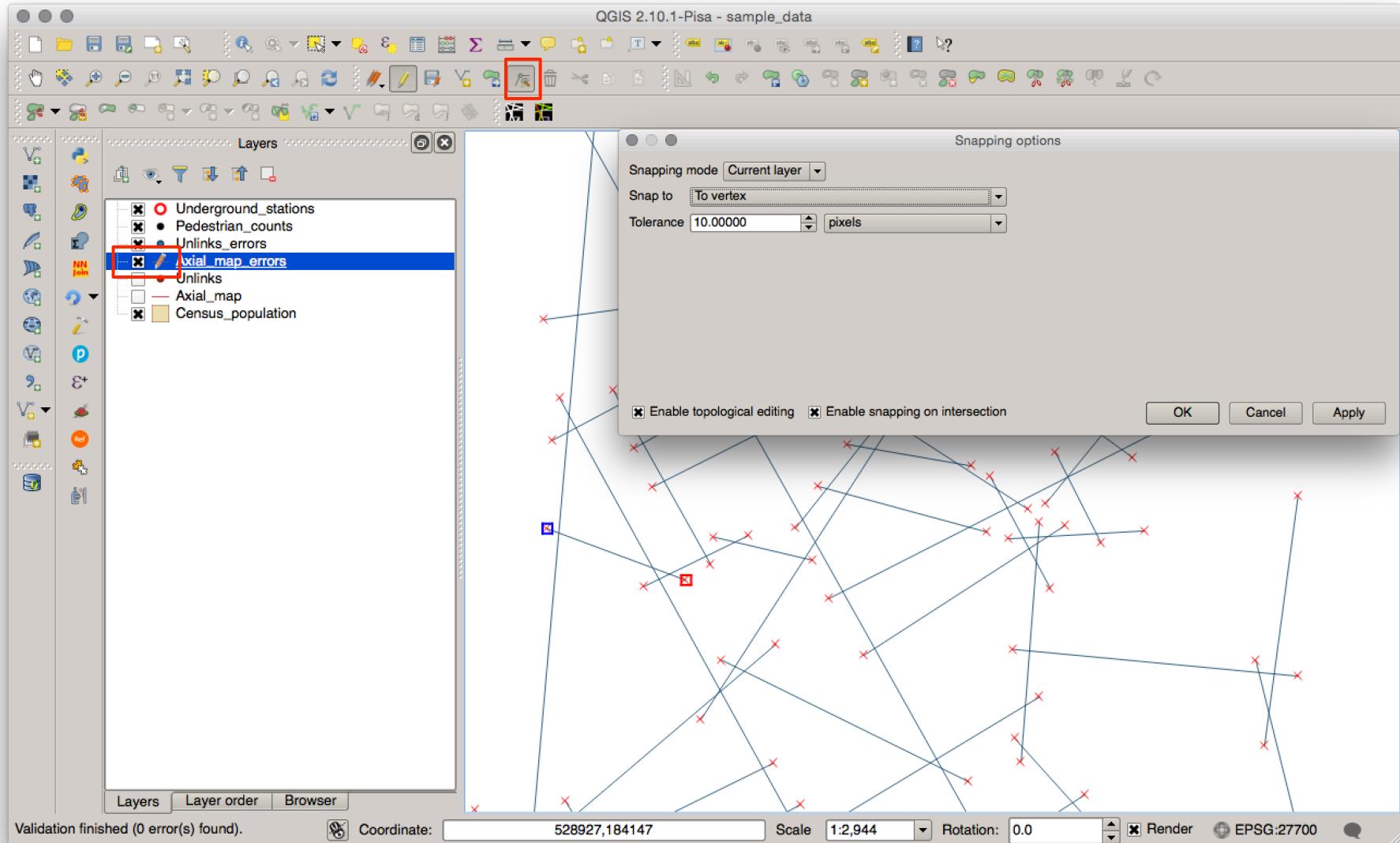
Editing layers



Editing features



Editing nodes



Editing attributes

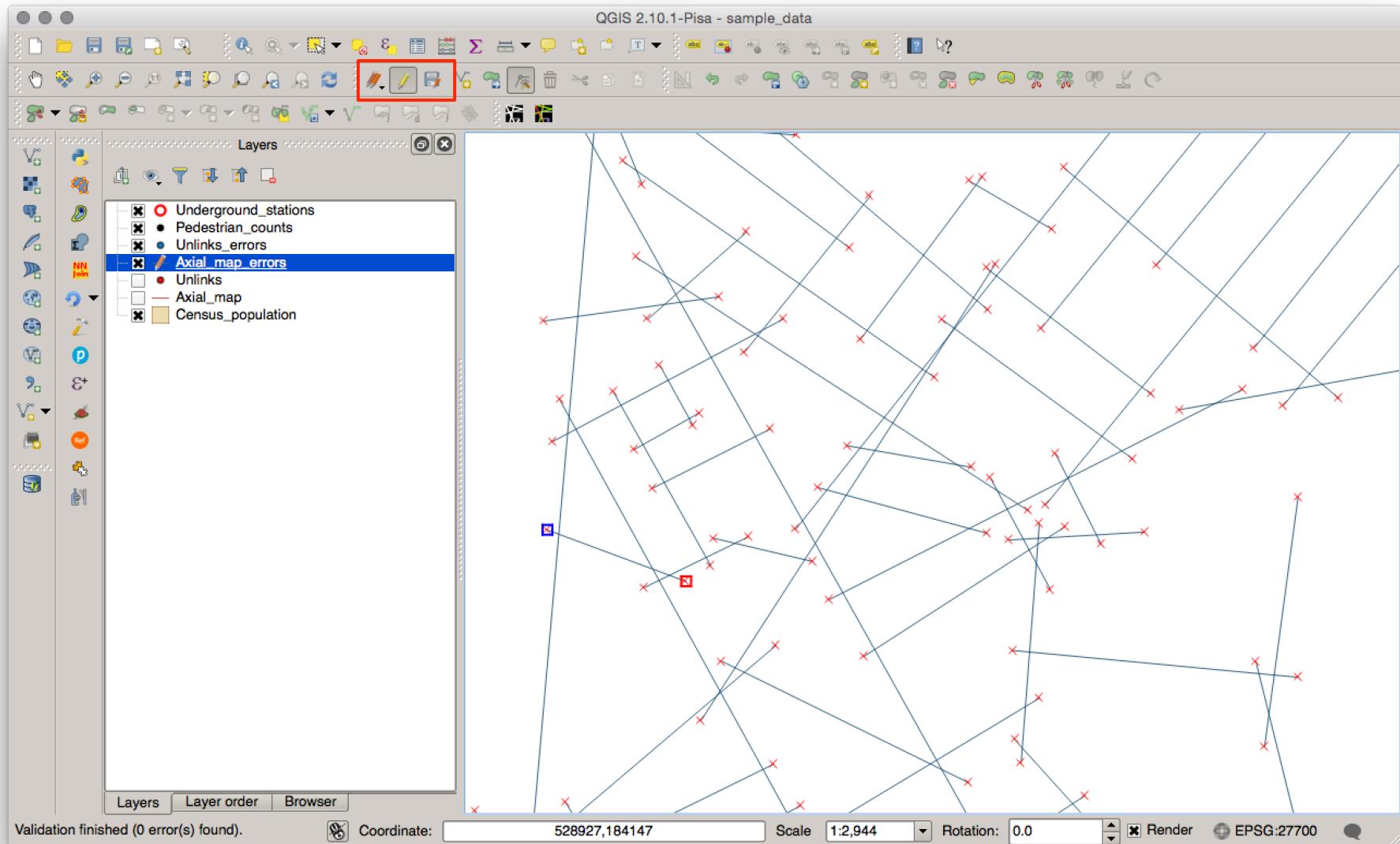
Attribute table - Pedestrian_counts :: Features total: 85, filtered: 85, selected: 0

Update All Update Selected

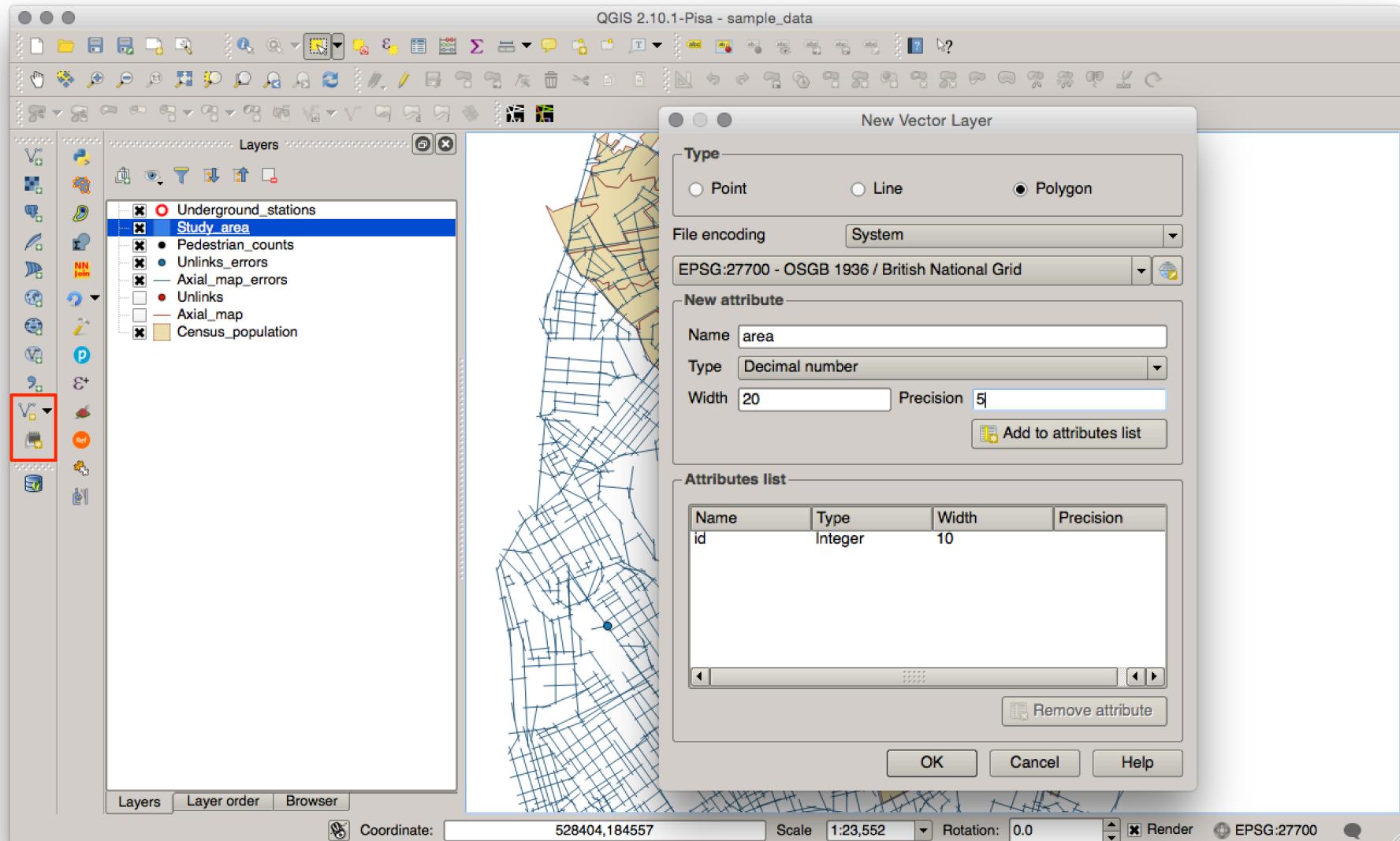
ID	Area_Name	Gate_No	Axial_Map	LineID	X	Y	mov_veh_ph	landuse	trafmanage	streettype	avebuildhe	ma
0	1 Barnsbury	1	Barnsbury	3	1017.248000...	-1669.21499...	606	residential	twoway	primary	3	
1	2 Barnsbury	2	Barnsbury	3	1084.500000...	-1639.30500...	589	residential	twoway	primary	3	
2	3 Barnsbury	3	Barnsbury	3	1144.724999...	-1612.51500...	892	residential	twoway	primary	3	
3	4 Barnsbury	6	Barnsbury	3	1209.914999...	-1583.52500...	759	residential	twoway	primary	5	
4	5 Barnsbury	7	Barnsbury	3	1244.630000...	-1568.08500...	652	school	twoway	primary	4	
5	6 Barnsbury	8	Barnsbury	3	1278.470000...	-1553.02999...	673	residential	twoway	primary	4	
6	7 Barnsbury	9	Barnsbury	3	1301.365000...	-1542.84999...	675	residential	twoway	primary	3	
7	8 Barnsbury	11	Barnsbury	24	1088.845000...	-1670.27999...	59	residential	twoway	local	4	
8	9 Barnsbury	14	Barnsbury	7	1208.980000...	-1674.75000...	53	residential	twoway	local	3	
9	10 Barnsbury	15	Barnsbury	7	1289.430000...	-1653.47499...	414	residential	twoway	local	3	
10	11 Barnsbury	16	Barnsbury	57	1173.130000...	-1710.01999...	49	mixed	twoway	local	3	
11	12 Barnsbury	17	Barnsbury	57	1217.079999...	-1700.94499...	18	residential	twoway	local	3	
12	13 Barnsbury	22	Barnsbury	42	1138.755000...	-1752.73499...	249	residential	twoway	local	3	
13	14 Barnsbury	23	Barnsbury	42	1170.125000...	-1752.86999...	217	residential	twoway	local	3	
14	15 Barnsbury	24	Barnsbury	22	1202.420000...	-1747.53999...	232	residential	twoway	local	4	
15	16 Barnsbury	25	Barnsbury	22	1238.934999...	-1738.01500...	233	school	twoway	local	4	
16	17 Barnsbury	26	Barnsbury	22	1302.279999...	-1721.49000...	189	residential	twoway	local	3	
17	18 Barnsbury	28	Barnsbury	5	1278.755000...	-1766.49000...	98	residential	twoway	local	4	
18	19 Barnsbury	38	Barnsbury	16	1092.115000...	-1872.56999...	114	residential	twoway	local	3	
19	20 Barnsbury	39	Barnsbury	16	1135.634999...	-1871.13499...	113	residential	twoway	local	3	
20	21 Barnsbury	40	Barnsbury	16	1163.039999...	-1870.23000...	112	residential	twoway	local	3	

Show All Features

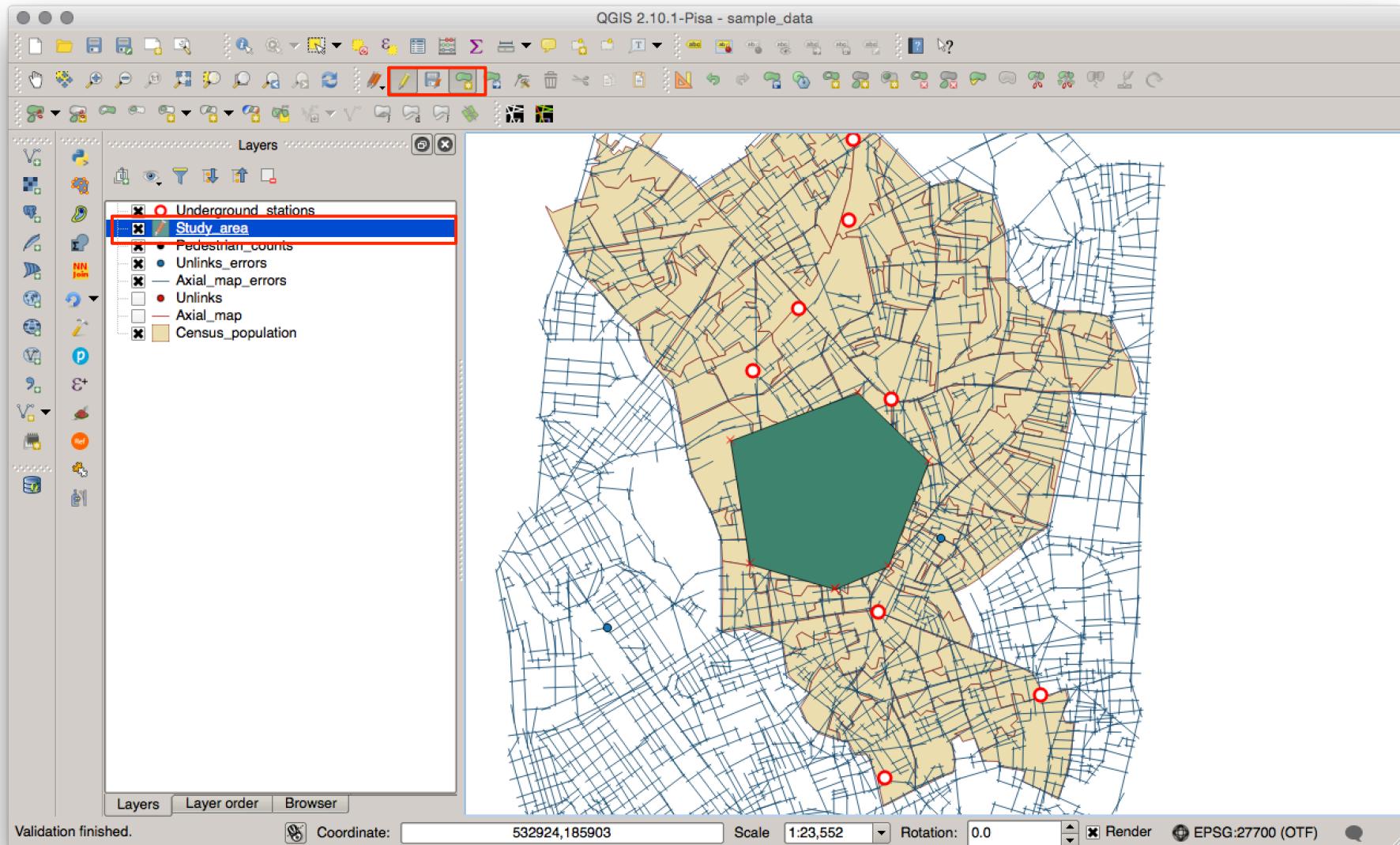
Saving layers (edits) and reverting



Creating layers with attributes



Adding geometry



Updating attributes

The figure shows the QGIS Attribute Table interface for a 'Study_area' layer. The table has two columns: 'id' (containing value 0) and 'area' (containing value 'NULL'). A red box highlights the toolbar icons and the search bar at the top. Another red box highlights the 'Update All' button. Below the table is an 'Expression dialog' window. The dialog has tabs for 'Expression' (selected) and 'Function Editor'. The left panel shows a search bar and a tree view of available functions under 'Functions'. The 'Operators' section is expanded, showing operators like =, +, -, /, *, ^, ||, (,). The 'Record' section is also expanded, showing \$rownum, \$id, \$currentfeature, etc. The right panel displays information about the '\$rownum function', including its syntax (\$rownum), arguments (None), and an example (\$rownum → 4711). At the bottom of the dialog are 'OK' and 'Cancel' buttons.

Updating attributes

Attribute table - Study_area :: Features total: 1, filtered: 1, selected: 0

area = \$area

Update All Update Selected

	id	area
0	1	1570056.16975

Expression dialog

Expression Function Editor

Functions

Search: \$area

\$area function

Returns the area size of the current feature.

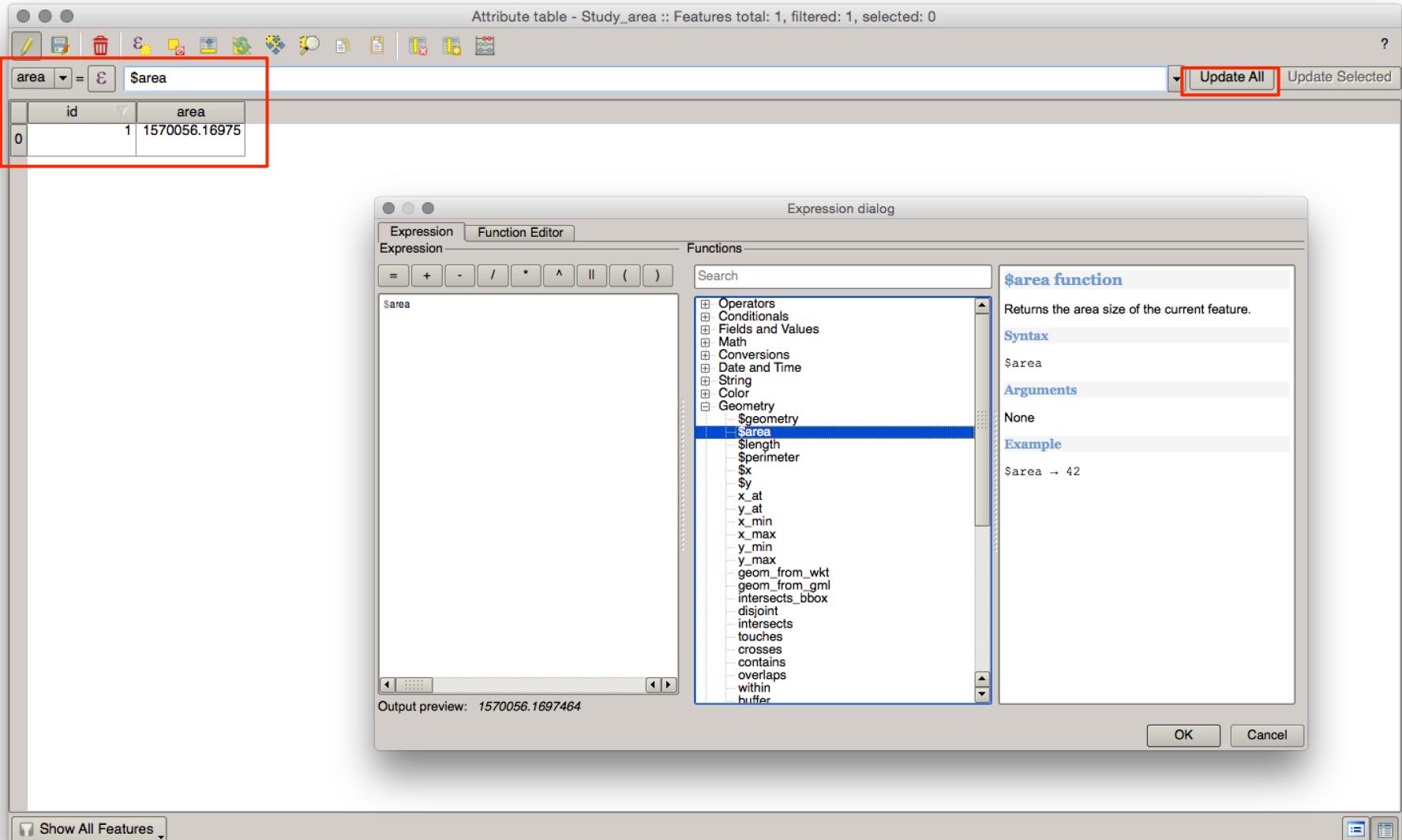
Syntax: \$area

Arguments: None

Example: \$area → 42

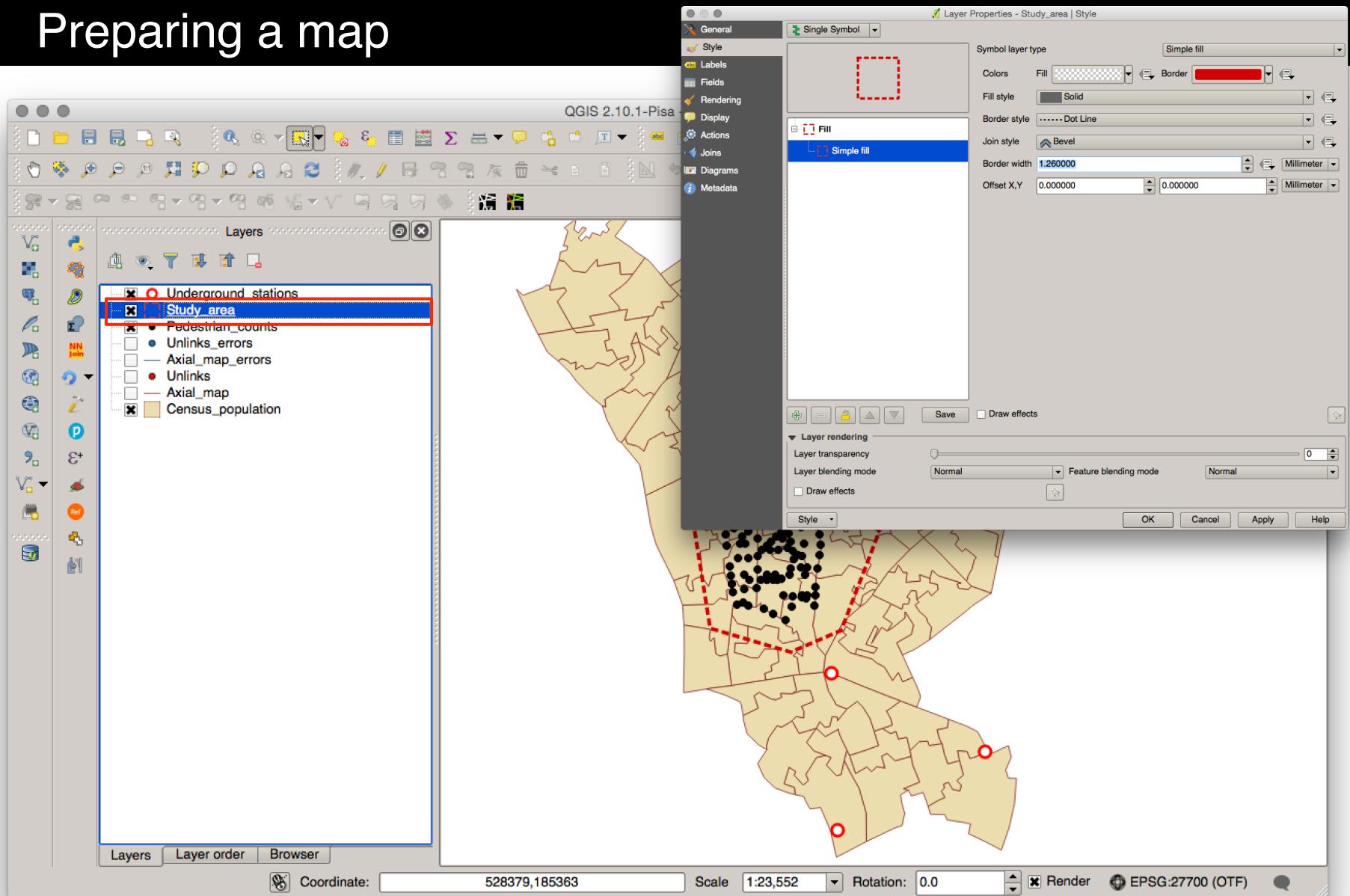
OK Cancel

Show All Features

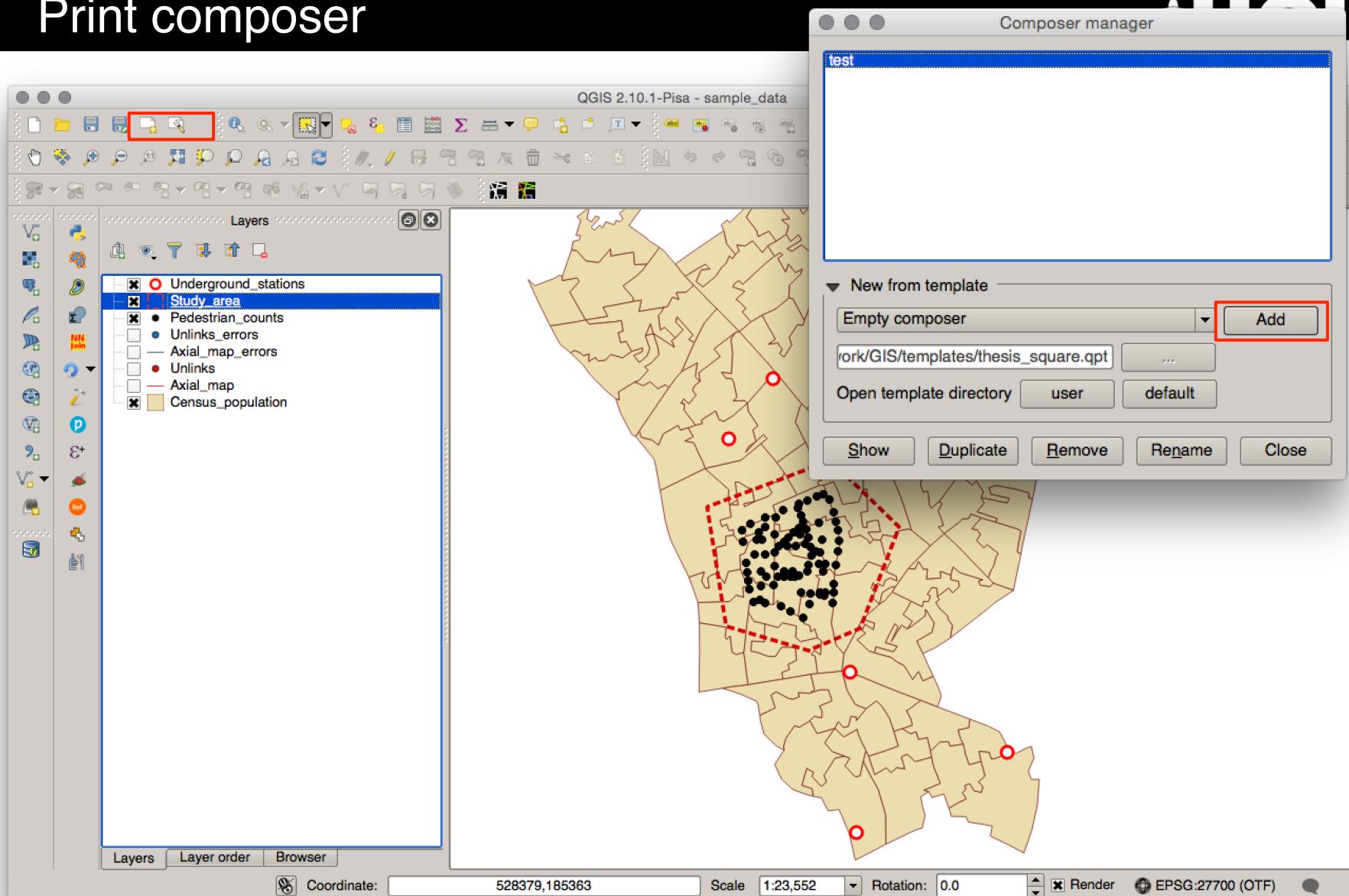


The screenshot shows the QGIS interface with the Attribute Table and Expression dialog open. The Attribute Table shows one feature with an ID of 1 and an area of 1570056.16975. The Expression dialog is used to update the 'area' field with the value '\$area'. The 'Update All' button is highlighted with a red box. The Expression dialog lists various functions under 'Geometry' and highlights '\$area' under 'Fields and Values'. The output preview shows the result as 1570056.1697464.

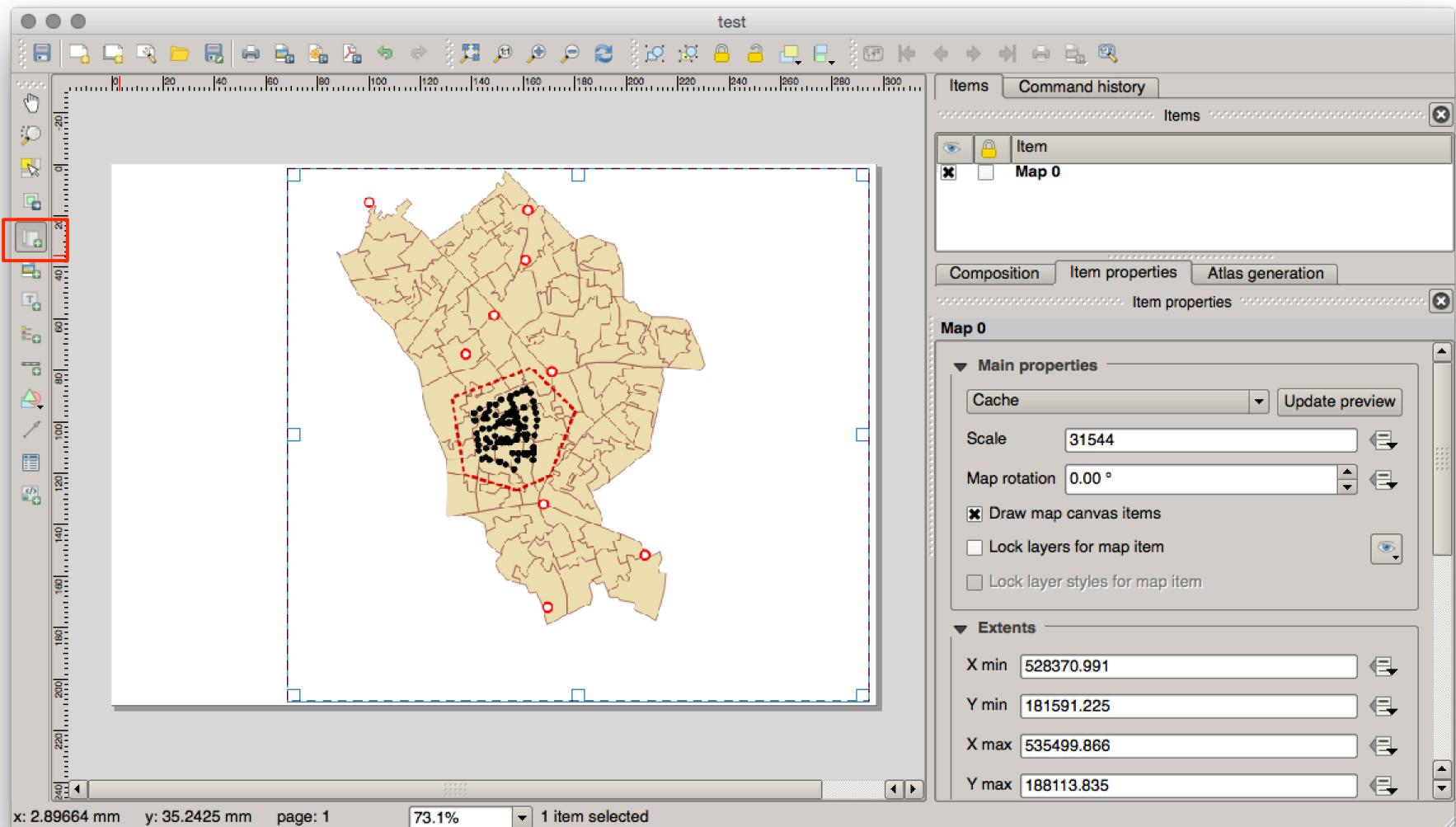
Preparing a map



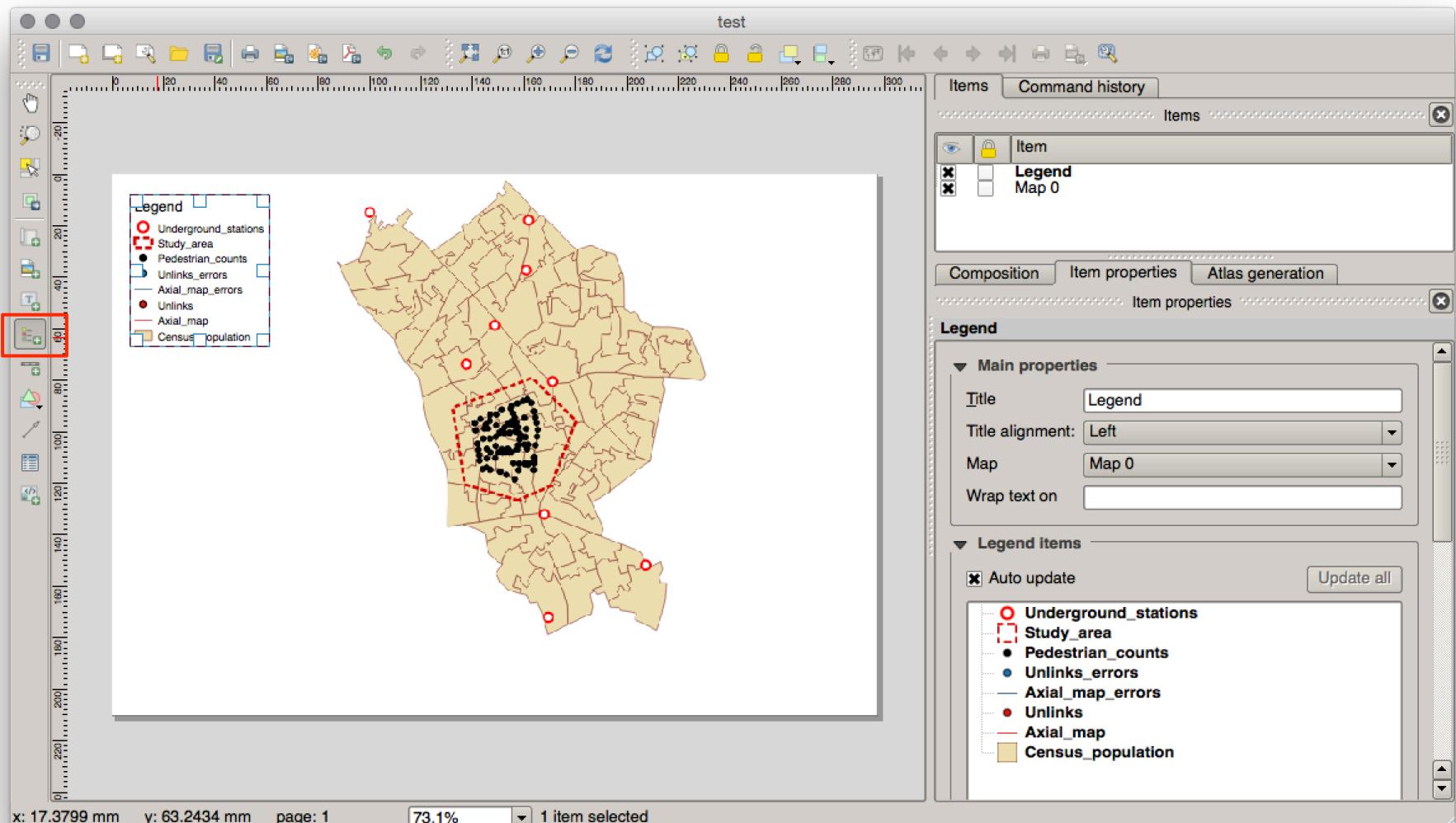
Print composer



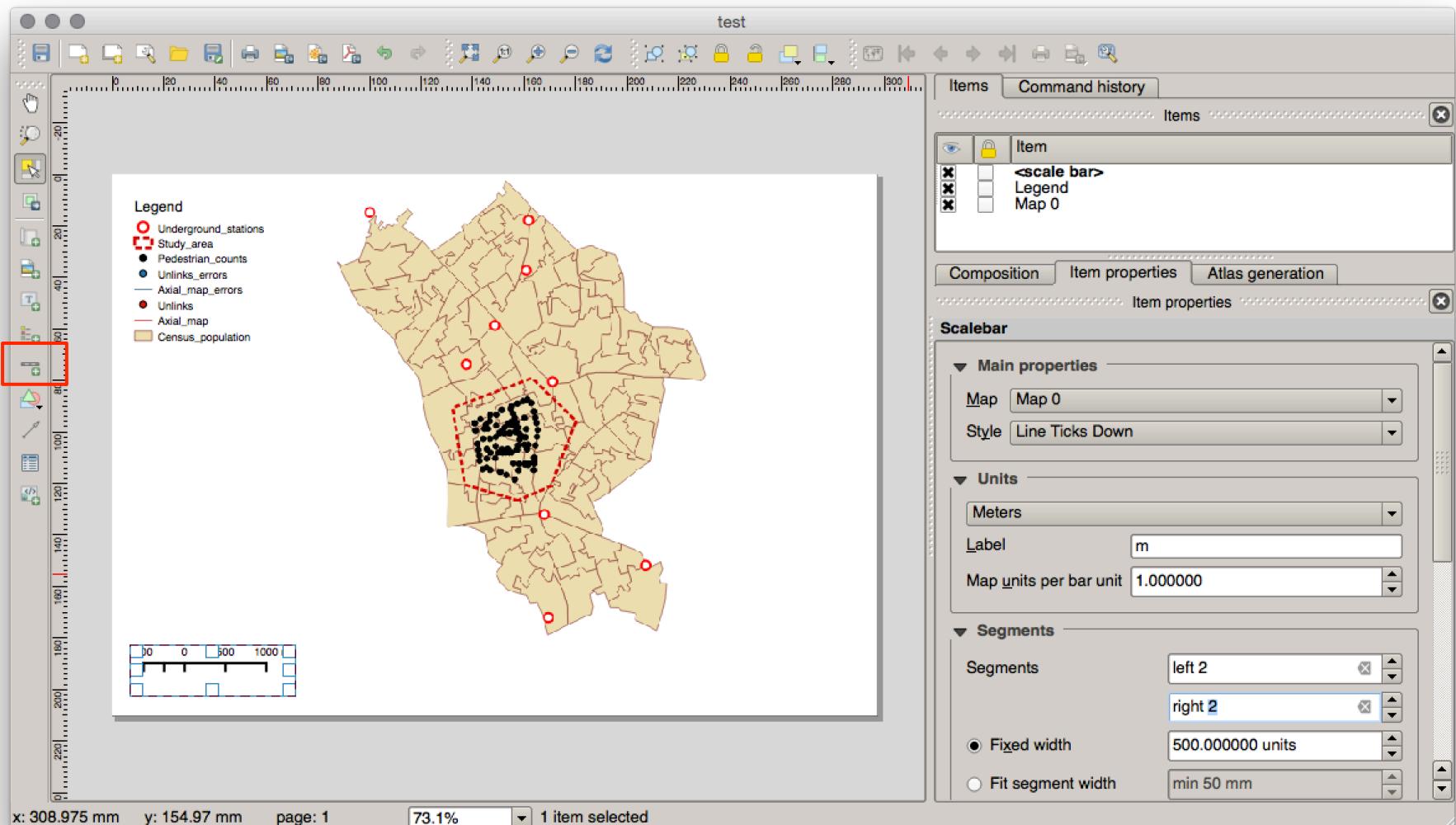
Print composer



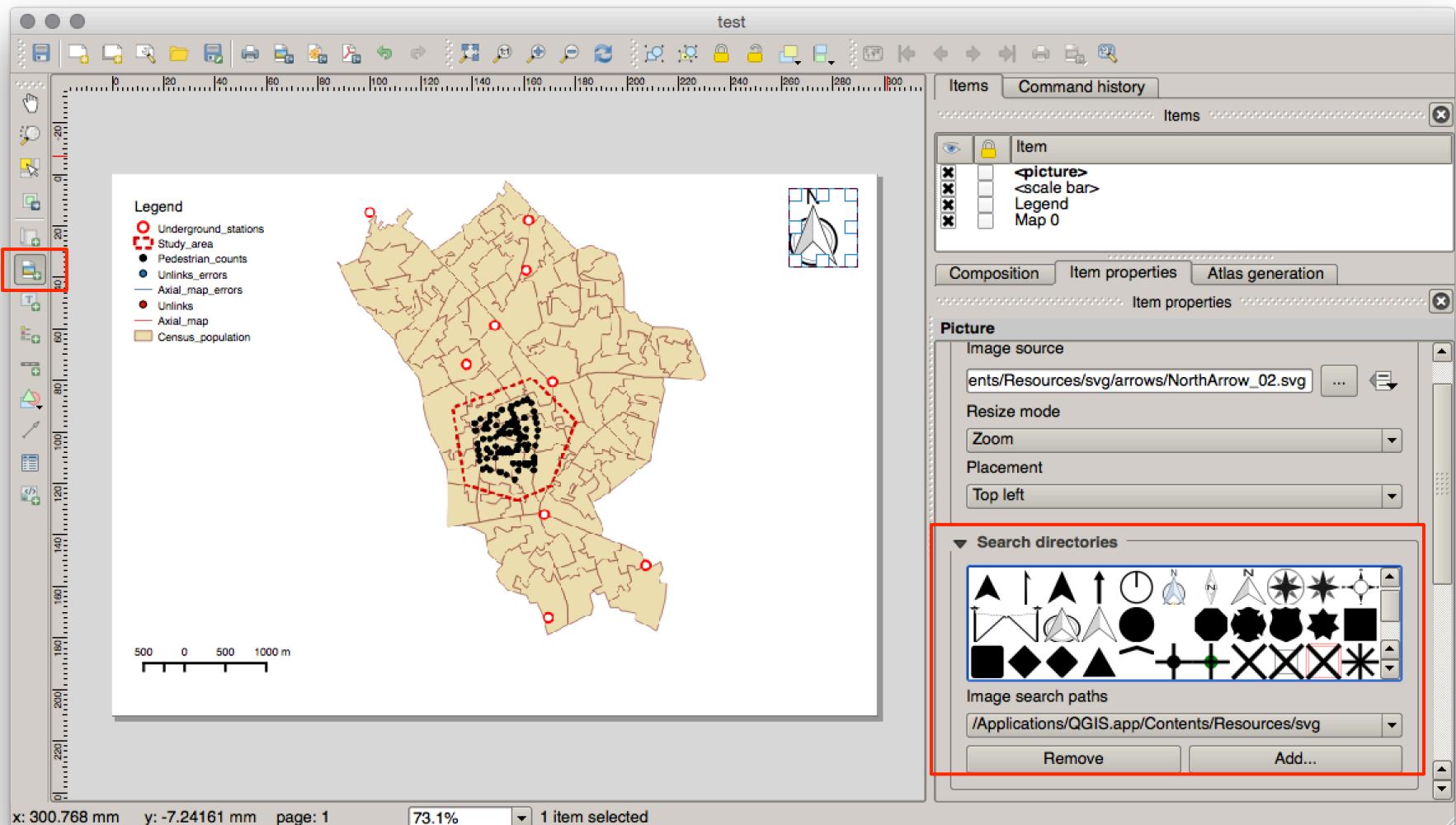
Print composer

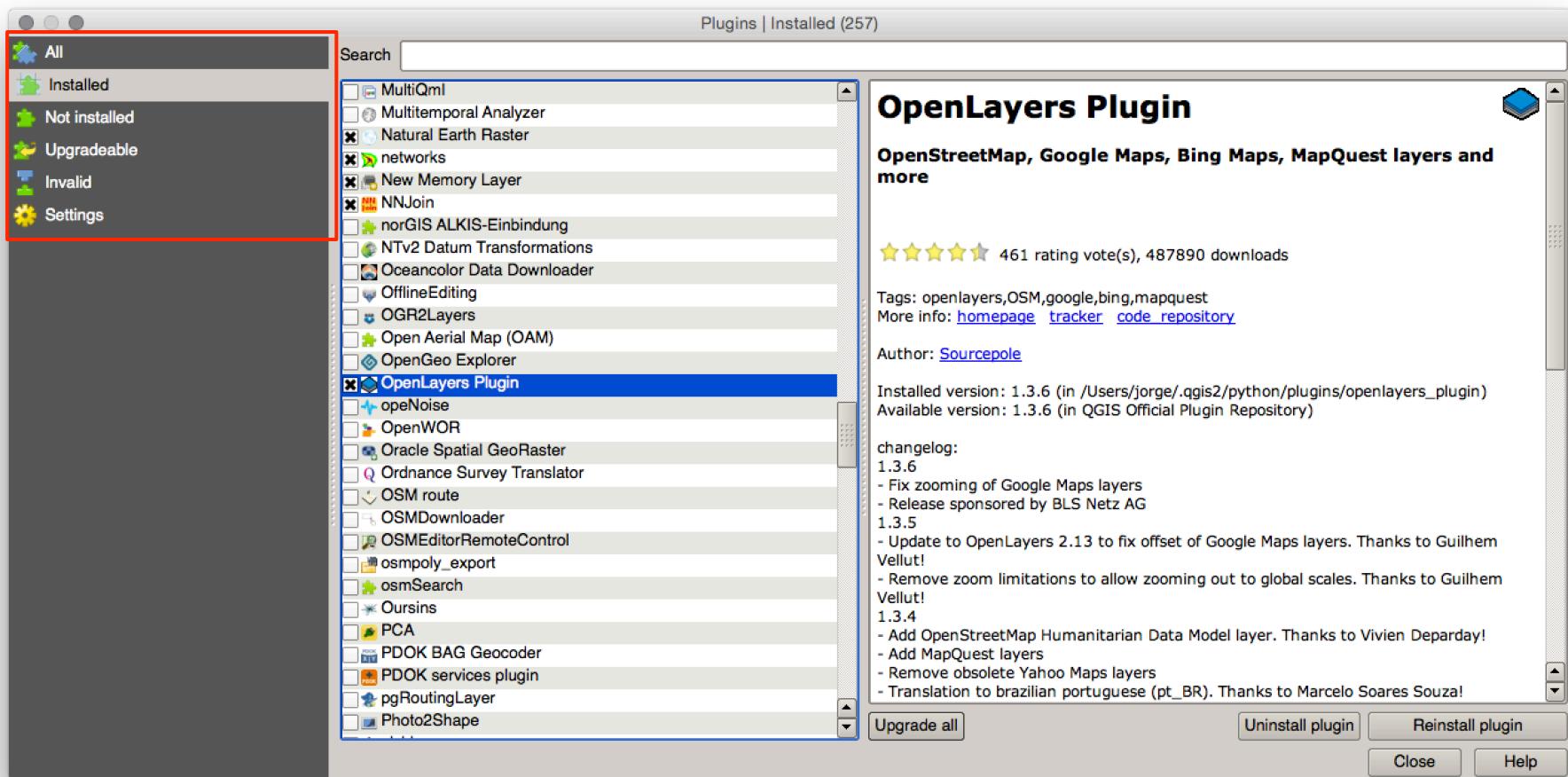


Print composer



Print composer





- Processing
 - fTools
 - GDALTools
 - OpenLayers
 - Dbmanager
 - Digitizing tools
 - Dissolve with stats
 - NNJoin
 - New Memory Layer
 - Concave Hull
 - Contour plugin
 - Heatmap
 - Point sampling tool
 - Table manager
 - Spatial Join
 - ...
- (not a comprehensive list, and there are alternatives to some of the above)

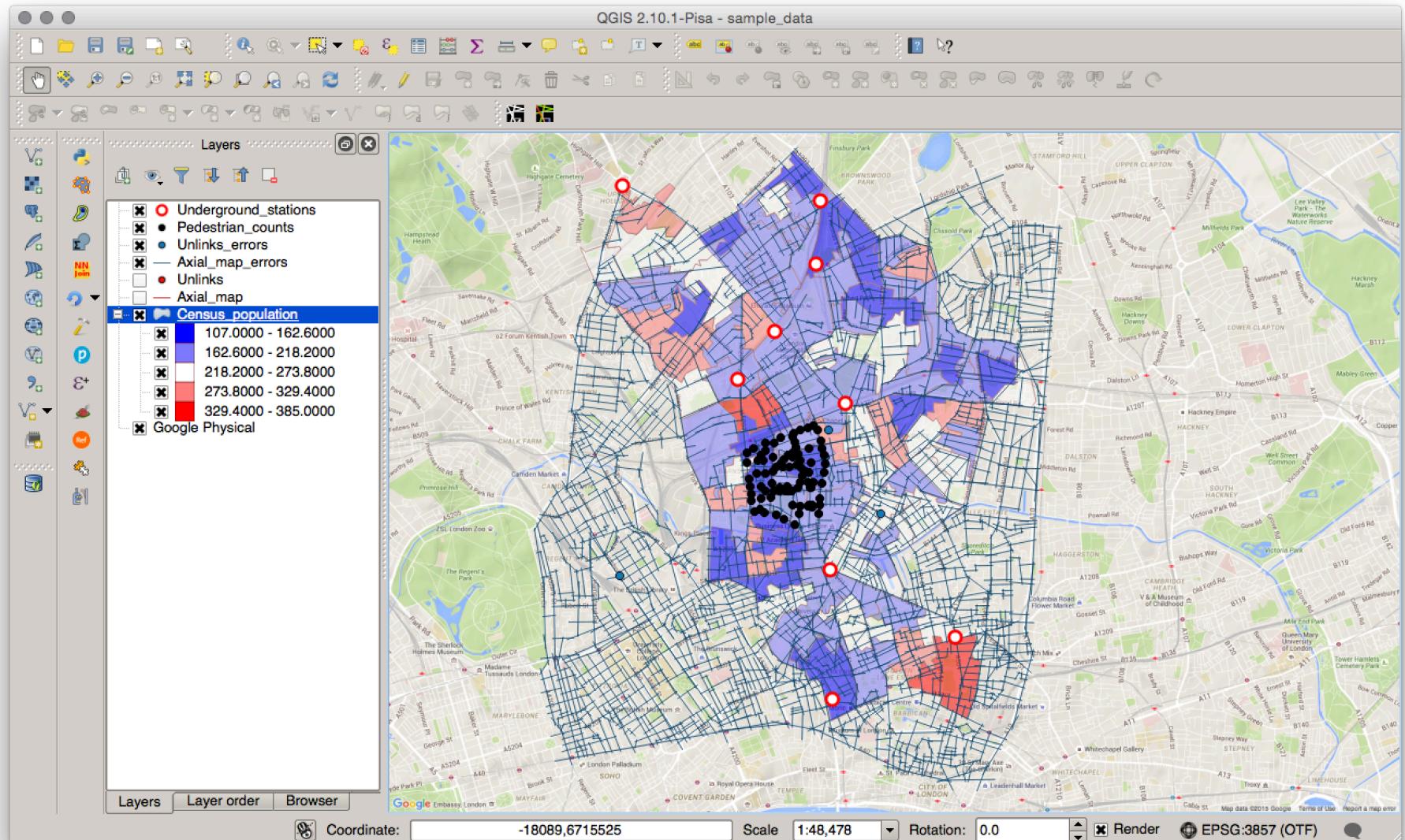


<http://www.qgistutorials.com/en/>

By Ujal Gandhi

- Making a Map
- Importing Spreadsheets or CSV files
- Basic Vector Styling
- Working with Attributes
- Calculating Line Lengths and Statistics

Or a free exploration of the software...





Apresentação de estudos aplicando space syntax e GIS

- Maps and comparative historical analysis
- Atlas for comparative visualisation
- High resolution modelling
- New models: whatever makes sense and works
- VGA & DepthmapX with QGIS
- Batch analysis (yes, via Rhino or QGIS)
- Rhino + depthmapX
- Edge effect

Q&A

- Introduction to QGIS
- Hands-on experience of the SST
- Interpretation and application of the results
- QGIS solutions for targeted issues
- Overview of current research work

**Your questions,
comments
and suggestions!**

Jorge Gil - jorge.gil@ucl.ac.uk

Workshop – QGIS + 'Space Syntax Toolkit'

Name:

Space Syntax Toolkit wish

General workflow or software specific issues (e.g. depthmapX, GIS, CAD, statistics, images)

What is your biggest frustration? (“Not again! I hate this...”)

What is your dream tool/feature? (“If only it could...”)

What is your favourite tool? (“Can't live without this one...”)

Your contribution to the SST repository!



Datastore not set even when selecting a folder #130

! Open **jorgegil** opened this issue 11 hours ago · 0 comments

 jorgegil commented 11 hours ago

Collaborator 

When opening a project or loading a shape file, the datastore field in "Graph Analysis" is not automatically updated with its location. Even if the user selects the datastore manually in the dialog box, it is not set in the "Graph Analysis" panel.

This seems to happen when the folder where the data is kept has non standard characters, such as accents, brackets, etc. Especially common in non-english systems.

Labels 

bug

Graph Analysis

Milestone 

No milestone

Failed to Import Analysis Results (Mac OSX) #129

! Open **JJFriesen** opened this issue 8 days ago · 3 comments

 JJFriesen commented 8 days ago



Using QGIS 2.10.1-Pisa and the Spatial Syntax Toolkit for QGIS version 0.1.3 on a 2010 Macbook Air I have encountered two problems.

1) Often when verifying my axial map layers the verification freezes before producing a list or errors.

2) When I attempt to calculate a segment or axial analysis for my own maps or for the sample maps provided on this hub (the ones without errors) using the DepthMapX remote function I receive this error message: "Failed to import the analysis results"

Labels 

bug

duplicate

Graph Analysis

Milestone 

No milestone

Don't forget to submit your work and participate at
the **11th Space Syntax Symposium in Lisbon!**

And register on the **space syntax mailing list** for
the latest information and “gossip”
and to be able to ask questions to the experts:

<https://www.jiscmail.ac.uk/cgi-bin/webadmin?A0=SPACESYNTAX>

Thank you!

jorge.gil@ucl.ac.uk