

Ordnance Survey

OS OPEN MAP LOCAL

Getting started guide

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1.1 Introduction

From the end of October 2016, OS Open Map Local will be available as both a raster version and a vector version as previously. This getting started guide illustrates how to load both raster and vector versions of the product into several GI applications.

1.2 Downloaded data

OS OpenMap-Local raster data can be downloaded from the OS OpenData web site in GeoTIFF format. This format does not require the use of geo-referencing files in the loading process. The data will be available in 100km² grid zip files, aligned to National Grid letters.

OS OpenMap-Local vector data can be downloaded from the OS OpenData web site in either ESRI Shapefile format or in .GML format version 3.2.1. It is available as 100km² tiles which are aligned to the 100km national grid letters, for example, TQ. The data can also be downloaded as a national set in ESRI shapefile format only. The data will not be available for supply on hard media as in the case of some other OS OpenData products.

- **ESRI shapefile supply.**

The data is supplied in a .zip archive containing a parent folder with two sub folders entitled DATA and DOC. All of the component shapefiles are contained within the DATA folder. The data is supplied as 'hairy tiles' in that no feature is broken at the tile edge, but is included across the tile boundary if it extends into an adjacent tile. A data holding comprising of more than one 100km² tile will contain duplicate features which may need to be removed depending upon the user requirement.

- **GML supply.**

The data is supplied in a .zip archive containing a parent folder with two sub folders entitled DATA and DOC. The data is supplied in the DATA folder as one .GML file covering the whole area. The data is supplied as '**hairy tiles**' in that no feature is broken at the tile edge, but is included across the tile boundary if it extends into an adjacent tile. As with the shapefile supply, a data holding comprising of more than one 100km² tile will contain duplicate features which may need to be removed depending upon the user requirement.

1.3 Media

There are currently no plans to make this product available on hard media supply.

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2.1 QGIS

It is assumed that the user will have already set the default co-ordinate reference system in QGIS to British National Grid (EPSG 27700). Instructions of how to do this can be found in the QGIS Getting Started Guide;

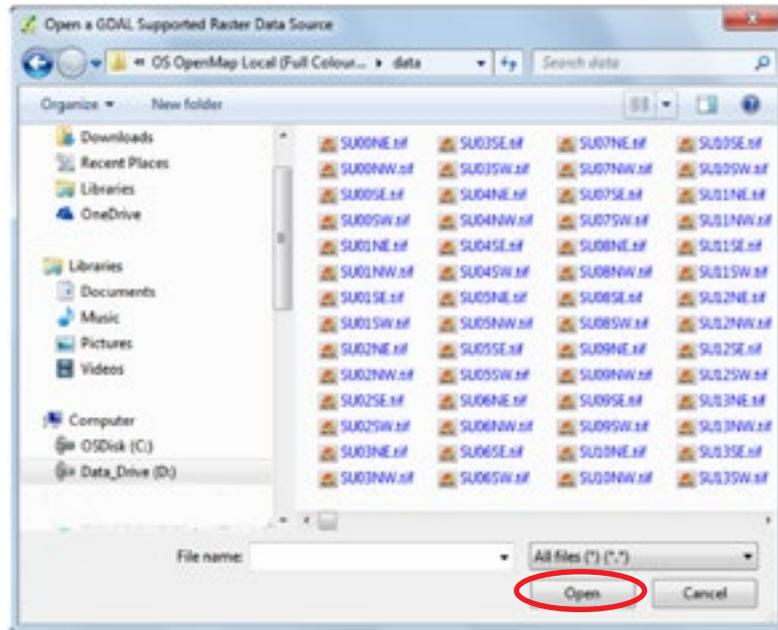
<http://www.ordnancesurvey.co.uk/docs/support/opensource-gis-guide-04-qgis-intro.pdf>

2.1.1 Loading and Displaying GeoTIFF supply

Open QGIS. Select 'open raster layer' from the left hand toolbar.



In the next window, click '**browse**' and navigate to the folder where the OS OpenMap-Local GeoTIFF files are located.



Select one or several GeoTIFF files as required. Once selected, click '**open**'.

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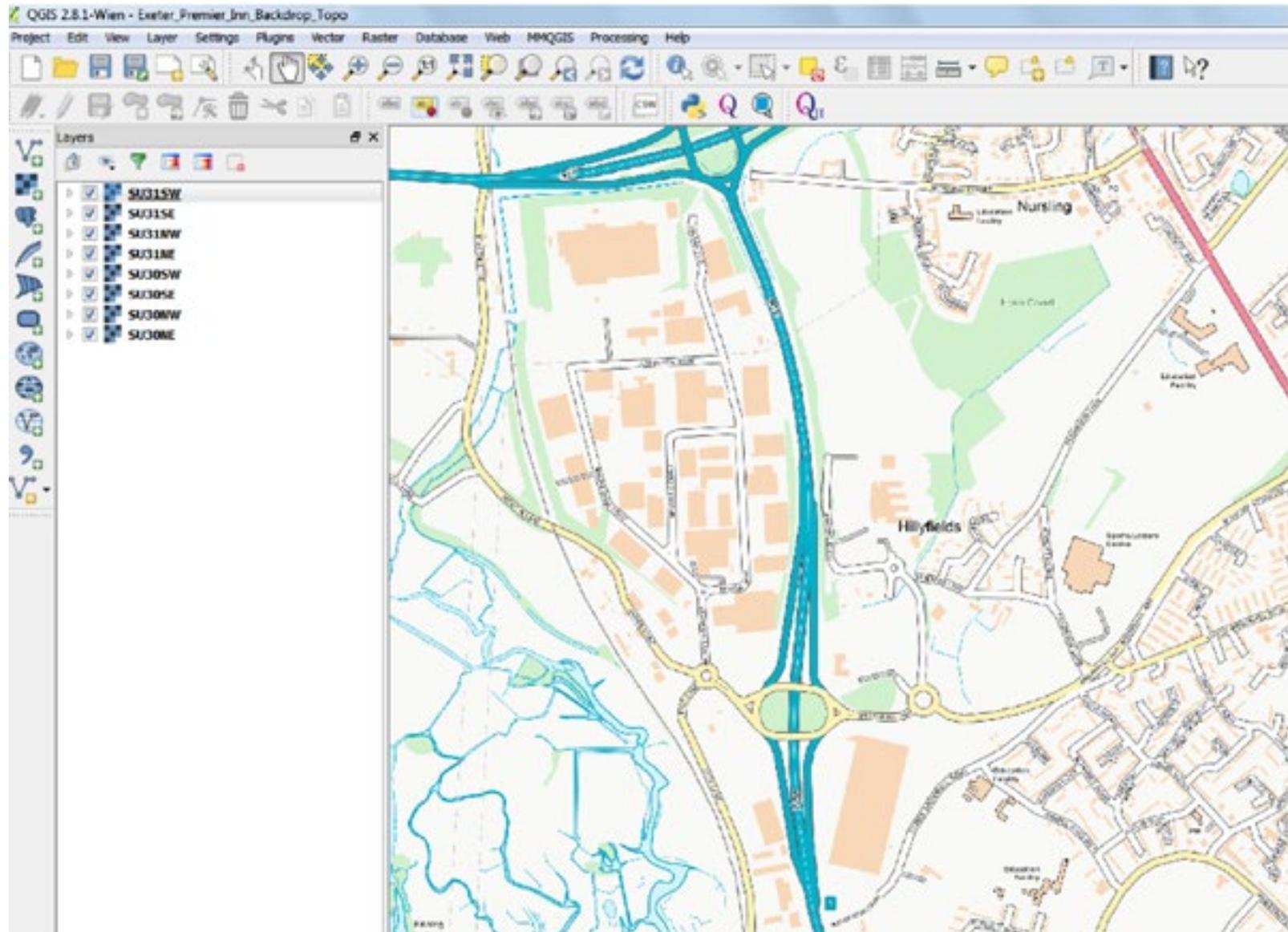
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The files will then appear in the QGIS map window.



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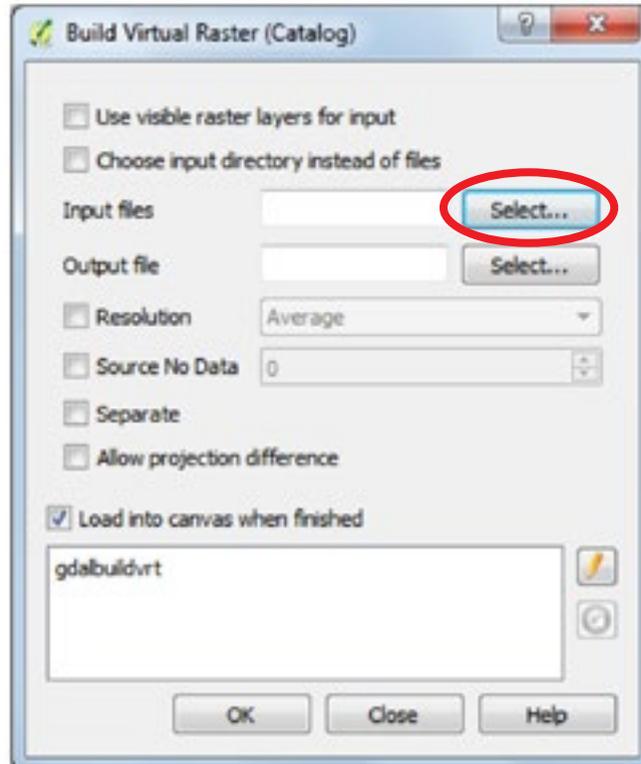
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Zoom to the desired map scale using the zoom buttons or set the scale using the drop-down option at the bottom of the window. It is recommended to set the viewing scale to 1:5000 or slightly less.

As an alternative to loading the GeoTIFF files one at a time or in groups, it can be quicker and easier to create a virtual raster table (VRT) to load the data.

In the QGIS main menu, select '**Raster**' and then in the drop-down menu select '**build virtual raster (catalog)**'. In the resulting window, the user has the option of selecting a folder containing all the raster GeoTIFF files, or the user can simply select several files with which to build the virtual raster table. It is highly recommended, for OS OpenMap-Local, to keep the maximum size of the VRT file to a 100km² grid square, for example, SU. In some cases, the maximum number of tiles will be smaller than this.



The user also has the option of loading the virtual raster table when finished. Once the choice is made click '**select**' and then navigate to the selected folder.

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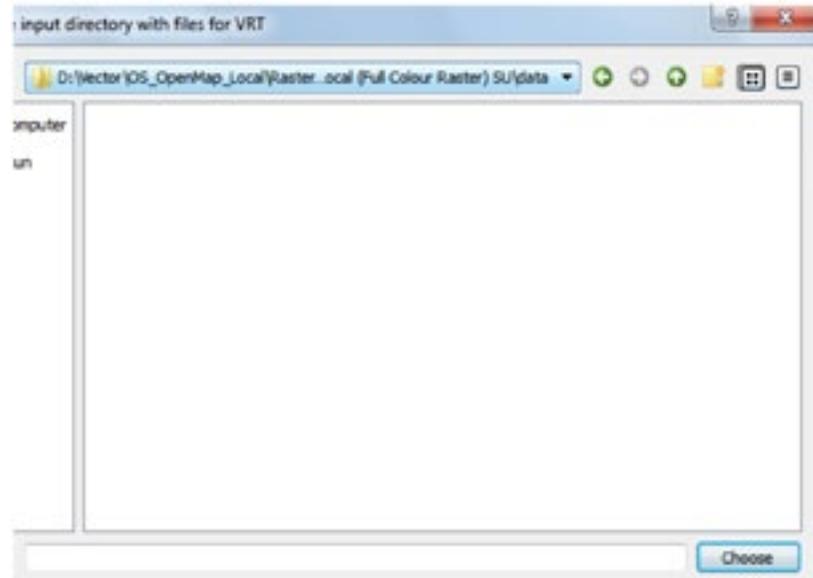
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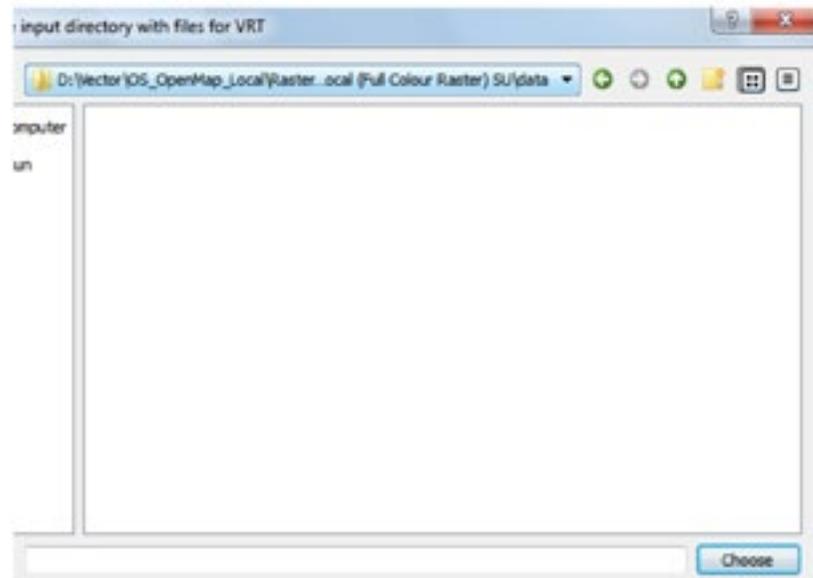
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In this case, an input folder is being selected to compile the VRT file.



It is then necessary to specify the name and location of an output VRT file. It is normal procedure to place the VRT file in the same folders as the GeoTIFF files.



Once the user is happy with the name of the VRT file and its location, click **'Save'**.

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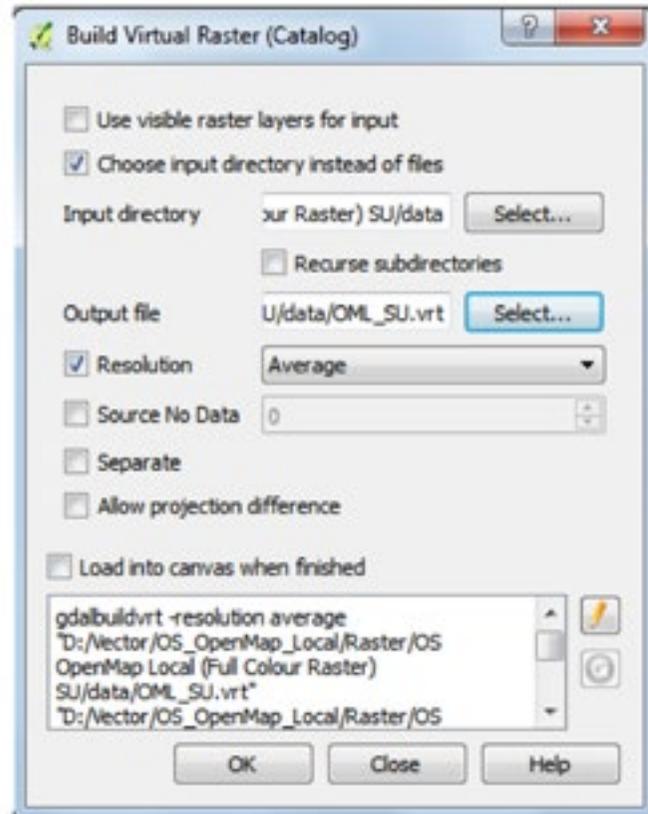
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The dialog box is now populated with the data required to construct the VRT file.



When satisfied, click 'OK'. The process should now start and run to completion. It is important to note that in testing with the beta release data, the actual maximum number of OML raster tiles that could be included in a VRT file was considerably less than a 100km² grid tile, as indicated previously in this guide. This is because there are 400 separate GeoTIFF files within a 100km² tile and the actual size of the GeoTIFF file does vary according to the density of detail in the area which it covers. The user must experiment with their own system to find the optimal number of tiles for a VRT table.

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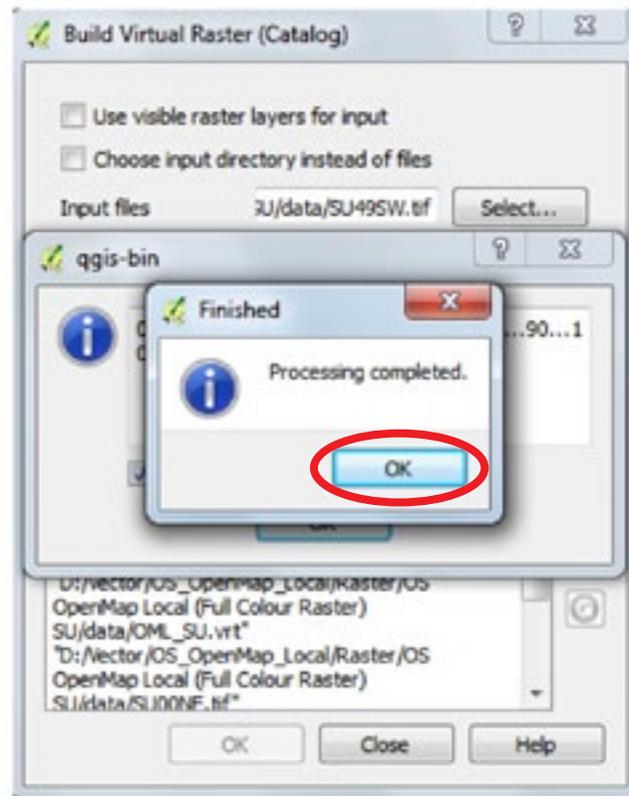
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The user can now click '**OK**' twice and then close the Build Virtual Raster catalog dialog box.

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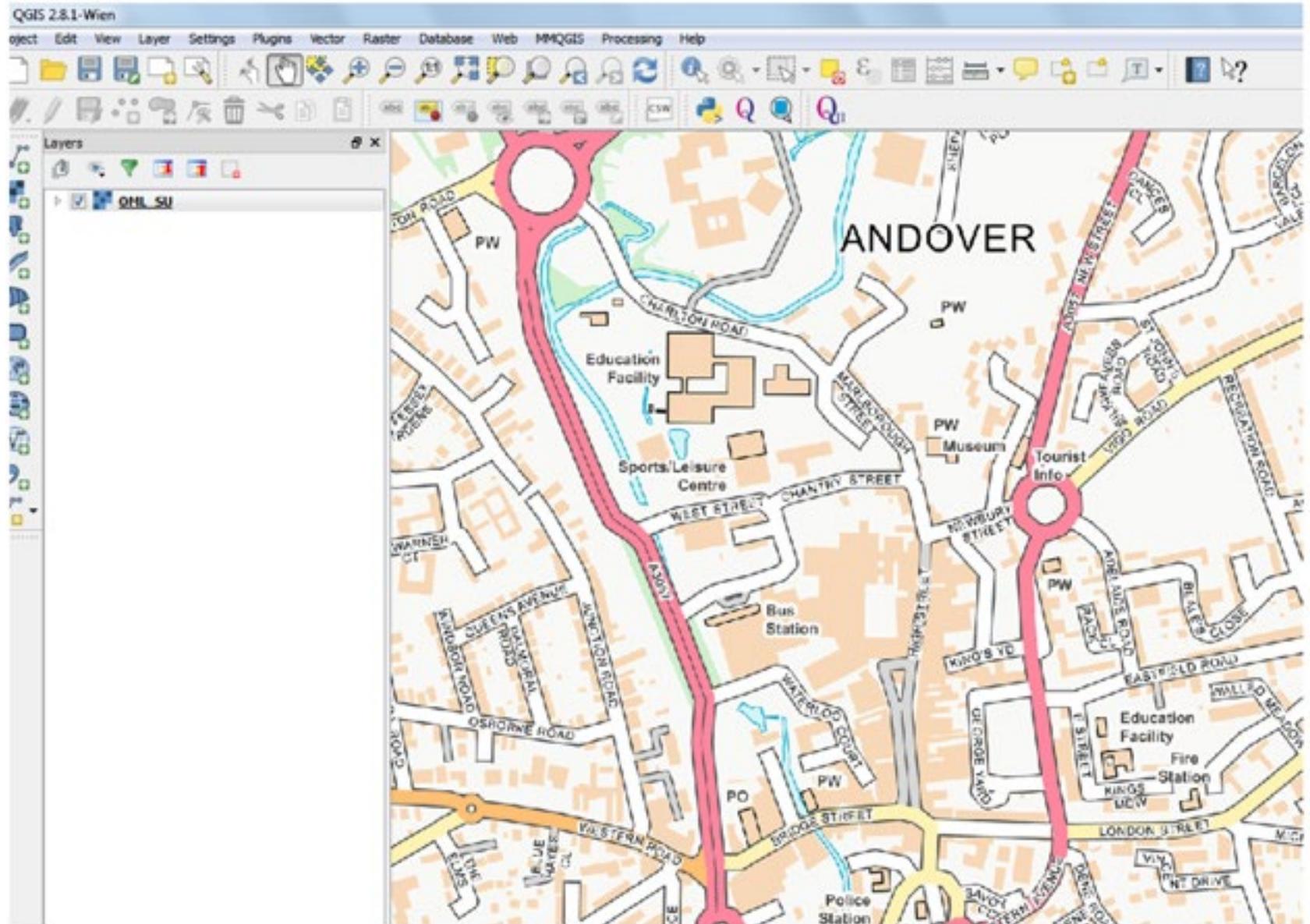
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The OS OpenMap-Local raster data should display in a similar fashion to the example below, if the 'load data into canvass when finished' option was ticked in the building dialog window. If this option was not selected, the VRT file will have to be loaded manually by selecting the load raster data button as described previously and then selecting the .VRT file just constructed. For best viewing results, set the viewing scale to 1:5000 or slightly less.



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2.2 ArcGIS ArcMap Desktop

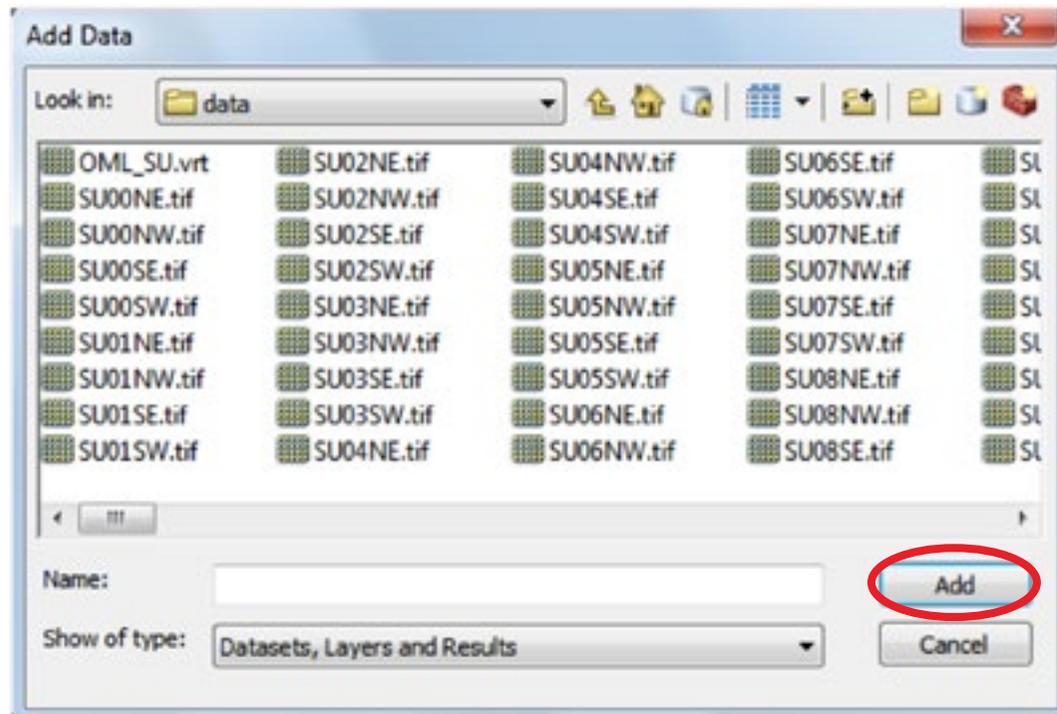
For the purposes of this guide, it is assumed that the user is familiar with the procedure of creating a file geodatabase within ESRI ArcGIS. A file geodatabase is used to contain a raster catalog. The procedure for creating a raster catalog will be described later. The construction of a file geodatabase is described in the loading of the vector version of OS OpenMap-Local section of this guide.

2.2.1 Loading and Displaying GeoTIFF supply

Open ArcMap. To load the GeoTIFF file on an individual basis, or in small groups, click **'Add Data'**.



In the dialog box, browse to the folder where the GeoTIFF files are to be found. If the folder is not in the list of connected folders, the user will have to create a new folder connection to it in the usual way. Select the GeoTIFF files required and click **'Add'**.



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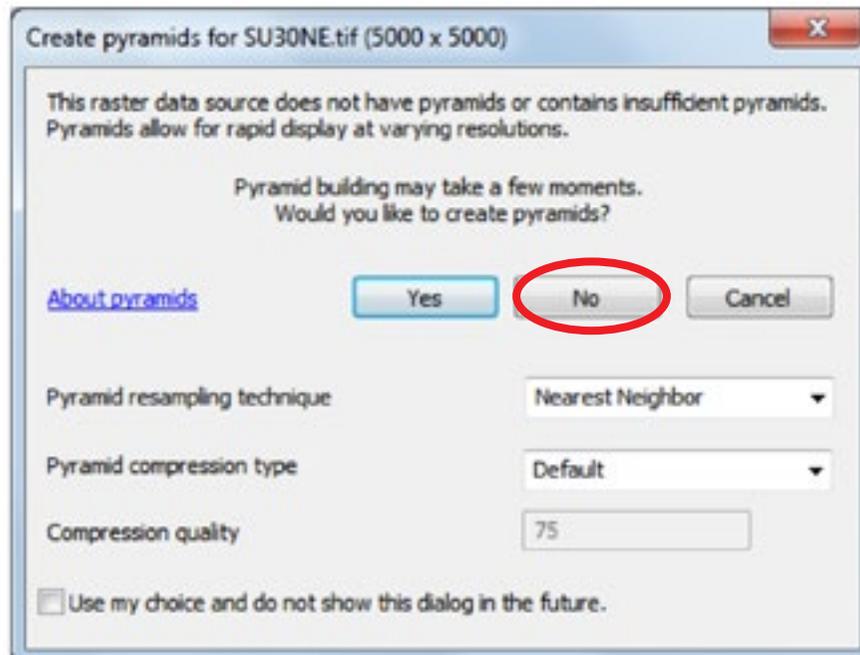
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In the next dialog box, the user should consider whether or not pyramids should be created before loading the raster data. In this case we are not going to create pyramids with the data.



Click '**no**' on this dialog box. This must be repeated for all the raster files selected to be loaded. The data loaded should appear in a similar fashion to what is displayed in the next example. Select a suitable scale for viewing the data, probably around 1:5000 or less.

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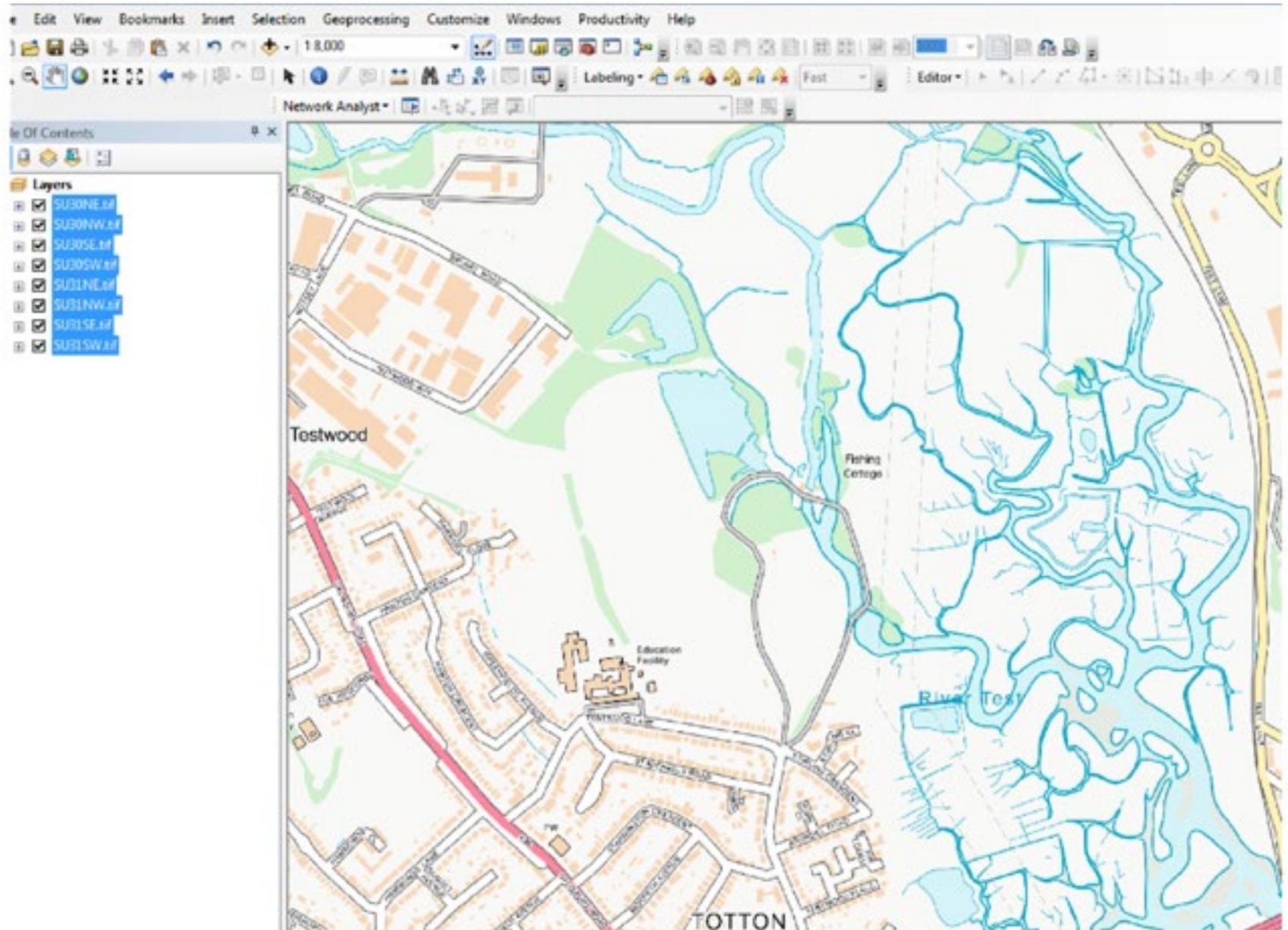
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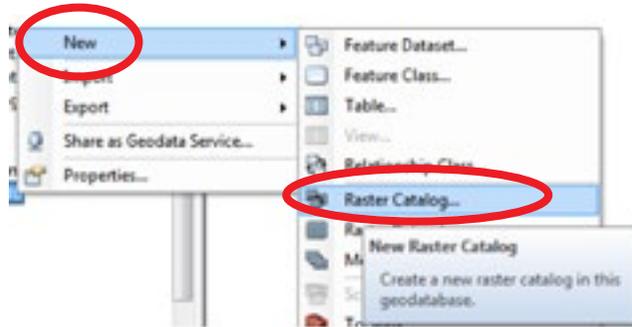
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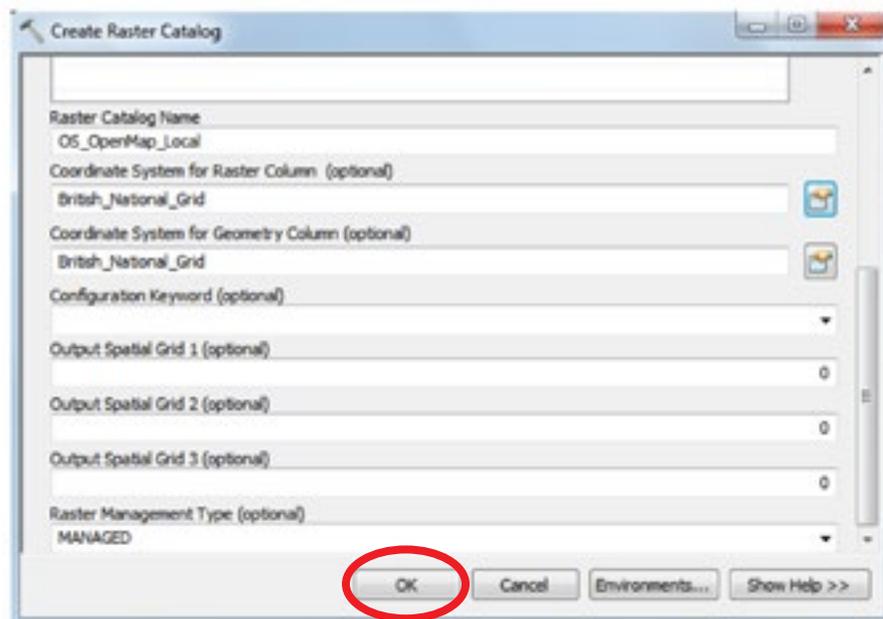
The best way of loading multiple raster files in ESRI ArcMap is to use a raster catalog to store the data. This method works from within a file geodatabase, which can also be used to store the vector version of OS OpenMap-Local if required. Details of how to create a file geodatabase in ArcCatalog are described in the loading of the vector version section later in this guide.

Assuming the user has a file geodatabase already created to hold the data, the following procedure can be used to create a raster catalog to hold the raster files.

Open ArcCatalog. Right-click on the file geodatabase that has been created to fold the data and select '**New**' '**Raster Catalog**'.



In the resulting dialog box, the user must give the raster catalog a name. In this box one can also specify a co-ordinate reference system and if the catalog will be managed or unmanaged. A managed catalog will physically contain all the raster tiles, and will take longer to create. However, if the file geodatabase is to be shared, the data will be available with the database and can be shared more easily with other users. In the example we have created a managed catalog with the British National Grid co-ordinate reference system. Click '**OK**' when finished.



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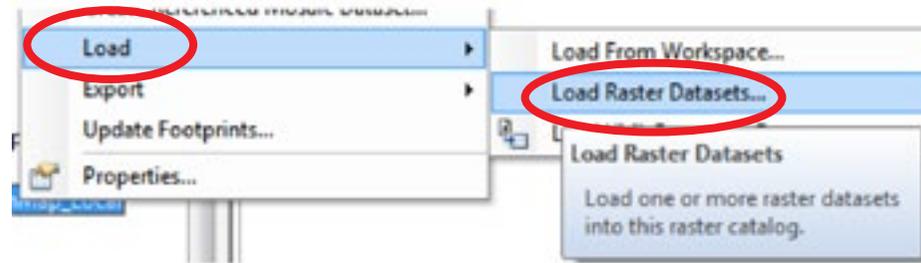
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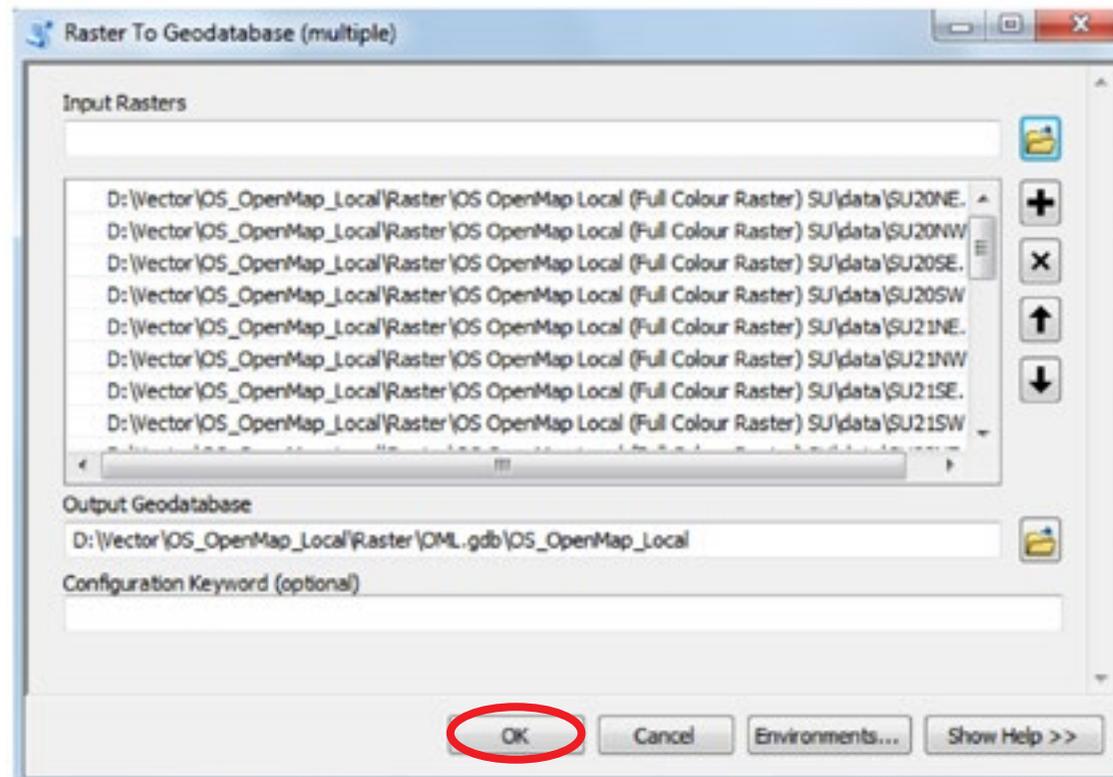
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Once the catalog has been created it will appear as an entity within the file geodatabase. Refresh in ArcCatalog to see if it has been created. To load the raster files into the catalog, right-click the raster catalog and select '**load raster datasets**'.



Browse, in the next dialog box, to the folder where the raster datasets are stored and select the ones required for use. Click '**OK**' when finished. The list of selected raster will now appear in the dialog box.



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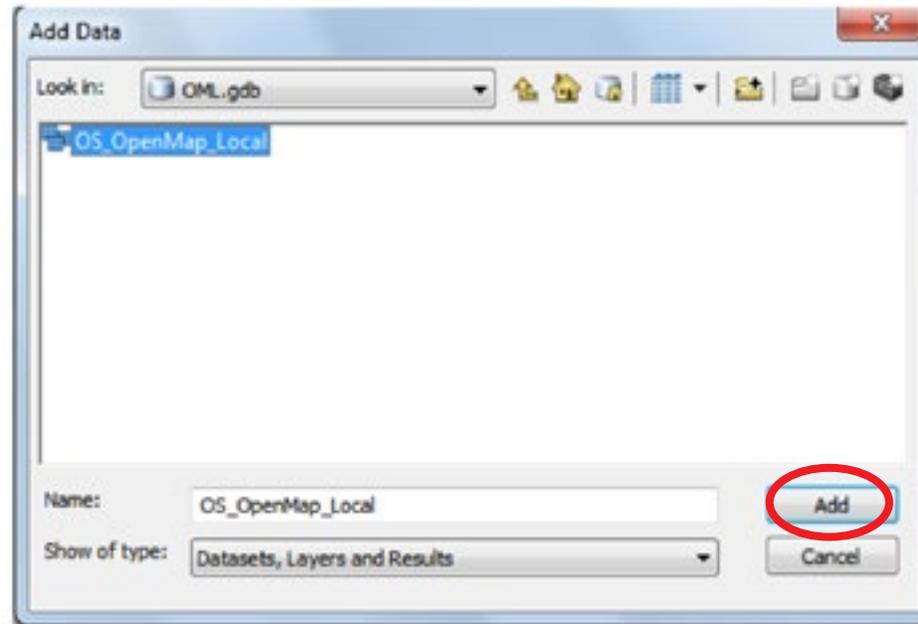
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The output geodatabase will normally be the correct one where the raster catalog is located, so the user can then click '**OK**'. This process may take some time if there are many files to be loaded to the catalog, and the catalog which is being used is of the managed type. Once completed, the user will see the list of files in the catalog listed in the view pane of the main ArcCatalog window.

Name	OBJECTID
SU20NE.tif	1
SU20NW...	2
SU20SE.tif	3
SU20SW...	4
SU21NE.tif	5
SU21NW...	6
SU21SE.tif	7
SU21SW...	8
SU22NE.tif	9
SU22NW...	10

In ArcMap, select '**Add Data**' and then browse to the file geodatabase where the raster catalog is stored.

Select the raster catalog and then click '**Add**'. The data will now appear in the ArcMap main map window.



Select the raster catalog and then click '**Add**'. The data will now appear in the ArcMap main map window.

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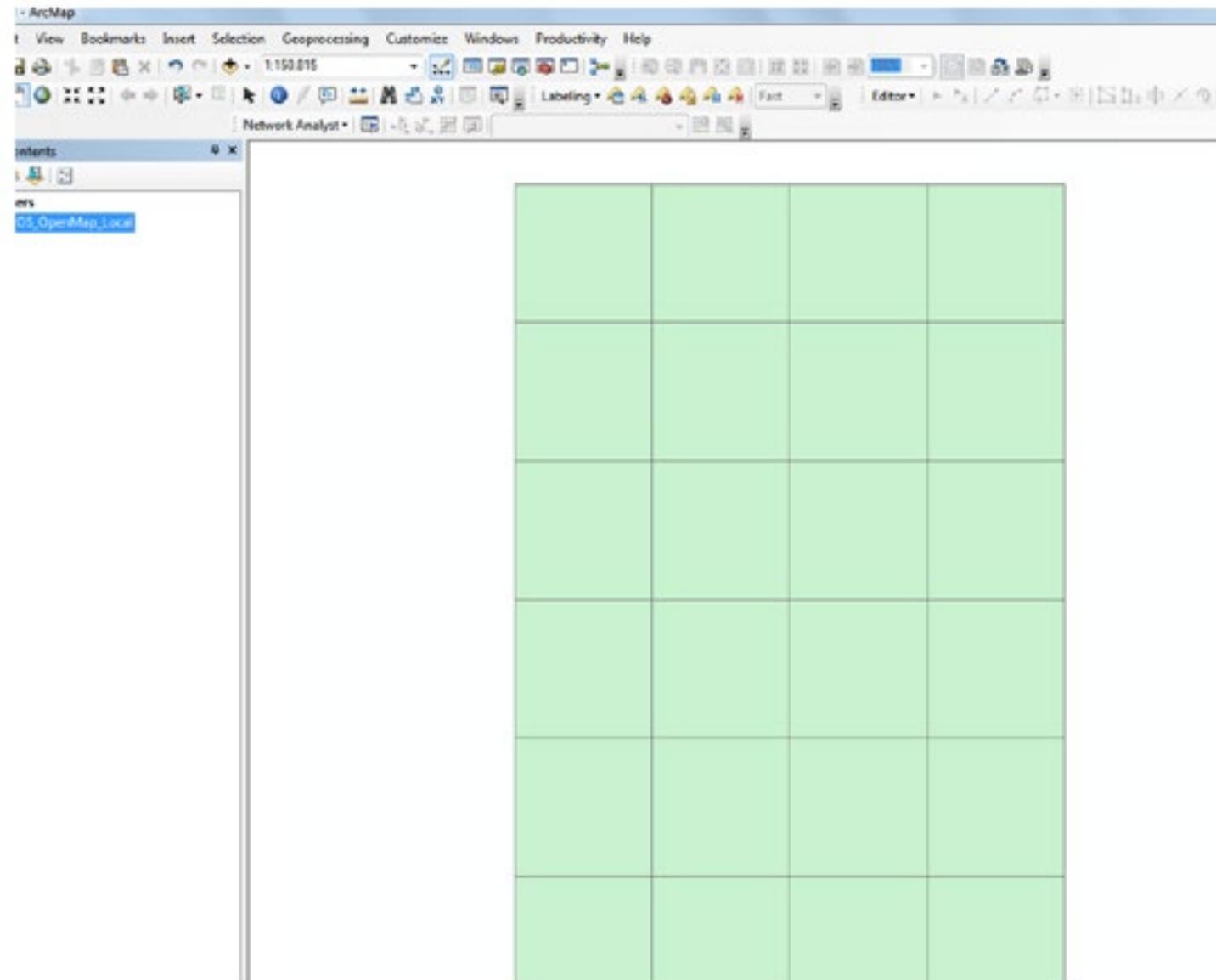
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If a grid similar to what is shown in the example below is seen, it means that the catalog contains over the maximum number of raster tiles set to be displayed in ArcMap, which then defaults to a wireframe grid.



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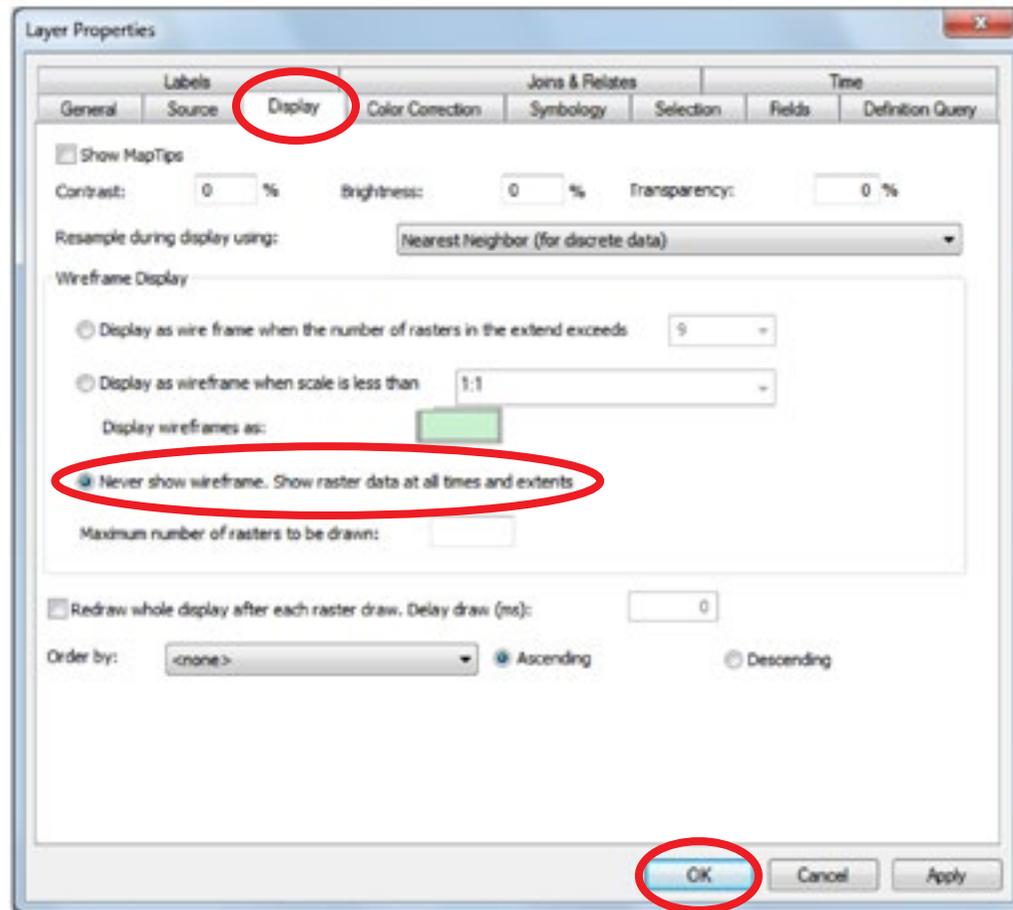
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If this happens, the wireframe mode should be turned off. Right-click on the raster catalog in the table of contents window, select **'Properties'** and then select the **'Display'** tab. Click on the **'Never show Wireframe'** radio button. Then click **'OK'** or **'Apply'**. The raster data should now display correctly.



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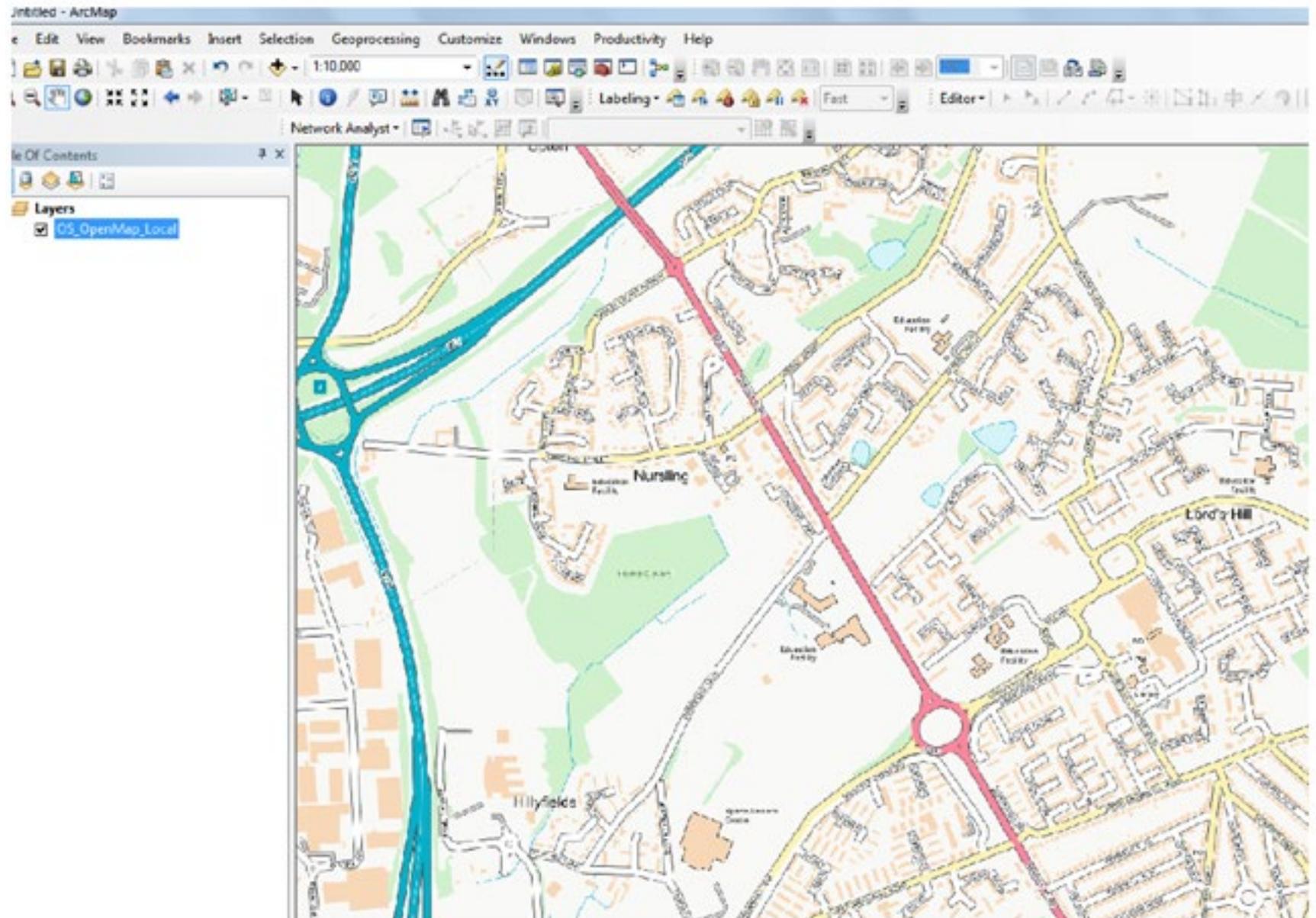
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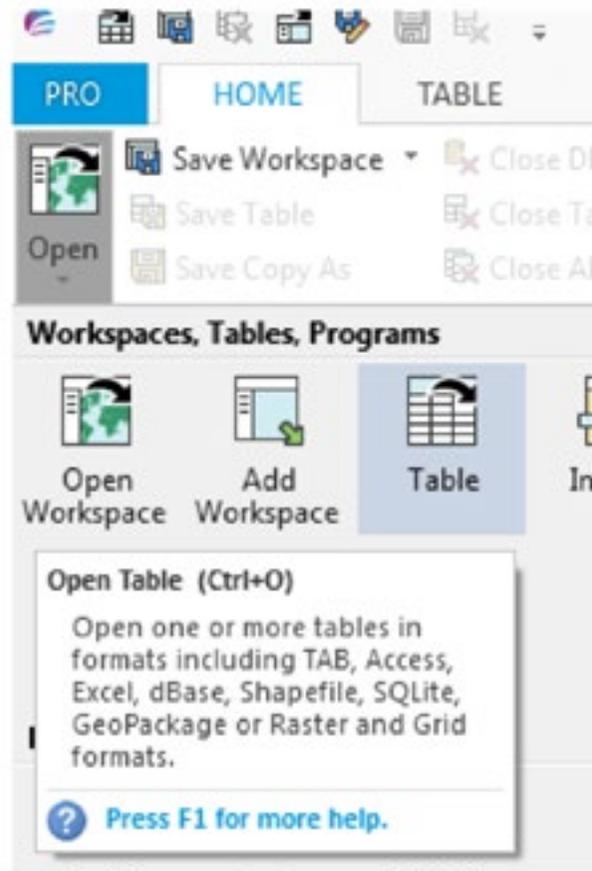
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2.3 MapInfo Professional

For the purposes of this guide, it is assumed that the user is familiar with using MapInfo Professional and knows how to perform certain functions required to handle raster data. MapInfo Professional 64bit version 15.2.4 is being used in these examples. Users of the 32-bit version of MapInfo or those using earlier releases will see different screens to those shown here.

To open the GeoTIFF raster files, select Open Table either from the ribbon button list at the top of the screen or select the **'Home'** tab and select the table option.



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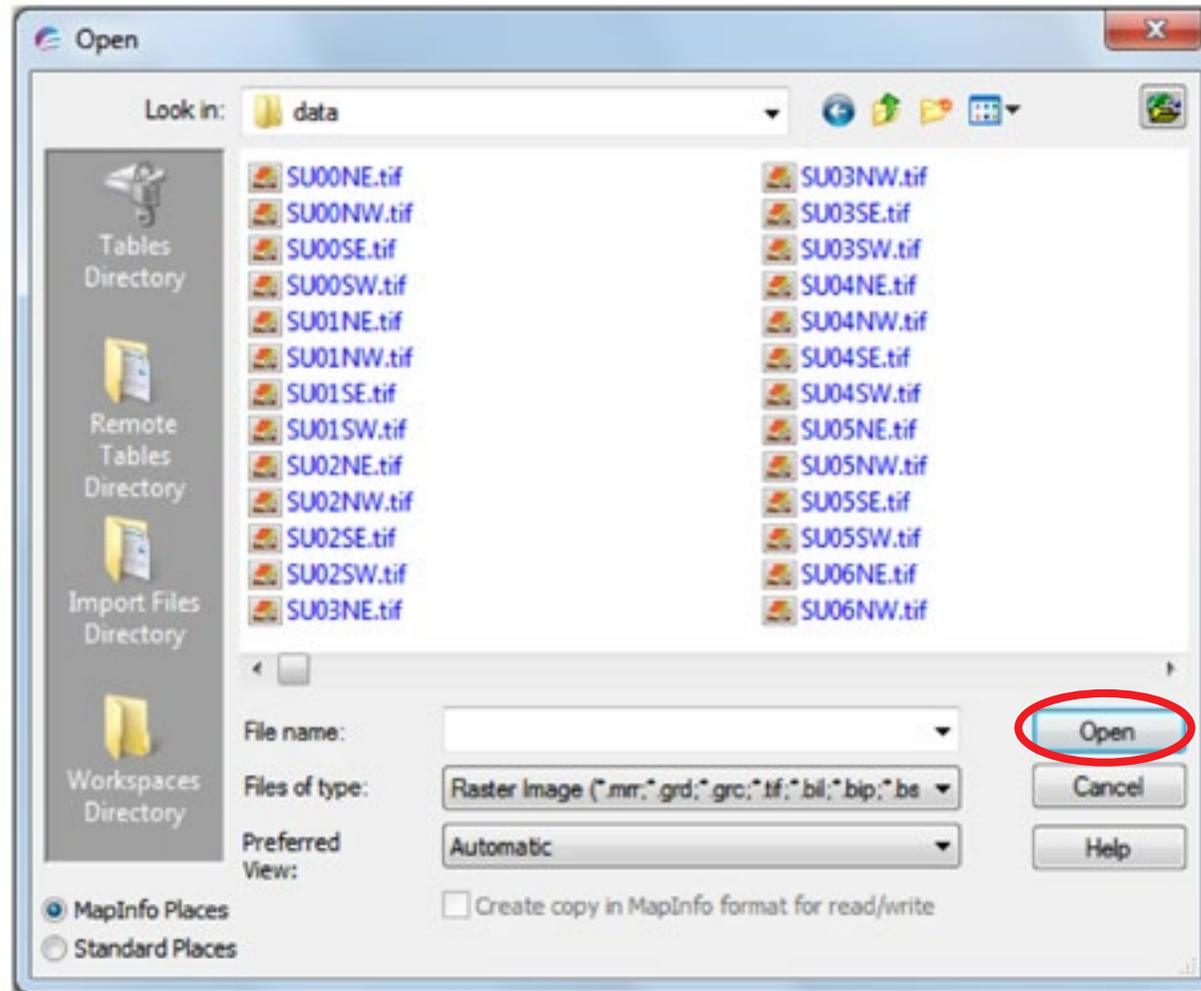
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In the next window, navigate to the folder in which the raster files are found. Initially, on a first load, the user will need to change the files of type to raster image from the default 'tab' type.



Select the number of raster tiles required and then click 'open'. The raster data is now displayed in the map window.

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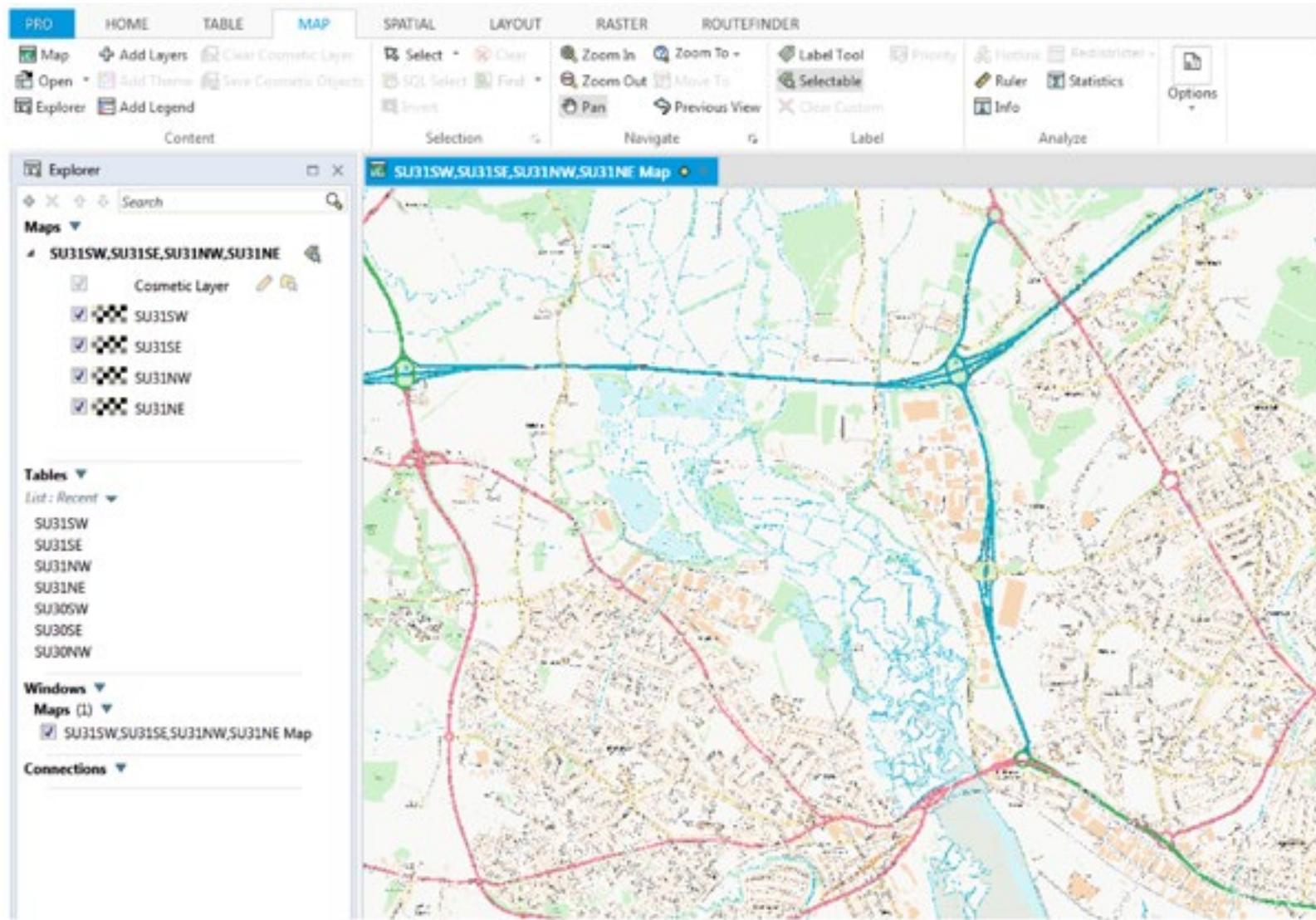
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MapInfo has loaded each of the raster tiles individually. Although this is normally OK for a small number of tiles, when working with large numbers of raster tiles and/or multiple layers of data, it is more efficient to create a seamless table in MapInfo to hold the data.

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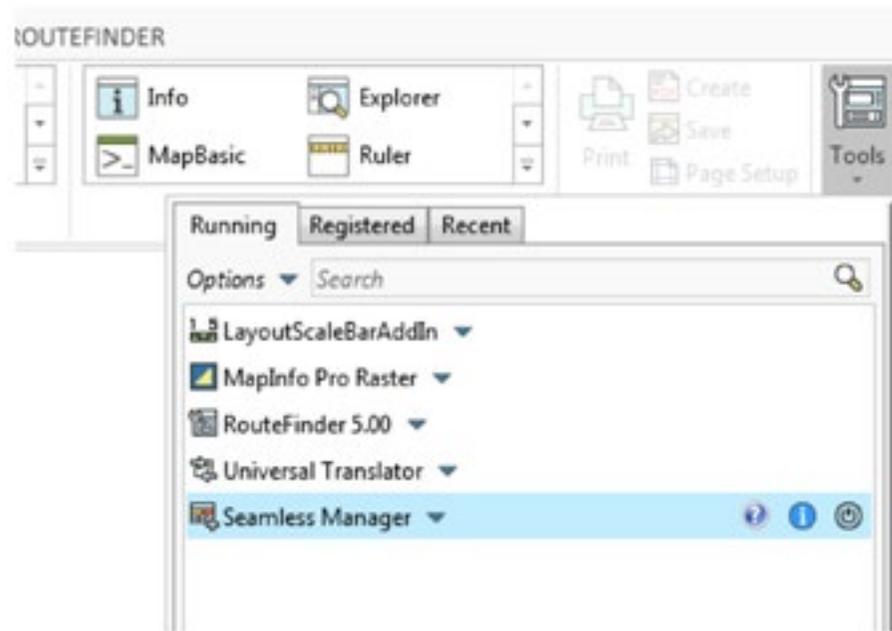
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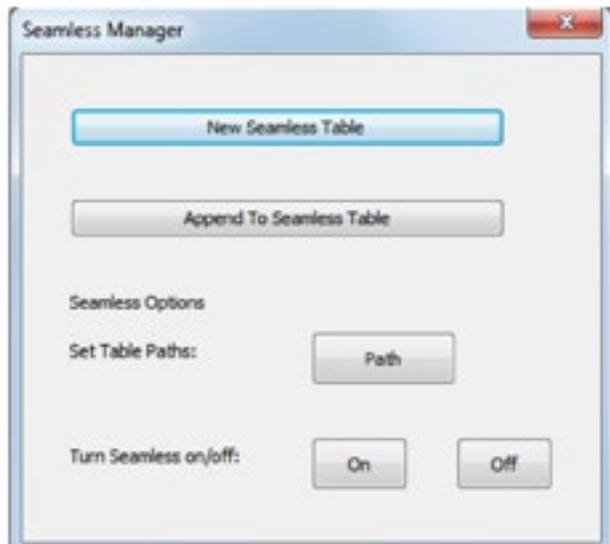
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The user will need to load the seamless table manager under the Tools button in the Home tab of MapInfo Professional.



The user must load at least one raster tile into the map window to start the process of creating a seamless table. Once this is done, double click seamless manager in the tools drop-down as shown above. The following window will appear.



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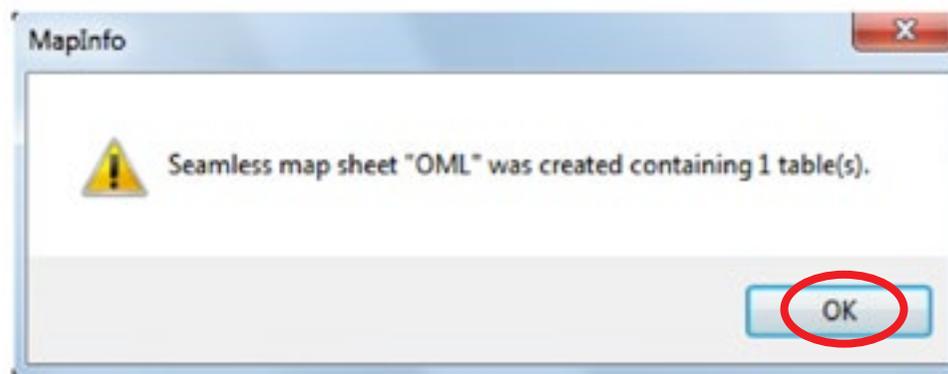
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Click **'New Seamless Table'**. Then select a folder in which to store the seamless table and give the table a name. Then click **'Save'**



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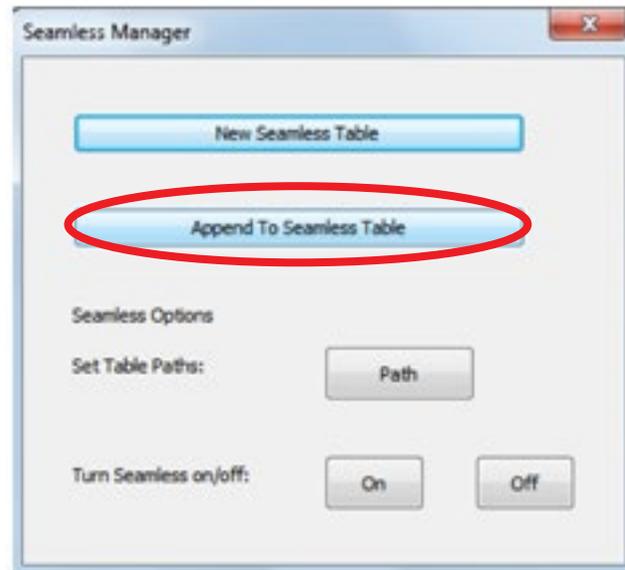
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MapInfo has now created a seamless table containing the one table that was loaded in the map window. The user can now add additional tables to the seamless table by appending additional tables to the one just created. This procedure works differently to the process used in earlier 32-bit versions of MapInfo. In MapInfo 64-bit, all the tables to be appended need to be loaded into the map window first.



This time click the '**Append to Seamless Table**' Option. The browse window will appear.

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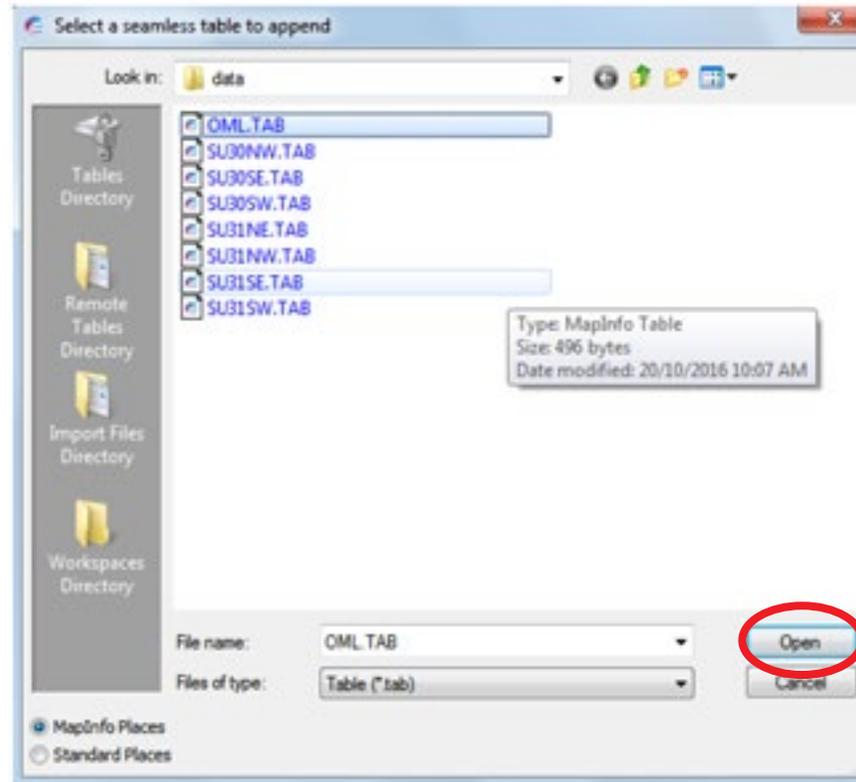
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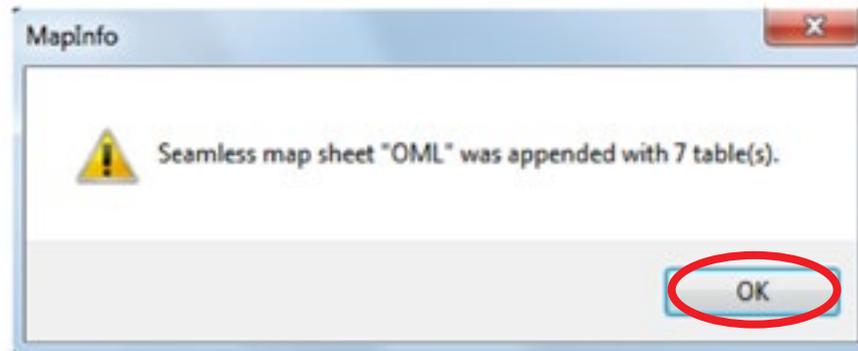
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Select the seamless table to be appended. In the example above it is '**OML.TAB**'. Click '**open**'. The following message will appear depending on the number of tables loaded into the map window.



From now on, the user can load all eight tables (in this example) at once simply by loading the seamless table. It is also important to note that the seamless manager will only work on tables created by MapInfo when loading in the original raster files. It will not work with GeoTIFF files directly.

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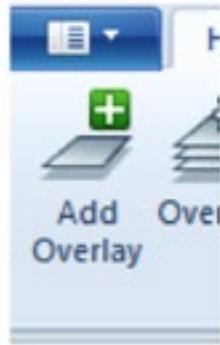
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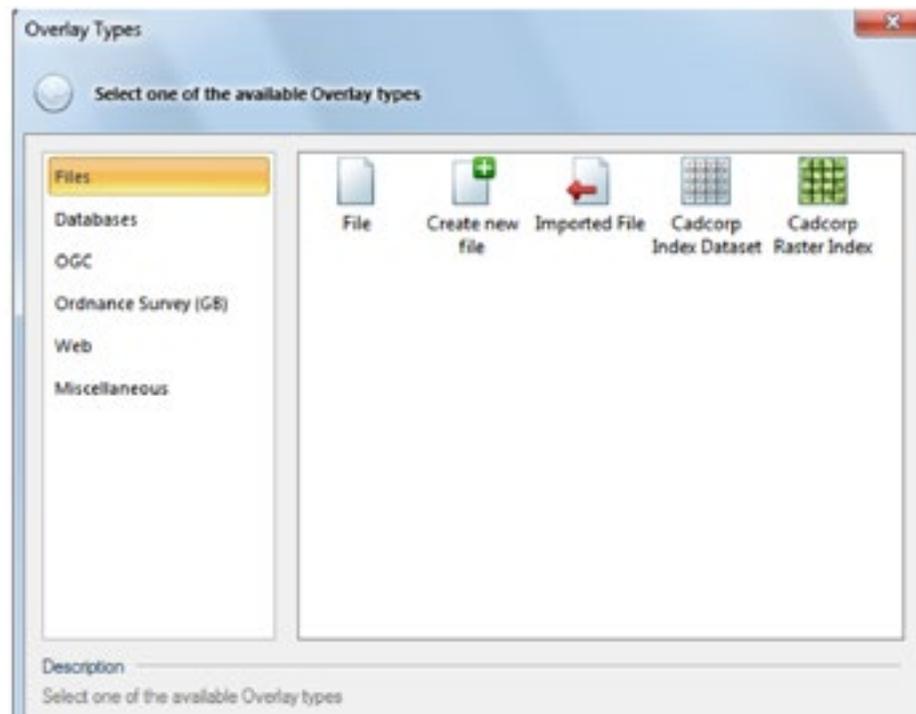
2.4 CadCorp Map Modeller

2.4.1 Loading and Displaying GeoTIFF supply

Open CadCorp Map Modeller. In the ribbon menu bar, select '**Add overlay**'.



In the next window, select '**File**' as the type of overlay to be opened.



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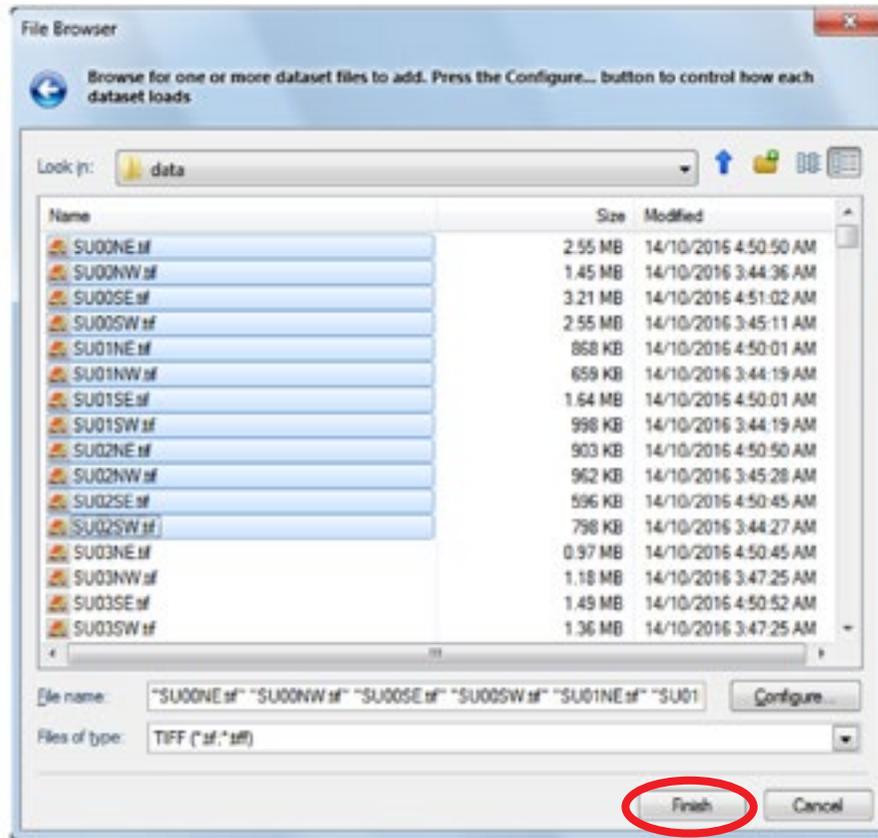
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Navigate to the folder where the data resides and select however many GeoTIFF files that are required to be loaded.



Click **'Finish'**.

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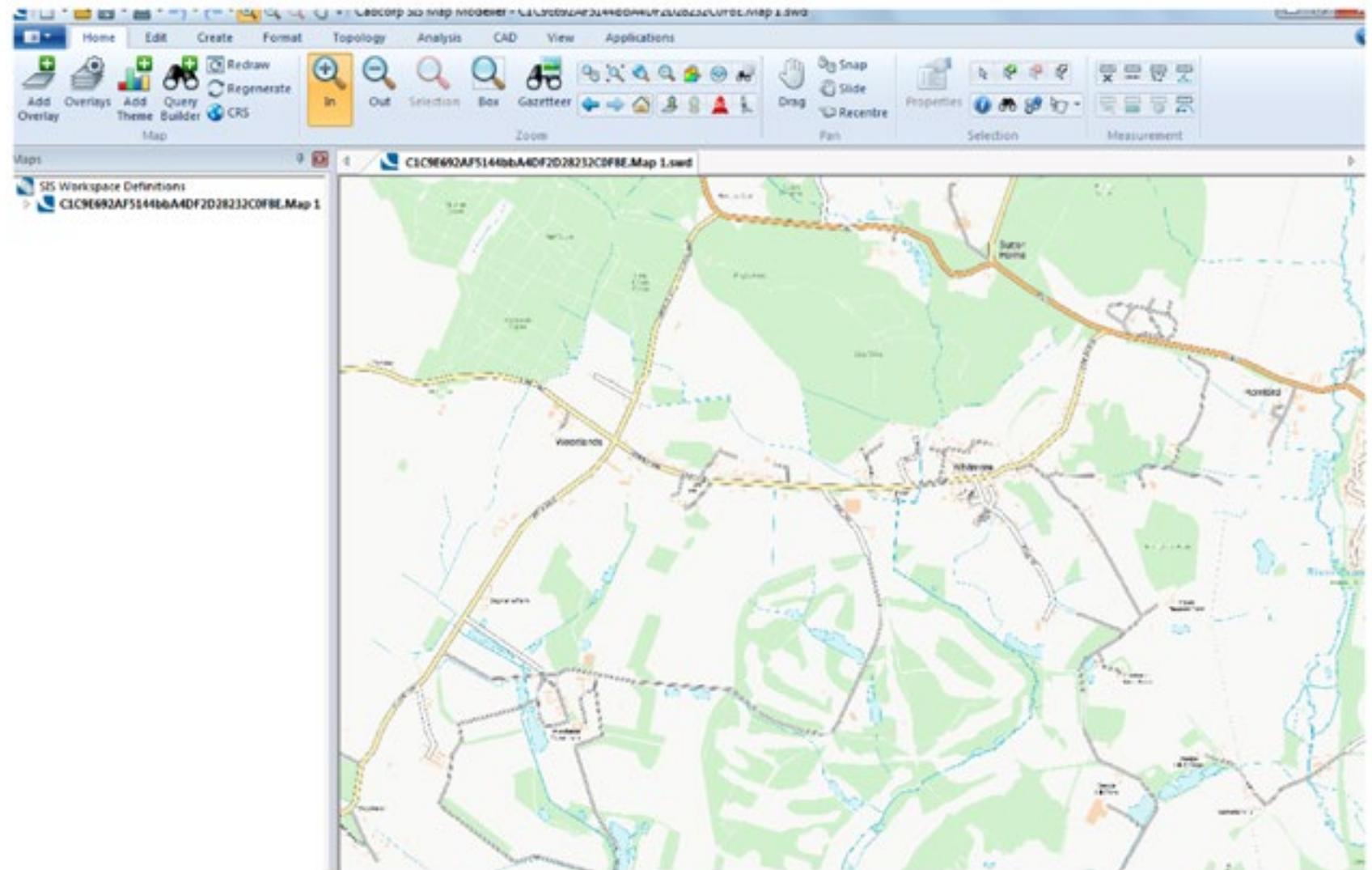
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The GeoTIFF files will load into the map window.



Alternatively, the user can drag and drop the GeoTIFF files directly into the CadCorp Map window.

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3 Loading OS OpenMap-Local Vector Data

3.1 QGIS

It is assumed that the user will have already set the default co-ordinate reference system in QGIS to British National Grid (EPSG 27700). Instructions of how to do this can be found in the QGIS Getting Started Guide;

<http://www.ordnancesurvey.co.uk/docs/support/opensource-gis-guide-04-qgis-intro.pdf>

3.1.1 Loading and Displaying Shapefile Supply

Open QGIS. Select '**open vector layer**' from the left hand toolbar.



In the next window, click '**browse**' and navigate to the folder in which the OS OpenMap-Local shapefiles are located.

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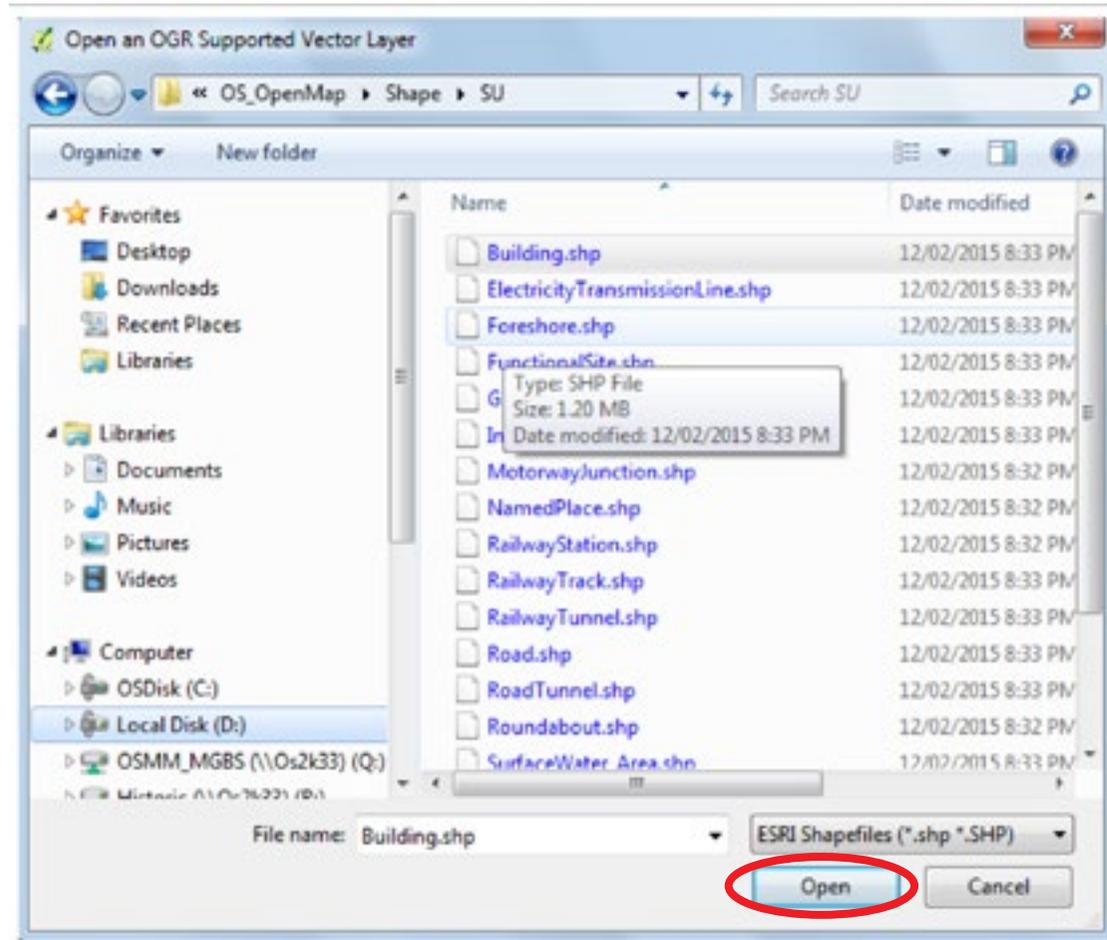
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OS OpenMap-Local data is comprised of a number of shapefiles containing different elements of the whole dataset. It is up to the user as to which elements are loaded depending upon requirements. In this example, all of the main elements will be loaded into QGIS. After selecting the files required and clicking 'open' twice, the user will be presented with the data loaded.

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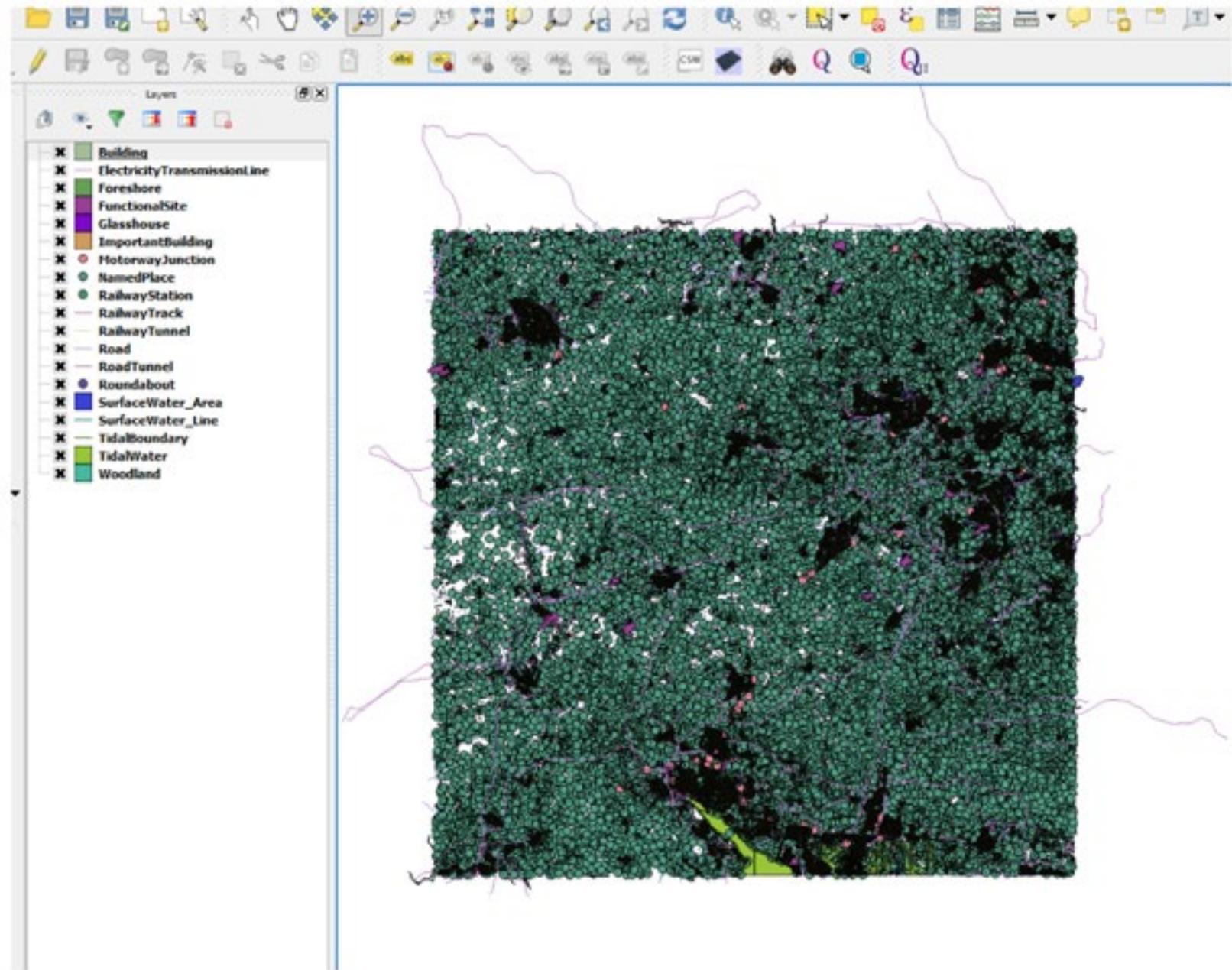
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In the example below, the SU 100km grid tile has been loaded.



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It will be noted that some features extend beyond the tile edge. This is indicative of the 'hairy tile' supply. The layers will need to be ordered correctly in order to display correctly, so that the polygon data does not cover the line and point data. A suggested layer order is shown below, but the user may wish to change this as per requirements.



It should be noted that initially, it is easier to turn off the functional site layer whilst styling is applied to the other layers. The functional site layer is an attribution layer which highlights various important sites and does not form part of the map base itself.

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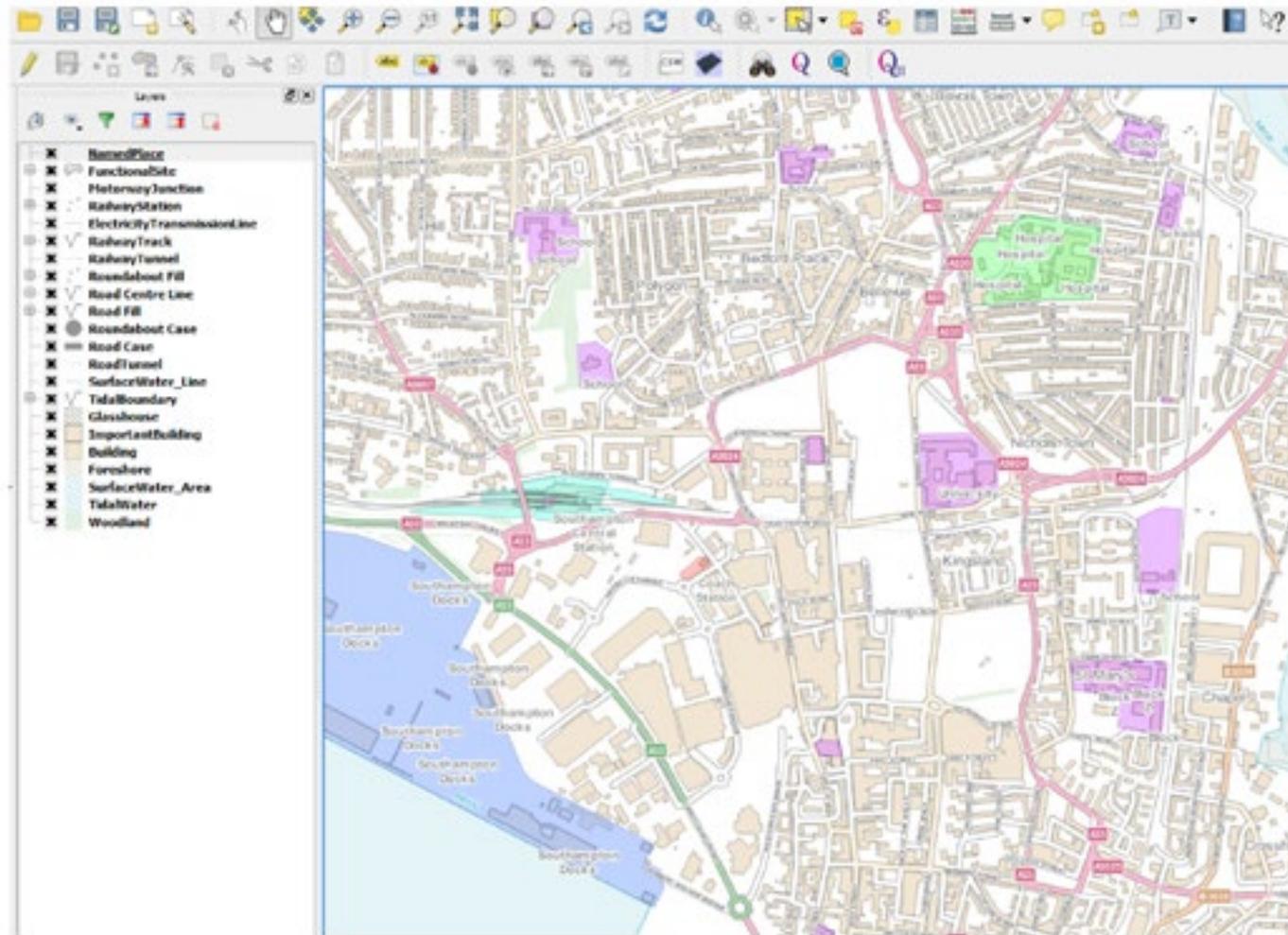
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Performance will be improved by adding a spatial index to each of the layers. Right click each layer in turn. In the context menu, select **'properties'** and then click the **'general'** tab. The **'create spatial index'** button will be seen just below the co-ordinate reference system box.

Each layer can be styled to appear as per user requirements. In QGIS, style files are identified by having the extension .QML. To add a style to a layer, right-click on the layer in the layer window and select **'properties'**. Click the **'style'** tab. The user can now either style the data using the various tools available or by loading a predefined style from a .QML file. For more information, please see the Getting Started with QGIS guide referred to at the beginning of this section. Ordnance Survey has released a set of style files for OS Open Map for QGIS. These will be available on [GitHub](#). Instructions for layer ordering and loading of these styles are provided in the Quick Start Guide which is included with the style files.



The example above is styled using the published OS OpenMap-Local style files and layered according to the instructions included in the Quick Start guide available with those files.

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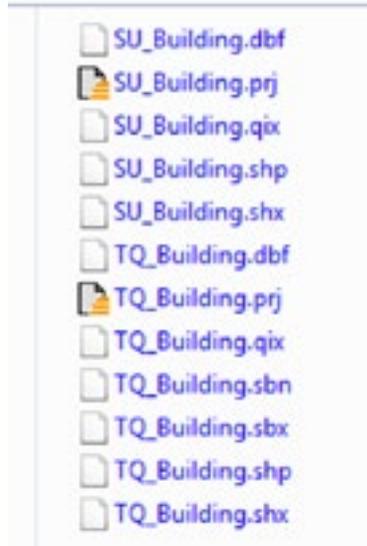
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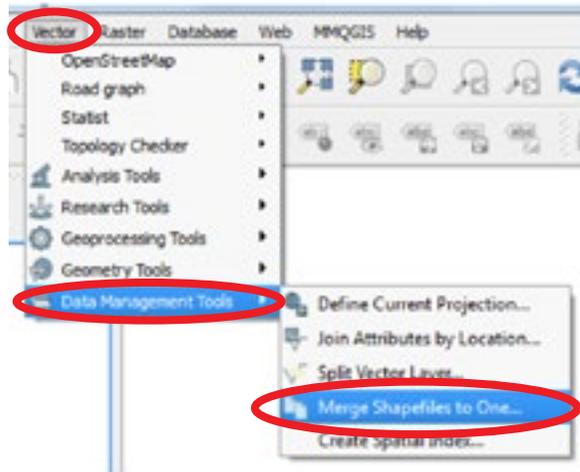
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3.1.2 Merging the Shapefile Supply

The user may have a requirement to load more than one 100km² grid square to cover the area that is required. The user will need to extract the relevant shapefiles from each tile into a folder. In the final release of data, the individual shapefiles will be prefixed with their National Grid 100km grid square reference letters as shown below.



Each shapefile element of OS OpenMap-Local will need to be merged separately in order that the user obtains a shapefile, for example, buildings, covering the whole area of interest. It is recommended that the user copies each of these elements into a new empty folder before merging is carried out. In the case shown above, the buildings shapefiles for SU and TQ have been copied to an empty folder. To merge the shapefiles together in QGIS, from the main menu, select '**vector**' then '**data management tools**'. The '**merge shapefiles to one**' option is towards the bottom of the list of options.



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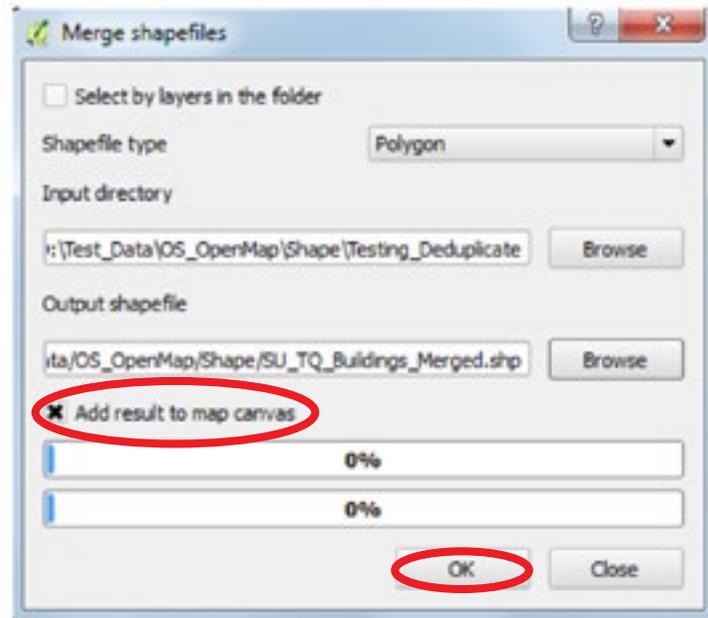
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In the next window, the user will need to define if the shapefiles to be merged are either points lines or polygons, and also the folder where the files to be merged will reside. In this example, all of the files in the folder specified will be merged, which is easier than defining individual files. Finally, an output folder and filename for the merged shapefile needs to be selected. The user can also specify if they want the newly merged file to be automatically added to the map canvass.



Once 'OK' is clicked, QGIS will create a merged shapefile covering the element of the grid tiles required. In this example, the building shapefiles for SU and TQ are being merged. This procedure will need to be repeated for all of the other layer shapefiles for OS OpenMap-Local which the user requires.

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When working with merged shapefiles of any kind, it is highly recommended that a spatial index be applied to each element of the data, particularly if the user is loading national sets of data. The performance improvement in rendering the data will be very noticeable. In the case above, styling can now be applied to the data as described previously in this guide.

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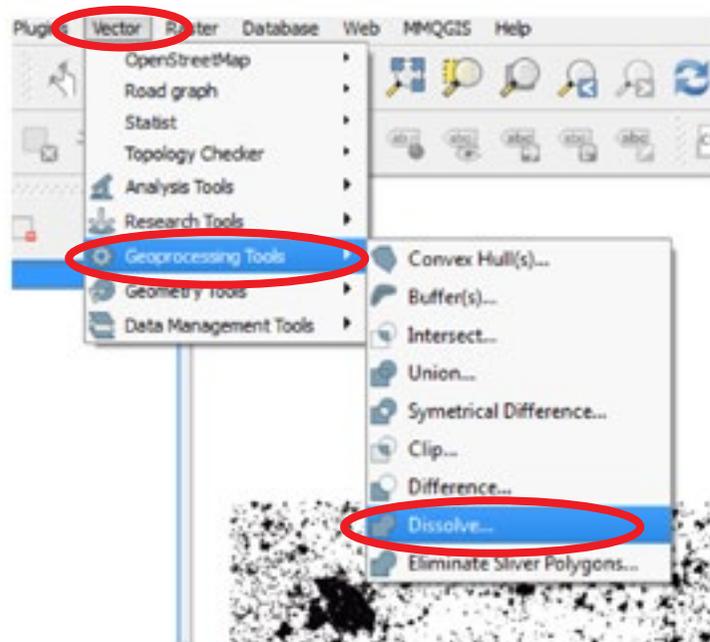
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3.1.3 Removing Duplicate Features from Merged data

As has already been stated, OS OpenMap-Local data is supplied as '**hairy tiles**' with features which cross a 100km² tile edge being supplied in both tiles in which the feature appears. In many instances, the user will simply wish to use the merged OS OpenMap-Local data as a contextual backdrop map. In this case, there will be no need to remove duplicate features along the tile edges as the features will display perfectly clearly with one duplicate feature overlying the other.

There may however, be instances where the user wishes to carry out some form of analysis using feature counts contained within the data. In this case, the data will need to have the duplicate features removed. There are several ways within QGIS to achieve this. There are also several plugins for QGIS which can be installed to carry out this function, in particular one called '**MMQGIS**'. However methods using these options are not described here.

The '**Dissolve**' function in QGIS which is part of standard functionality will effectively carry out this procedure. In the example described below, we are going to de-duplicate the merged SU_TQ Buildings file that we created in section 2.1.2. We have the file loaded into the map window.



From the main menu, select '**vector**' then '**geoprocessing tools**' followed by '**dissolve**'. Another window will then appear.

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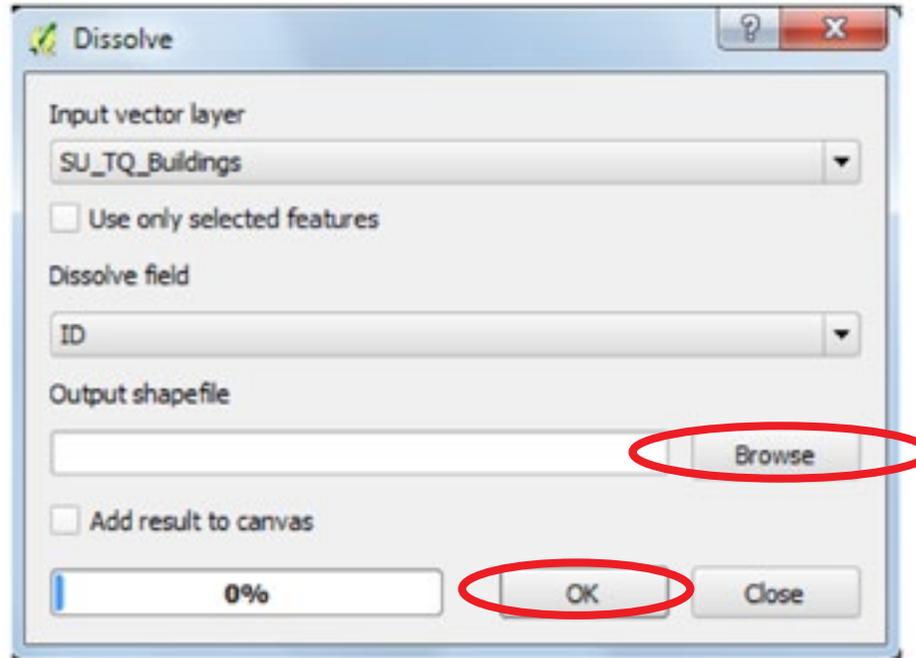
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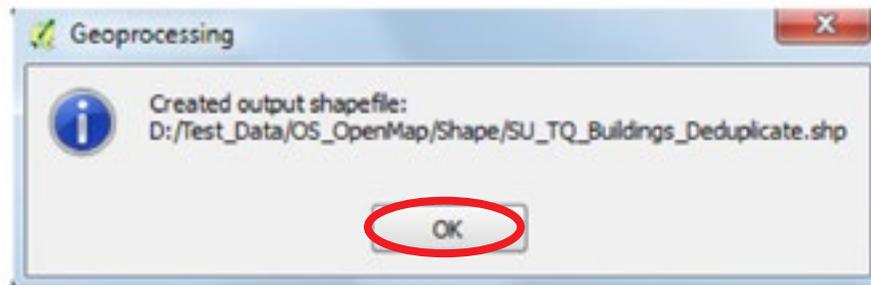
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The user will need to select the input vector layer to be de-duplicated; in this case, the SU_TQ Buildings file is already selected. The dissolve field is set to 'ID' which will be the field in the data which will be searched for duplicate features. Finally, the user will need to specify an output folder and filename for the de-duplicated data. Once this is done, the user can specify whether or not the newly created file can be added to the current map canvass. Click 'OK' to start the process.



A message appears once the process is complete. The new shapefile containing the de-duplicated data can now be loaded into QGIS. Once again, it is highly recommended that the de-duplicated file be given a spatial index using the method previously described to improve rendering performance

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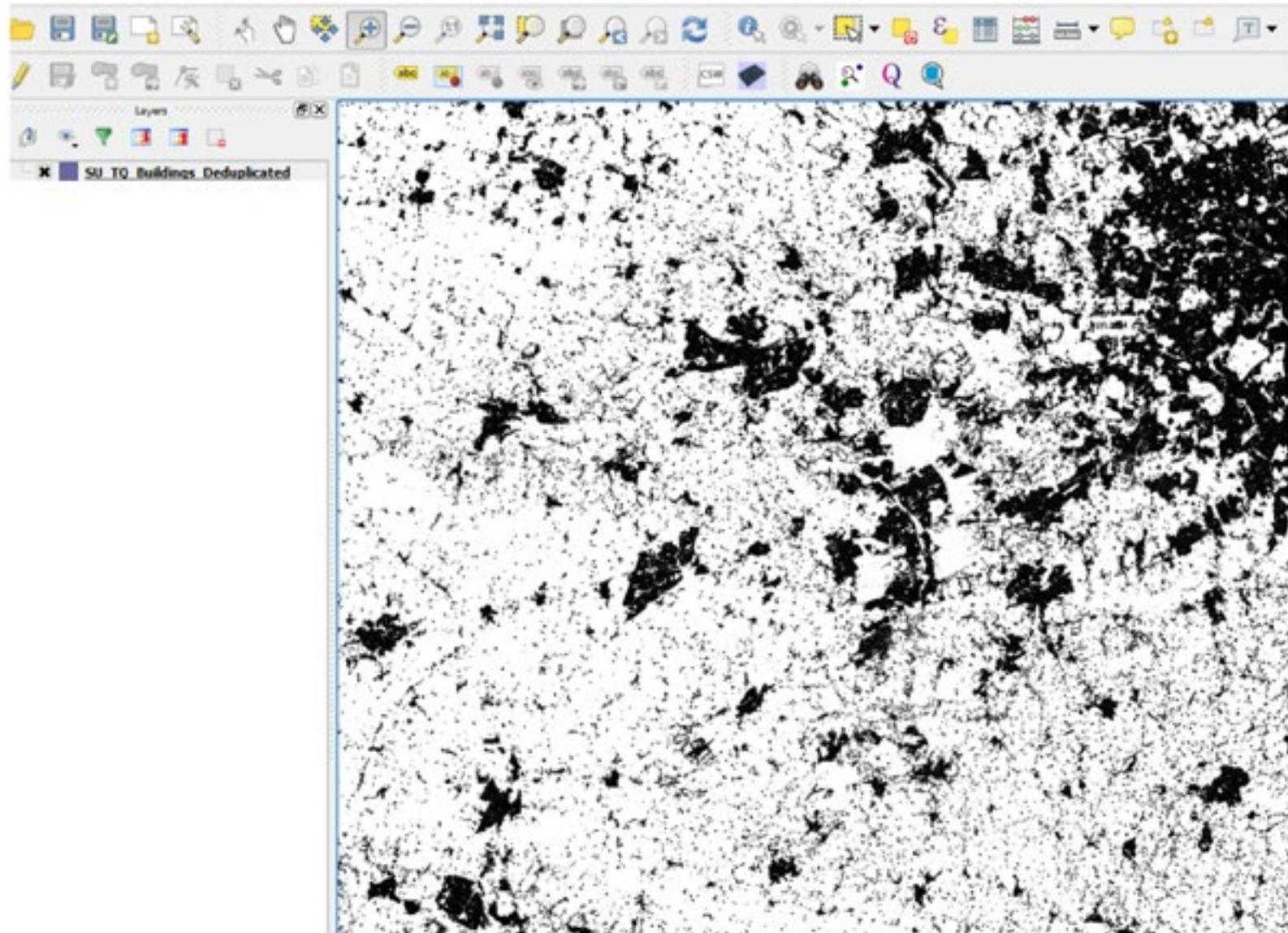
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The data can now be styled with a suitable style as per user requirements using the procedures as described earlier in this guide.

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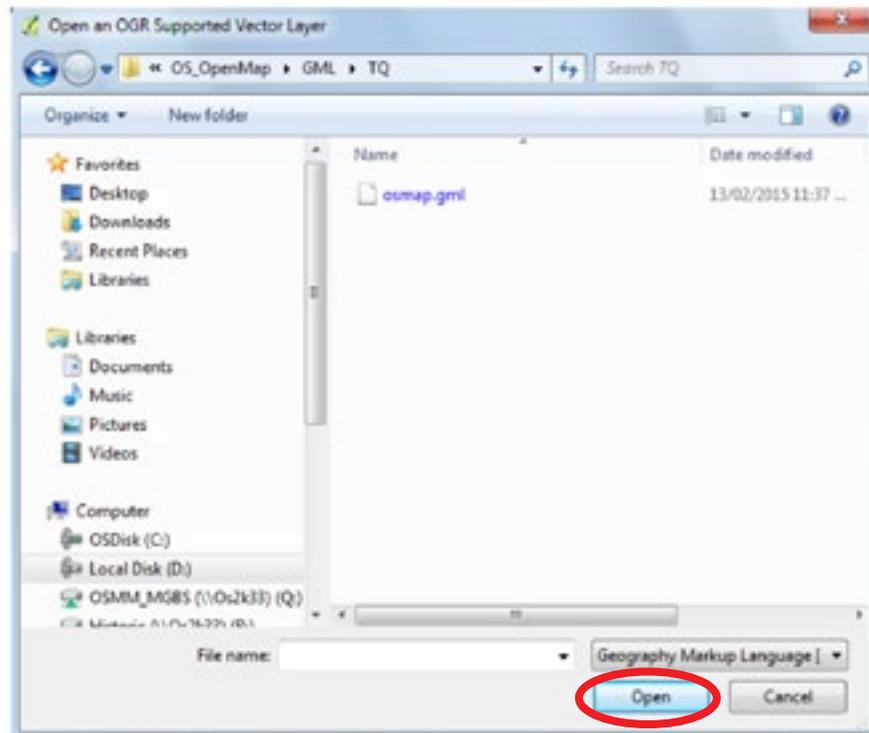
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3.1.4 Loading and Displaying GML Supply

Open QGIS. Select '**open vector layer**' from the left hand toolbar.



In the resulting window, click '**browse**' to open the window, which will allow the user to select the .GML file to be loaded.



The user will need to specify that a .GML (geography mark-up language) file needs to be opened from the drop-down menu at the bottom of the window. Select the file and then click '**open**' twice.

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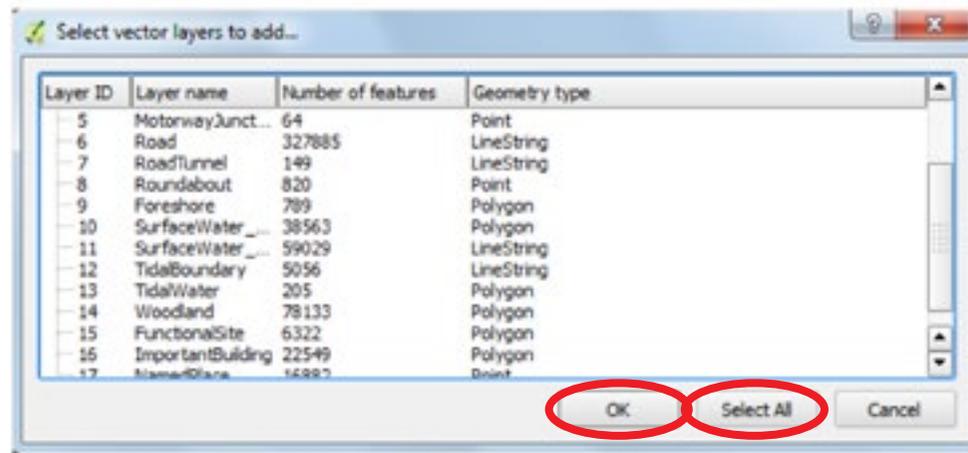
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Another window will appear which will allow the user to select which layers of the data to load. If all of them are required, click 'select all'.



The data will now load into the map window.

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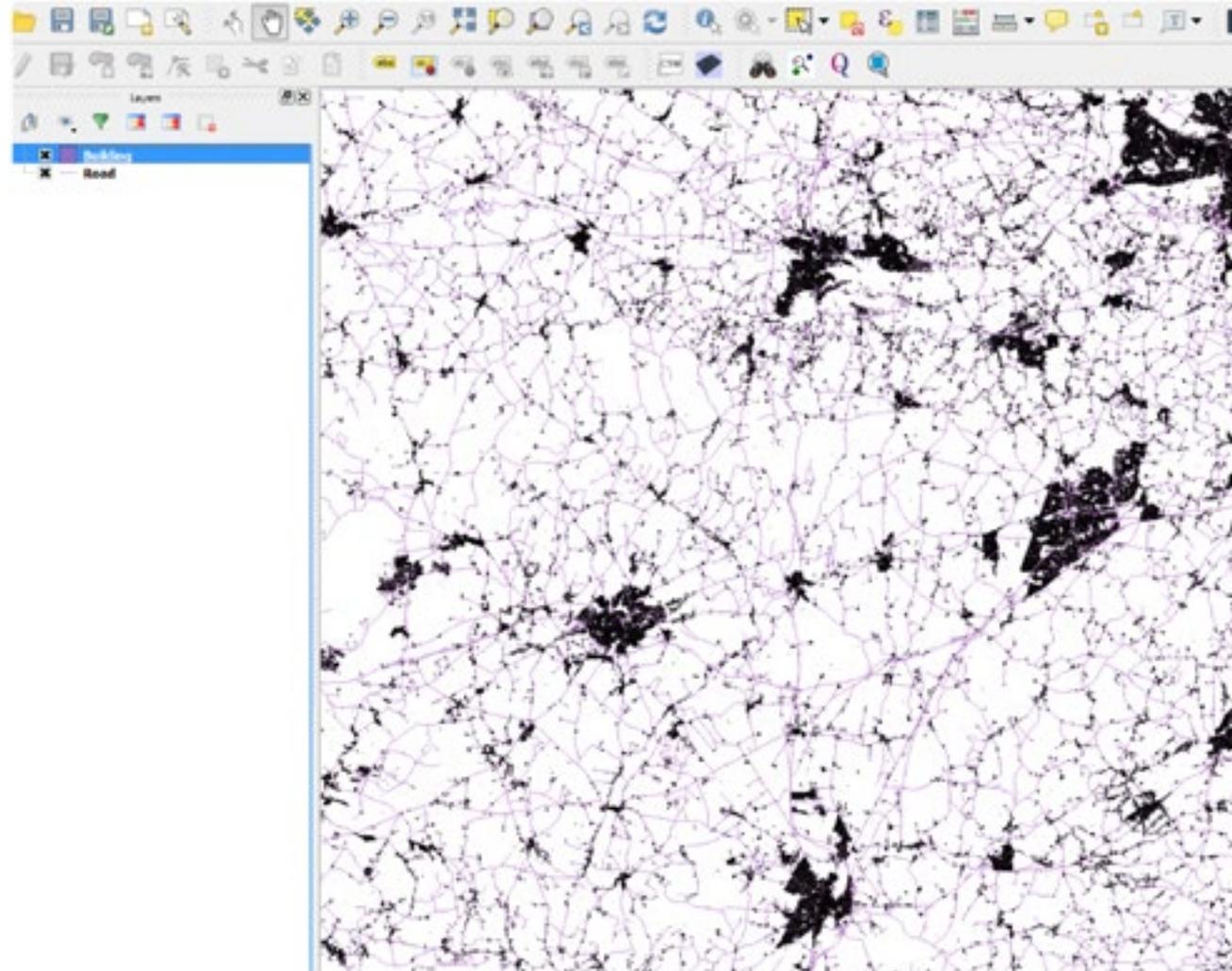
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In the example below, just the roads and buildings from the SU tile were selected.



The data can now be styled using a predefined style file (.QML file) as described previously or using the tools within QGIS. Please note that style files created for shapefile supply of the data will not work with GML supply without modifications. It is highly recommended that style files created specifically for the GML supply be used.

It should be noted that rendering performance of the data within QGIS will be much poorer than in the case of the shapefile format as GML data cannot be spatially indexed. It should also be noted that multiple 100km² tiles of OpenMap .GML data cannot easily be merged together as with the shapefile option and as a consequence, rendering performance will also be much slower. In addition, it is not easy to de-duplicate features along tile edges using common spatial geoprocessing tools within QGIS. As a result, the GML data itself will have to be queried using code scripts to highlight and remove duplicate features within a text editor. This is not covered in this guide.

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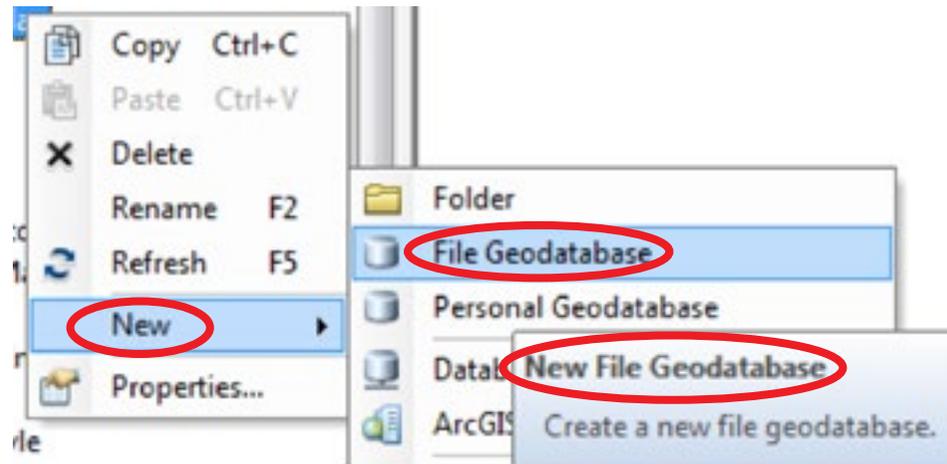
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3.2 ArcGIS ArcMap

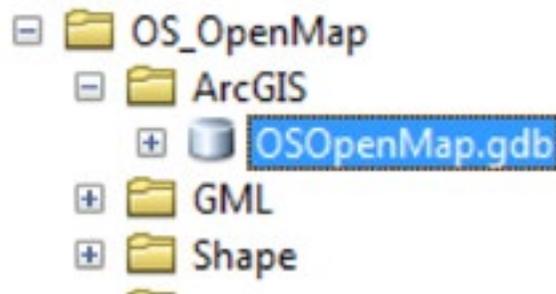
3.2.1 Loading and Displaying Shapefile Supply

There are two possible ways of loading and displaying the shapefile data in ESRI ArcGIS. The shapefile data can be loaded straight into ArcGIS. However, if more than one 100km² tile is being loaded, the rendering performance can become an issue. The recommended way of loading the data is to use a file geodatabase to house the data. This is the method which will be described in this guide.

Open ArcCatalog. Choose a folder where the file geodatabase is to be created.



Right click on the folder and in the context menu select '**new**' and then '**File Geodatabase**'. Give the new file geodatabase a suitable name for ease of reference by highlighting the geodatabase and typing a new name.



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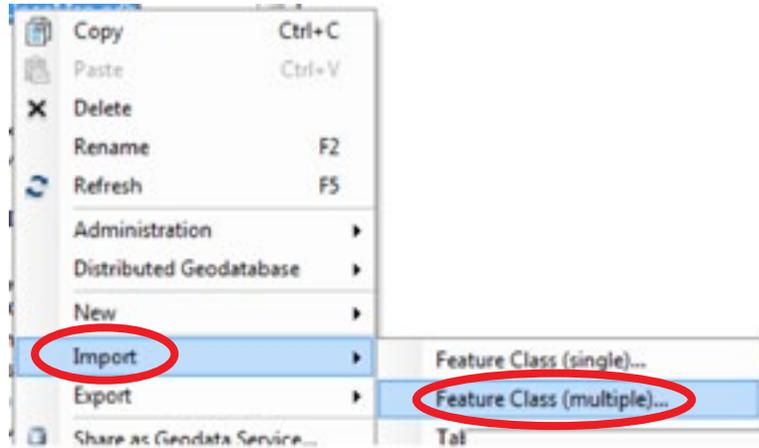
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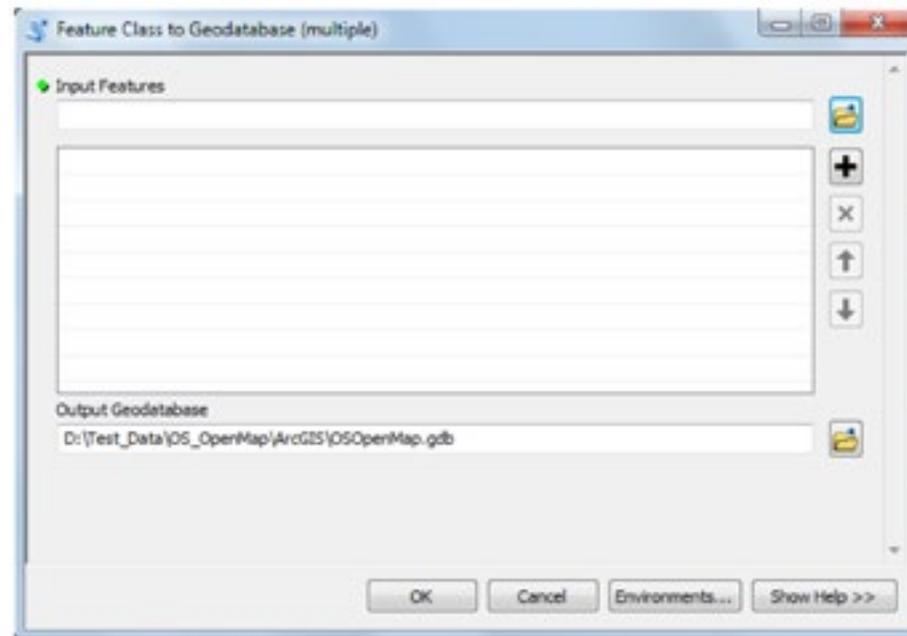
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Once created, right click on the file geodatabase and select **'import'** and then **'feature class (multiple)'**.



In the next window, browse to the location where the data resides which is to be imported. Because the individual shape files begin with the 100km prefix, it is possible to import more than one OS OpenMap-Local tile into the geodatabase as per user requirements.



Click on the button to the right of the blank window under **'input features'** and navigate to the folder where the OS OpenMap-Local shapefile data resides.

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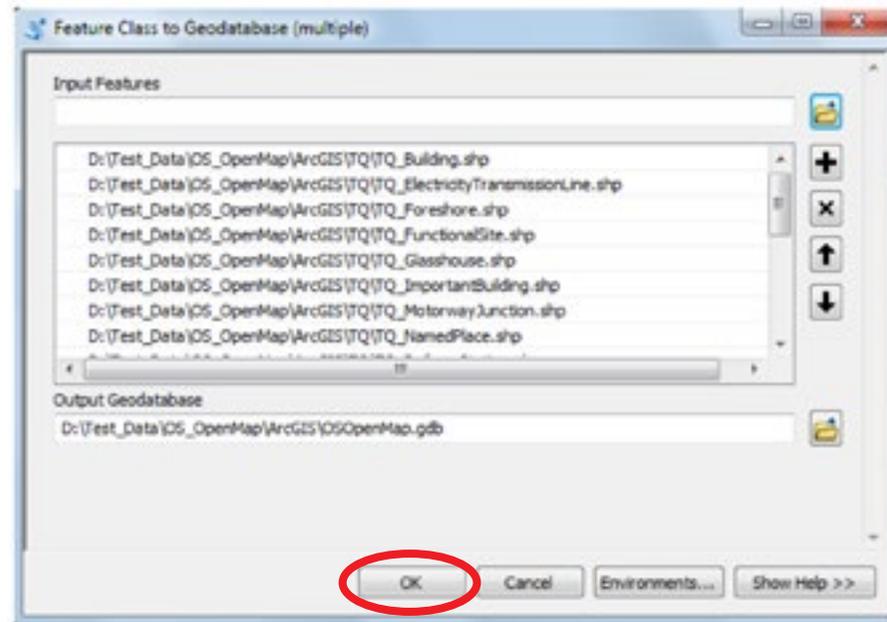
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Select all of the shapefiles that are required in the window and click 'add'.



The shapefiles selected will now appear as a list in the import feature class window. The output file geodatabase should default to the one which has been previously selected. Click 'OK'. The window will close and now ArcCatalog will import the features classes into the file geodatabase. A dialog box will appear when the process is complete.

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If the file geodatabase is now highlighted, a list of the imported features classes should be visible. In this example, both SU and TQ shapefiles have been imported.

Name	Type
SU_Building	File Geodatabase Feature Class
SU_ElectricityTransmissionLine	File Geodatabase Feature Class
SU_Foreshore	File Geodatabase Feature Class
SU_FunctionalSite	File Geodatabase Feature Class
SU_Glasshouse	File Geodatabase Feature Class
SU_ImportantBuilding	File Geodatabase Feature Class
SU_MotorwayJunction	File Geodatabase Feature Class
SU_NamedPlace	File Geodatabase Feature Class
SU_RailwayStation	File Geodatabase Feature Class
SU_RailwayTrack	File Geodatabase Feature Class
SU_RailwayTunnel	File Geodatabase Feature Class
SU_Road	File Geodatabase Feature Class
SU_RoadTunnel	File Geodatabase Feature Class
SU_Roundabout	File Geodatabase Feature Class
SU_SurfaceWater_Area	File Geodatabase Feature Class
SU_SurfaceWater_Line	File Geodatabase Feature Class
SU_TidalBoundary	File Geodatabase Feature Class
SU_TidalWater	File Geodatabase Feature Class
SU_Woodland	File Geodatabase Feature Class
TQ_Building	File Geodatabase Feature Class
TQ_ElectricityTransmissionLine	File Geodatabase Feature Class
TQ_Foreshore	File Geodatabase Feature Class
TQ_FunctionalSite	File Geodatabase Feature Class
TQ_Glasshouse	File Geodatabase Feature Class
TQ_ImportantBuilding	File Geodatabase Feature Class
TQ_MotorwayJunction	File Geodatabase Feature Class
TQ_NamedPlace	File Geodatabase Feature Class
TQ_RailwayStation	File Geodatabase Feature Class

A useful point to note is that loading the shapefiles into a file geodatabase will automatically add spatial indexes to the data in the import process. There is therefore no requirement to manually add one once the data has been loaded, which would be the case if shapefiles had been loaded into ArcGIS without using the file geodatabase option. As has been previously mentioned, the addition of a spatial index greatly improves rendering performance.

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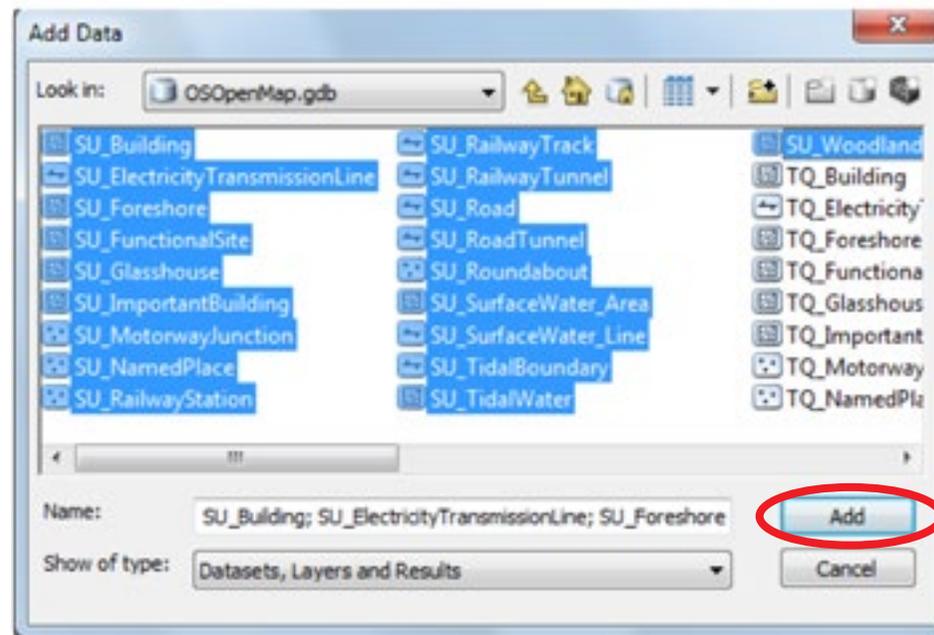
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Start ArcMap. Click on the **'import data'** button in the top toolbar.



In the window that appears, navigate to the location of the file geodatabase just created. Select the feature classes that are required and click **'add'**.



The data will load into ArcMap. Although ArcMap does put the shapefiles into a more logical sequence, the user can move the layers according to the desired preferences. The data will, of course load in as un-styled data. ArcMap will assign a random style to the data.

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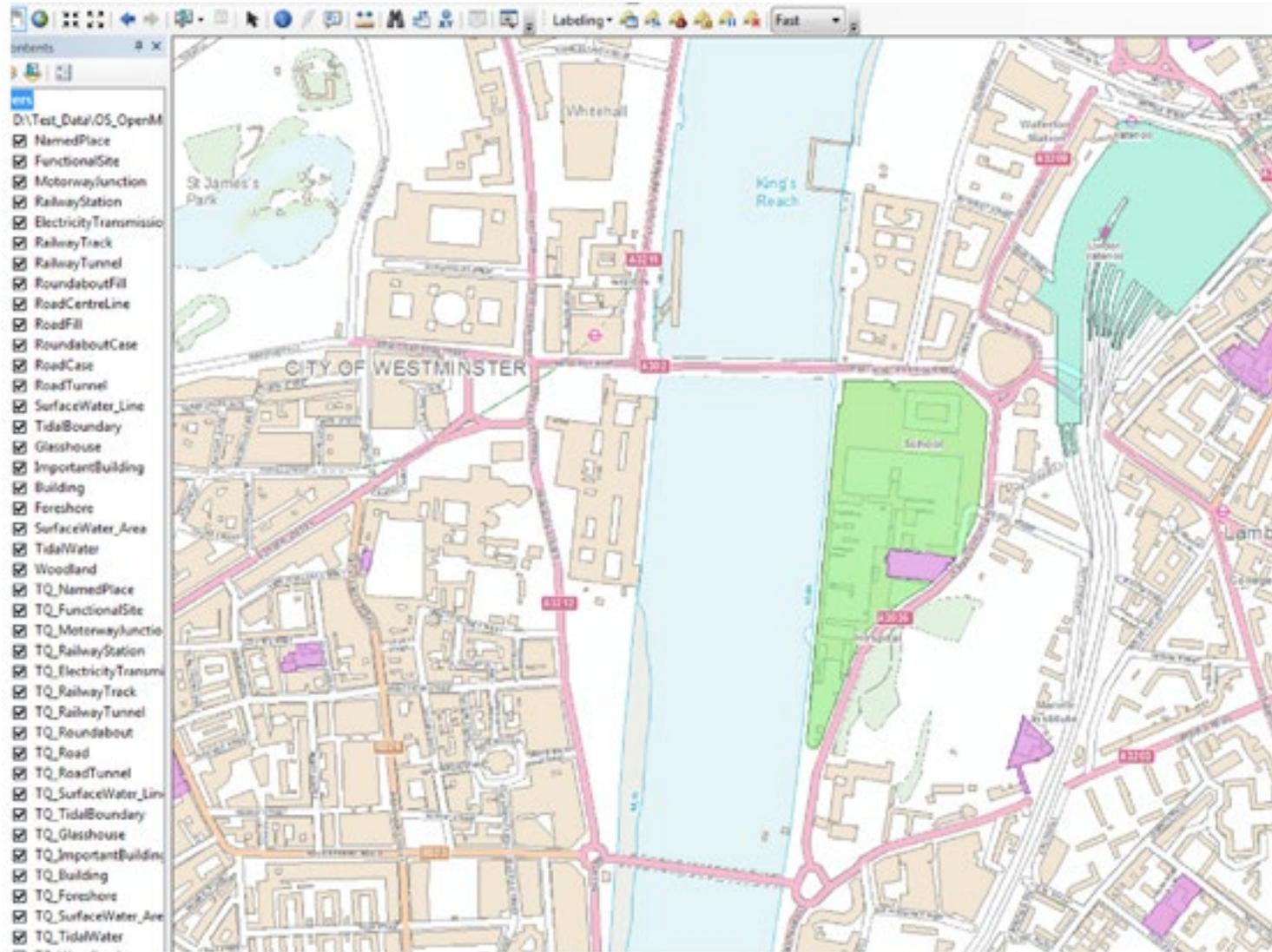
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The user can manually style each of the layer files by right-clicking on each of the loaded layers, selecting '**properties**' and then '**symbolology**'. ArcMap contains an extensive range of tools to allow the user to apply various styles to each layer of the data and then save the work as an ArcGIS layer file. This procedure is not covered in this guide.

A set of ESRI layer files for OS OpenMap-Local will be available for download from the GitHub web site at product launch. Follow the instructions in the Quick Start Guide which accompanies these files to apply the styling to the data. These style files will work with either a direct shapefile load in ArcMap or using the file geodatabase methodology described here



The user should see something like the screenshot above when the process is complete.

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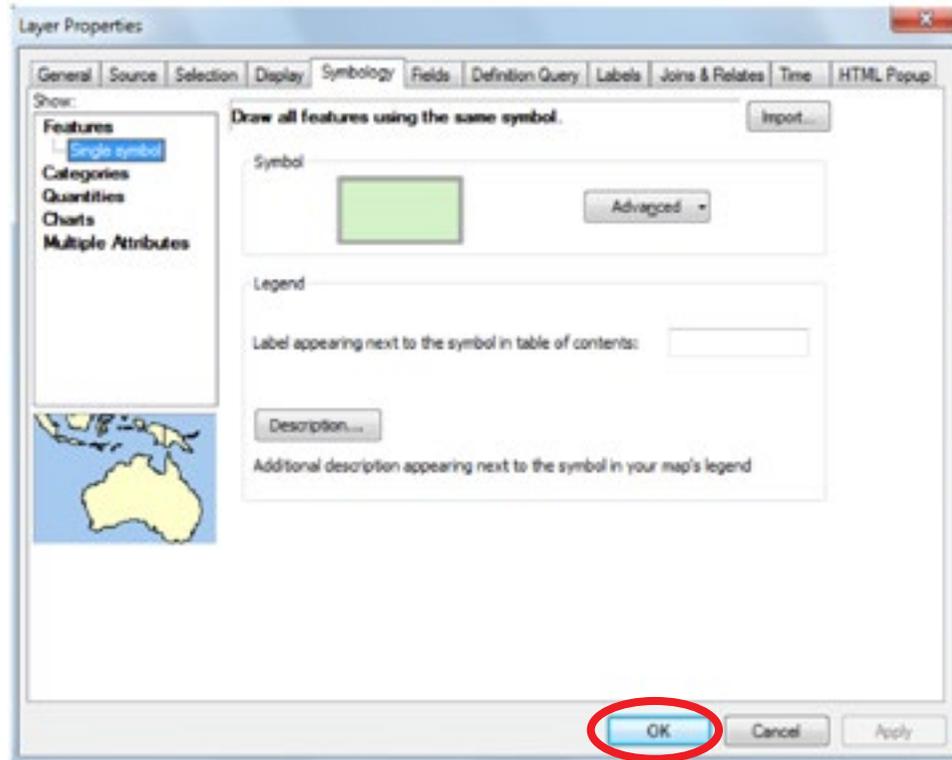
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If using a different set of layer files, the procedure for adding a style in ArcMap is as follows – this method can be used for many other data types. To add a style to a layer, simply right-click on a layer, select **'properties'** and then **'symbology'**

In the layer properties window, select **'import'** (the button below the tabs at the top). A list of available styles, drawn from the imported layer file will appear. Simply select the required style and click **'OK'**. The symbol in the box will now change to the predefined style.



Click **'OK'** again and the style will then be applied in ArcMap. Repeat this procedure for all of the layers until the OS OpenMap-Local data is styled to requirements. Labels for certain features can also be applied as required.

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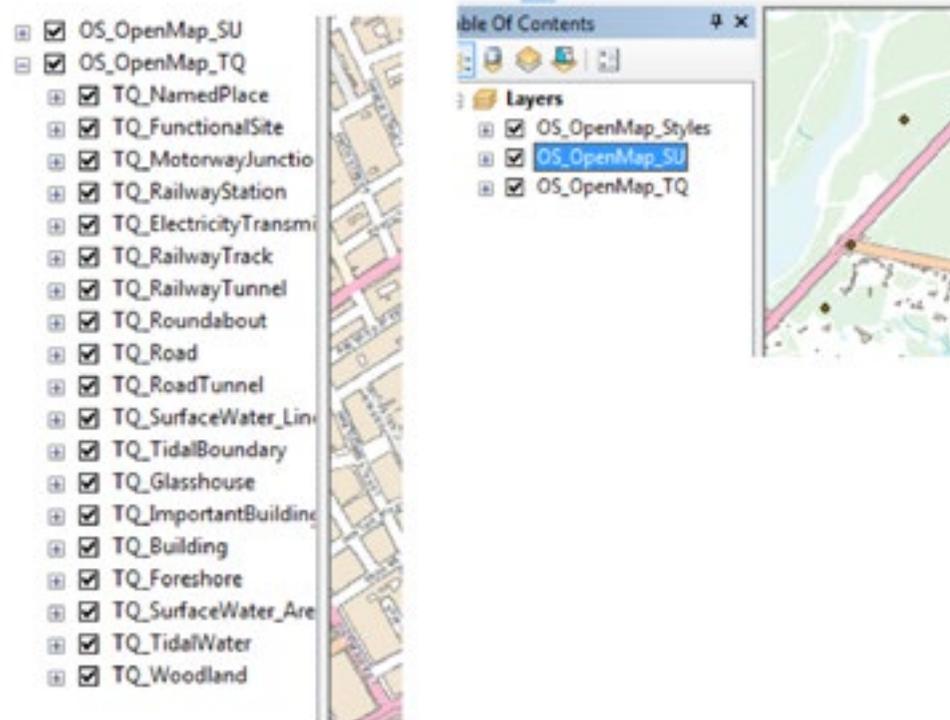
3.2.2 Loading multiple shapefiles

If there is a requirement to load a larger area of interest, it is recommended that the user merge the shapefiles together before loading into the file geodatabase. This procedure is described under point 2.2.3. below. Doing this will also mean that the supplied layer files for styling will only need to be applied once to the data and all the styles will work properly.

If however, the user simply wants to load multiple areas using the file geodatabase option, there is no mandatory requirement to merge shapefiles together.

To add another 100km² tile of data in ArcMap previously loaded into the file geodatabase created earlier, simply click '**add data**' and repeat the procedure described above for loading the individual layers for the subsequent tile(s). The user may wish to group the layers for each 100km tile loaded in the table of contents window to avoid confusion.

To do this, select all of the layers within the new 100km tile added, right-click and then select '**group**'. The additional layers can be styled as previously using a predefined layer file or manually as required.



This example shows that all of the layers for SU and TQ have been loaded into ArcMap from within the file geodatabase. The file geodatabase option in ArcGIS is also useful in that if the user wishes to add another tile of data at a later date, the shapefiles can be simply imported into the same file geodatabase using ArcCatalog and then displayed in ArcMap.

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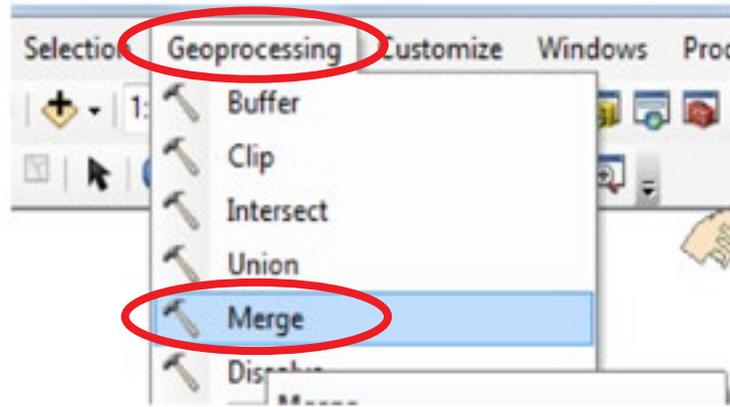
3.2.3 Merging shapefiles and removing duplicate features from the data

As has already been stated, OS OpenMap-Local data is supplied as '**hairy tiles**' with features which cross a 100km tile edge being supplied in both tiles in which the feature appears. These duplicate features will occur if more than one 100km² tile is loaded into a file geodatabase. In many instances, the user will simply wish to use the OS OpenMap-Local data as a contextual backdrop map. In this case, there will be no need to remove duplicate features along the tile edges as the features will display perfectly clearly with one duplicate feature overlying the other.

There may however, be instances where the user wishes to carry out some form of analysis using feature counts contained within the data. In this case, the data will need to have the duplicate features removed.

To remove duplicate features in ArcMap, it is necessary firstly to merge the elements of the tiles together before removing the duplicate features. This procedure can take some time, so the user should consider if this requirement is really needed.

Firstly, the elements of the data need to be merged together to create new features classes within the file geodatabase containing the original data (or to a completely new file geodatabase or shapefile if required).



Using either ArcMap or ArcCatalog, from the main menu, select '**Geoprocessing**' followed by '**merge**'.

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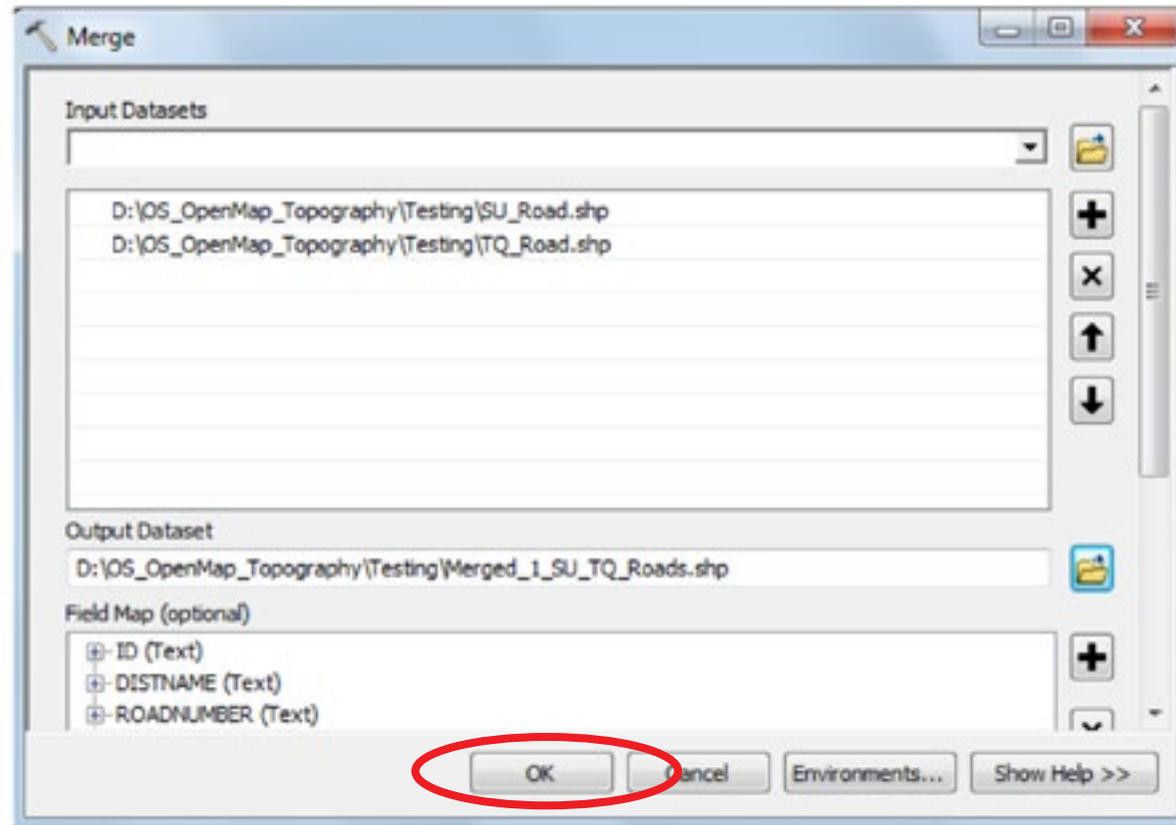
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In the next window, select the layers to be merged. In this example the SU_Roads and TQ_Roads are being merged together. All of the attribution is being copied into the new shapefile though the user can specify what attributes need to be copied. The user can also specify the output required. This can be a new feature class within a file geodatabase or a shapefile. In this example a new shapefile containing the merged data will be created.



Click 'OK' when all of the elements to be merged have been selected. It can be seen using this method, the roads element of a number of 100km tiles could be merged together, although only two are shown in this example. ArcGIS will then merge the files and load the newly created shapefile into the map window. Depending upon the sizes and number of of the data layers being merged, this could take some time. A dialog box will appear when the process is finished.

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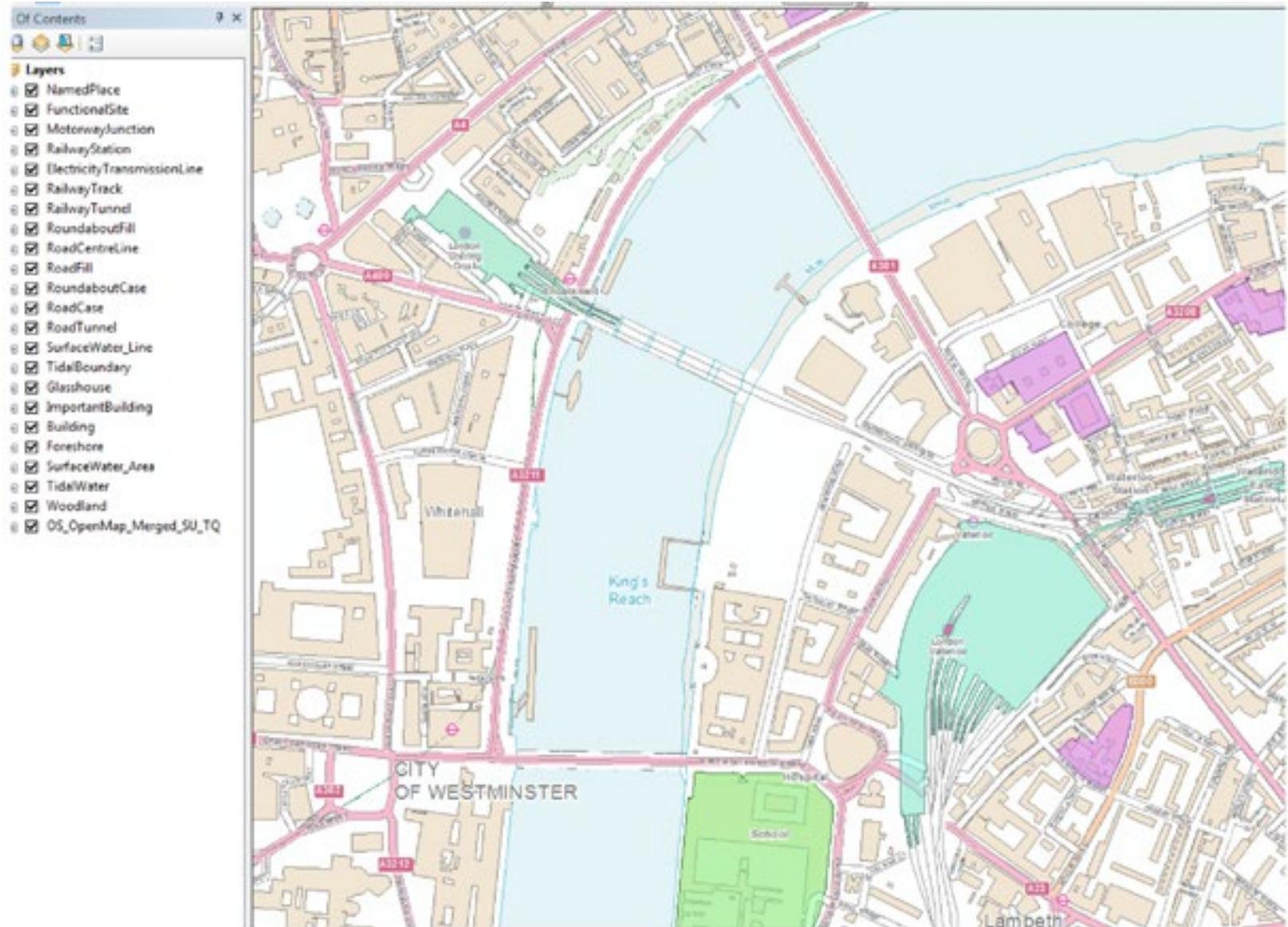
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In the example shown below, a new file geodatabase has been created to hold a set of merged shapefiles covering the SU and TQ grid squares. These have been styled using the style files for OS OpenMap-Local available from Github. As stated above, it is important that the instructions provided in the Quick Start guide, that accompanies these files, be followed to obtain the intended end result.



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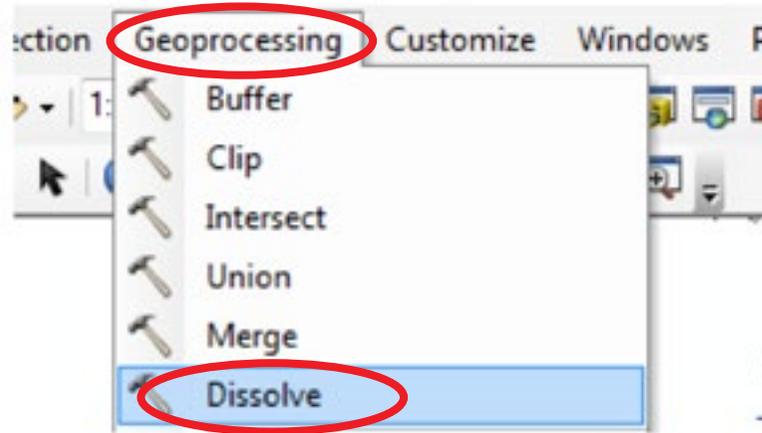
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The '**Dissolve**' function in ArcGIS will remove the duplicated features along the tile boundaries. This procedure can be carried out in either ArcCatalog or ArcMap. Firstly, select '**Geoprocessing**' and then '**Dissolve**' from the main menu.



The user will then need to specify which merged file from which duplicate features are to be removed. In this example we are looking at the SU_TQ_Merged road file.

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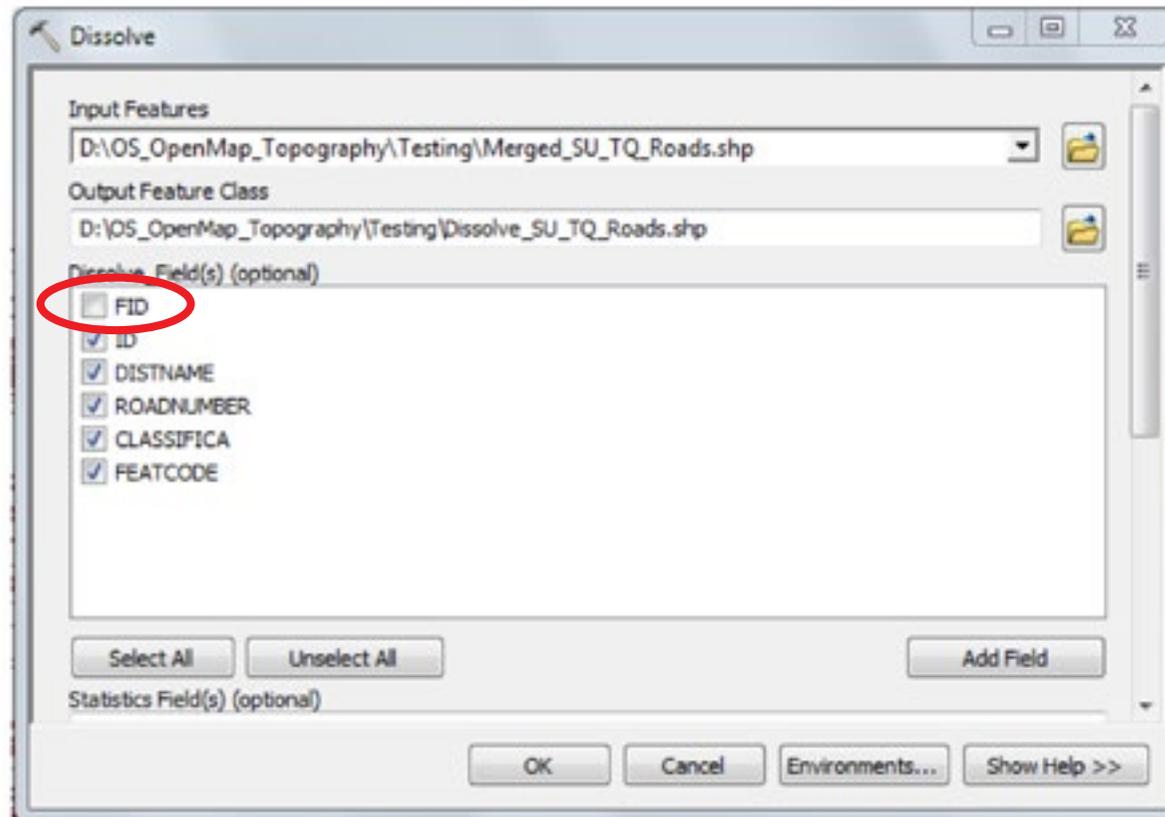
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We are going to save the new feature class as a new shapefile called '**Dissolve_SU_TQ_Roads**'. All of the dissolve fields in the box need to be ticked **except the FID field** as otherwise the attribution will not be carried over to the new dissolved file. Once complete, the dissolved layer will be loaded into ArcMap. This merged file will contain no duplicate features. It can now be styled as previously described. A count using the attribute table on both the original merged file and the dissolved file will confirm that the dissolved shapefile contains fewer features.

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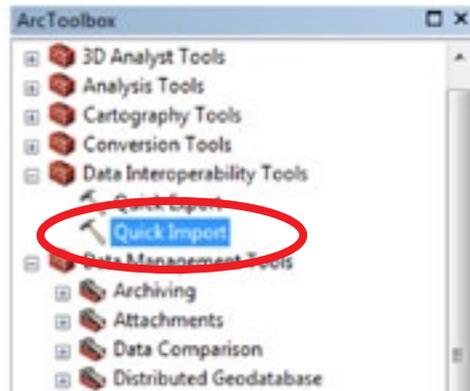
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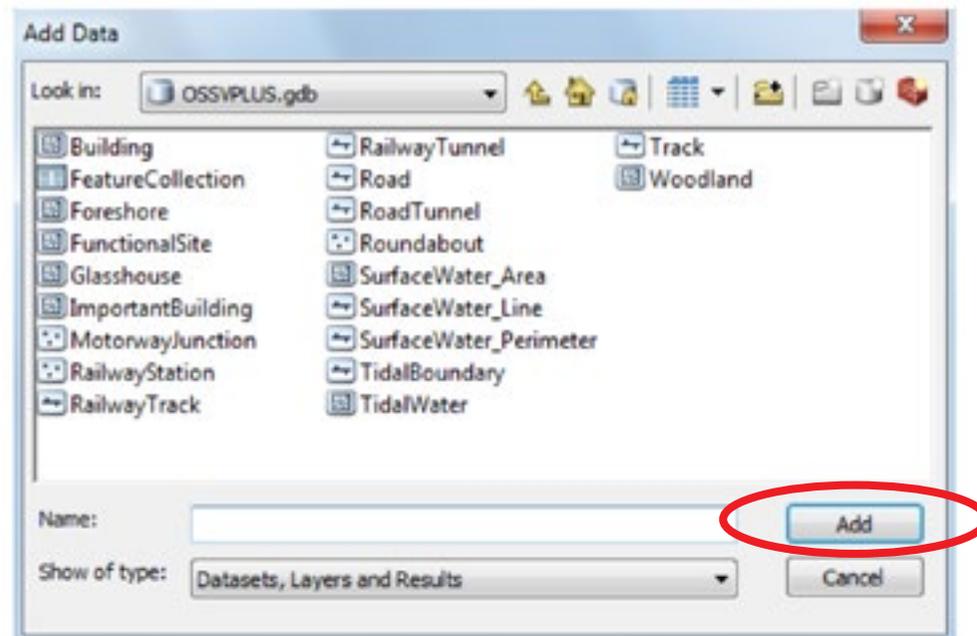
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3.2.4 Loading and Displaying GML Data

The GML data can be imported into ArcGIS using the Quick Import function in Arc Toolbox. The data will be imported un-styled. Users should also note that due to the large file sizes of some of the 100km² grid tiles especially SU and TQ, this import may take time to process.



The quick import will create a special file geodatabase into which to import the data. Once the quick import function has been completed, the data can be added using the usual 'add data' button in ArcMap and selecting all of the layers from the newly created file geodatabase;



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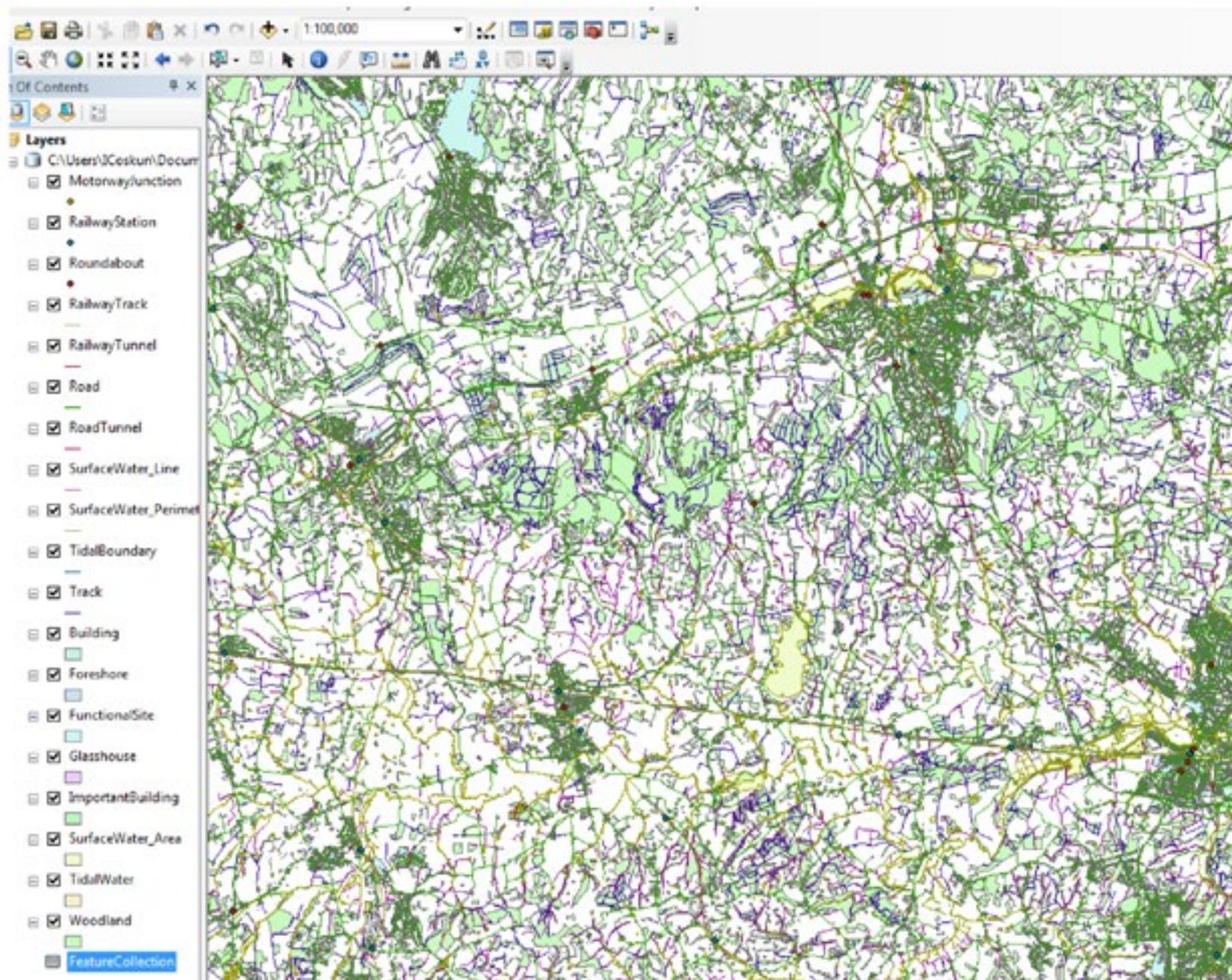
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The resulting imported data will then appear in the ArcMap window and can then be styled according to user requirements.



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The data can also be styled with a suitable ArcGIS layer file for OS OpenMap-Local previously created or styled manually using the styling tools provided.



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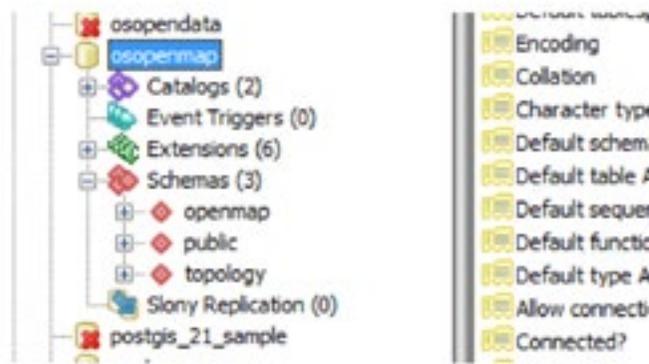
3.3 POSTGIS

PostGIS is the geospatial extension to the free open source database application PostgreSQL. The PostGIS extension needs to be installed as part of the PostgreSQL install. Instructions of how to do this can be found on the OS Web Site;

<http://www.ordnancesurvey.co.uk/docs/support/opensource-gis-guide-02-postgres-install.pdf>

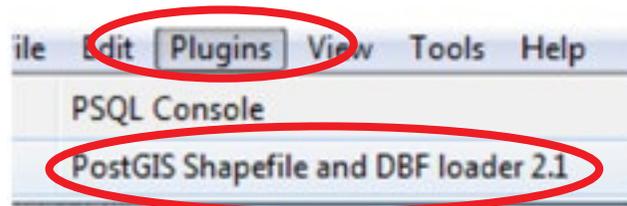
3.3.1 Loading and Displaying Shapefile Supply

Open '**PG Admin**' from the Windows desktop and, using the menu options available, create a new database and a new schema within the database to hold the OS OpenMap-Local data. It is recommended that the user not use the '**public**' schema to hold the data itself.



In the example above, a database called '**osopenmap**' has been created along with a schema called 'openmap' into which the data will be loaded.

As the data to be loaded comes in shapefile format, there is an easy to use PostGIS plugin available within PostgreSQL to load shapefile data.



Select '**plugins**' from the main menu followed by '**PostGIS Shapefile and DBF Loader**'

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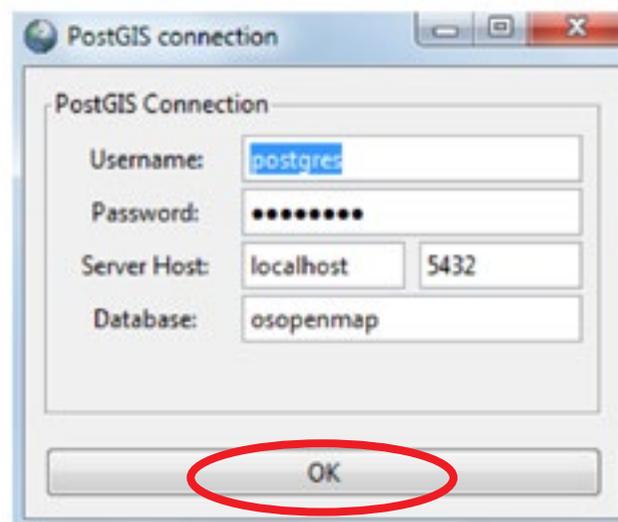
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The next window allows the user firstly to view connection details and then to add files to the database. The first thing to do will be to test connection details. Click on the '**view connection details**' button.



The resulting box should contain the username and password already entered along with the host name. The database being used to contain the data should already be selected. Click '**OK**'

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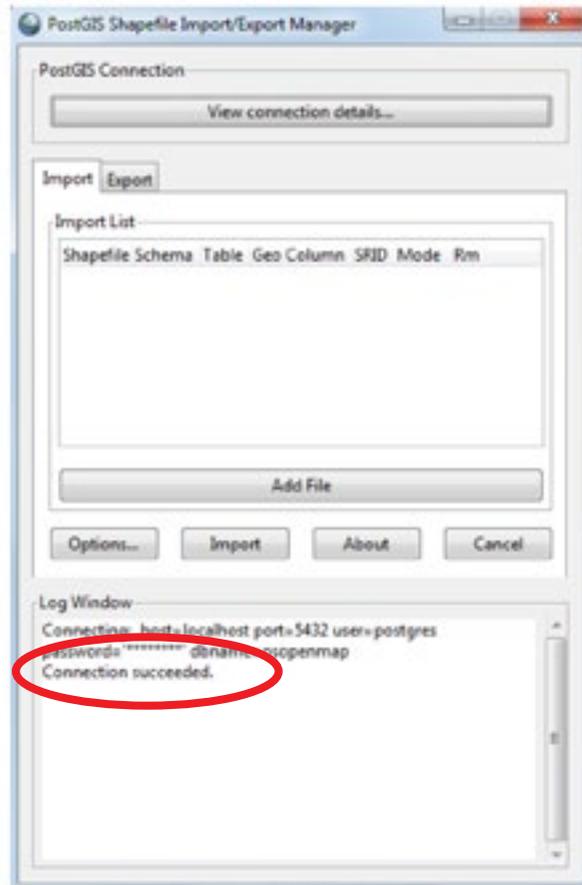
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If everything is working OK, **'connection succeeded'** should appear in the Log Window.

Click the **'Add File'** button.

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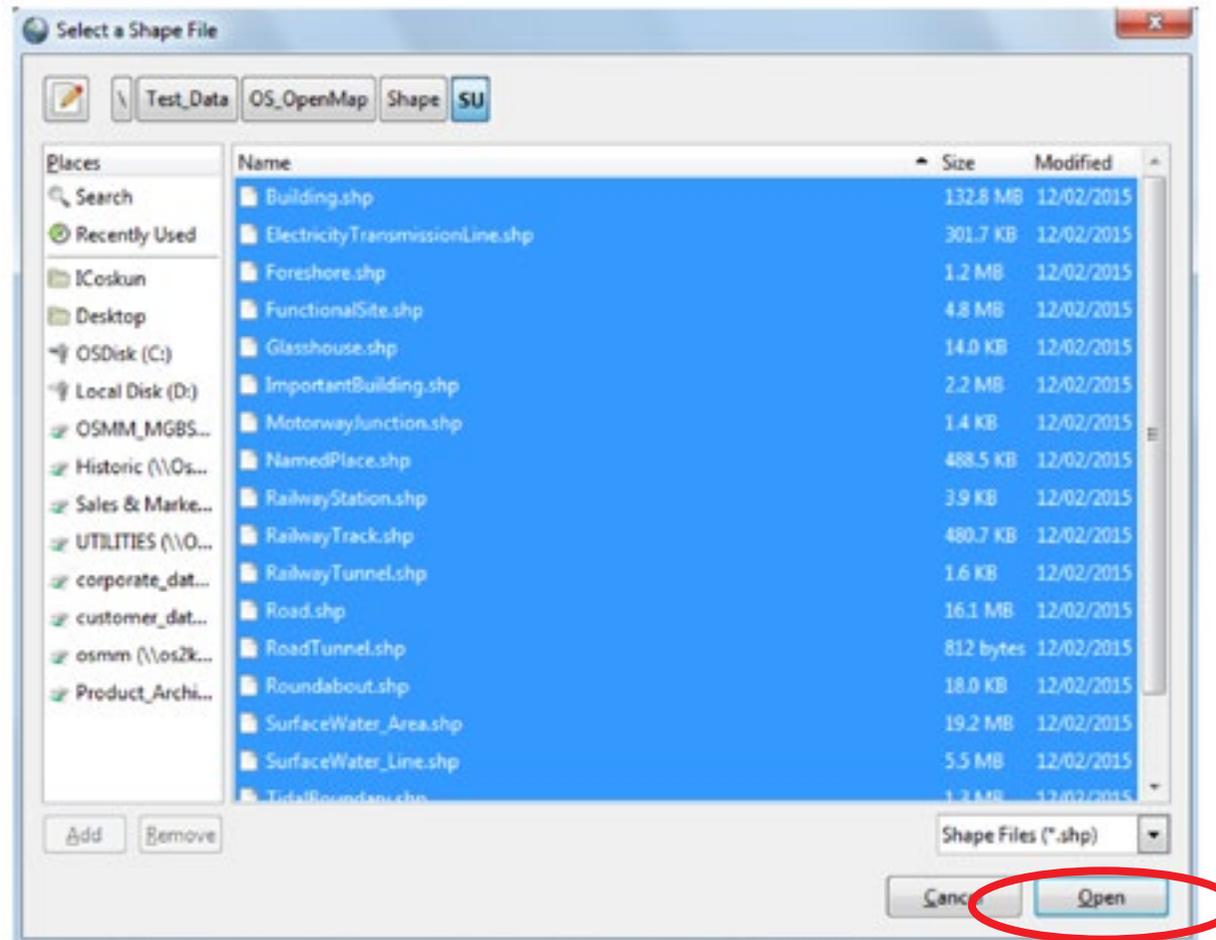
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In the next box which appears, use the file tree in the 'Places' box on the left to navigate to the folder in which the OS OpenMap-Local data resides. A list of the files will appear in the main window. It is possible to load one or all of the files into the database. In the example below, all of the shapefiles have been selected. The click 'Open'.



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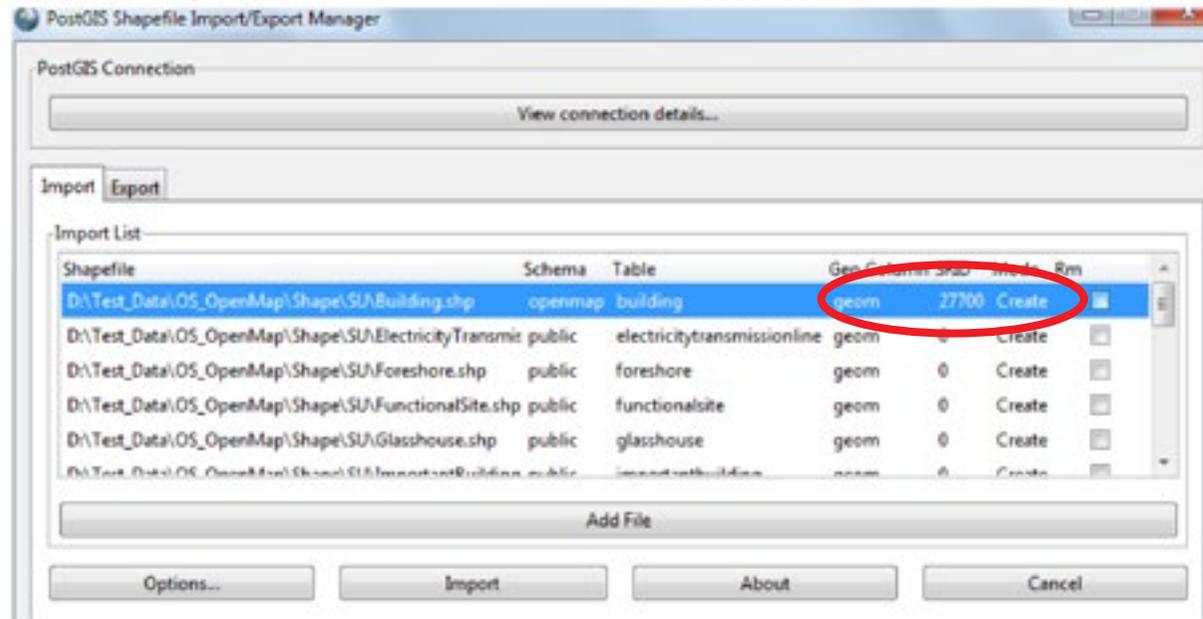
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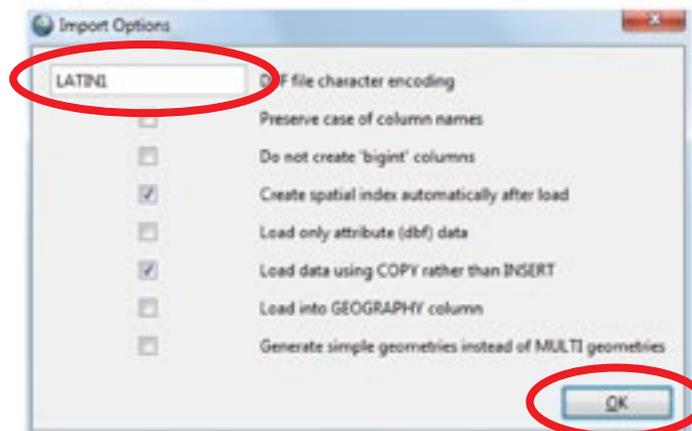
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Another window will open listing the selected shapefiles. The Schema and SRID will need to be changed. The schema will need to be changed to the schema in the database into which the data is being loaded (in this case 'openmap'). The SRID (or co-ordinate reference system) will need to be changed to **27700**, which is the code for British National Grid. This will need to be done for all of the shapefiles being loaded. No other element will need to be changed. Once this has been done click 'Import'.



At the end of the procedure, the log window at the bottom of the PostGIS import/export manager box should indicate that all of the shapefiles have loaded successfully. However one or two of the shapefiles may fail to load because the text encoding needs to be changed from UTF-8 to LATIN1. If this is the case, the user will need to close down the plugin and start again selecting just the shapefiles which failed to load previously. The schema and SRID must be changed again and this time, the character encoding will need to be changed. This can be done by clicking the 'options' button;

Change the DBF character encoding to LATIN1 and click 'OK'.



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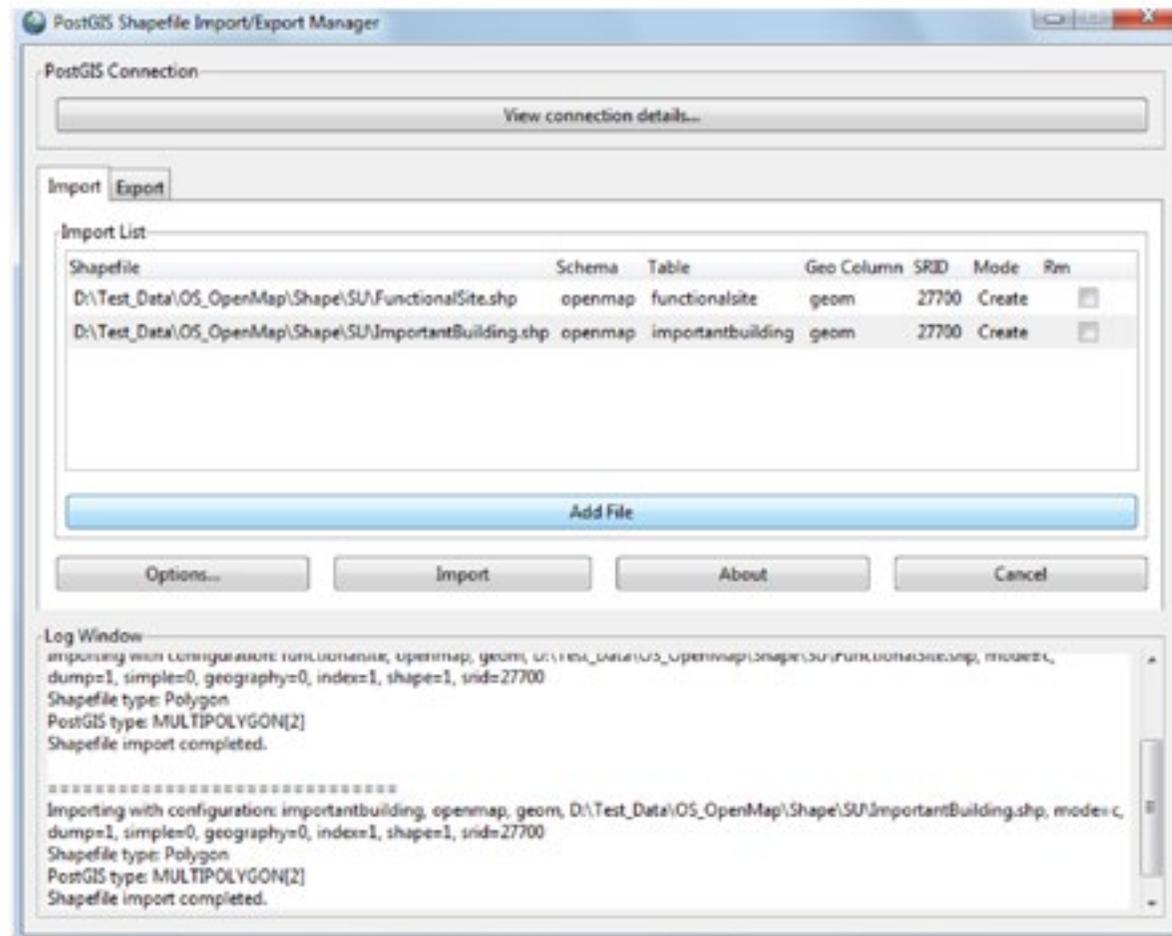
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Changing this should allow the import to complete successfully. For information, the shapefiles which are mostly likely to need this change to be made are the 'named place, important building and functional site' files. This is because these files contain text which may have accents within them which are not part of the UTF-8 character set.

Once the import has been completed, the user can check if the data is loaded properly by refreshing the schema in PGAdmin and opening up the 'table' tree. If the data has loaded correctly, there should be 20 tables in the schema.

The data is now loaded into the PostGIS database and is now ready to be viewed in a GIS application. As QGIS, the open-source GIS, has been developed to work seamlessly with PostGIS, we will open up and view the data using that application. However, any GI application which includes support for PostGIS can be used.

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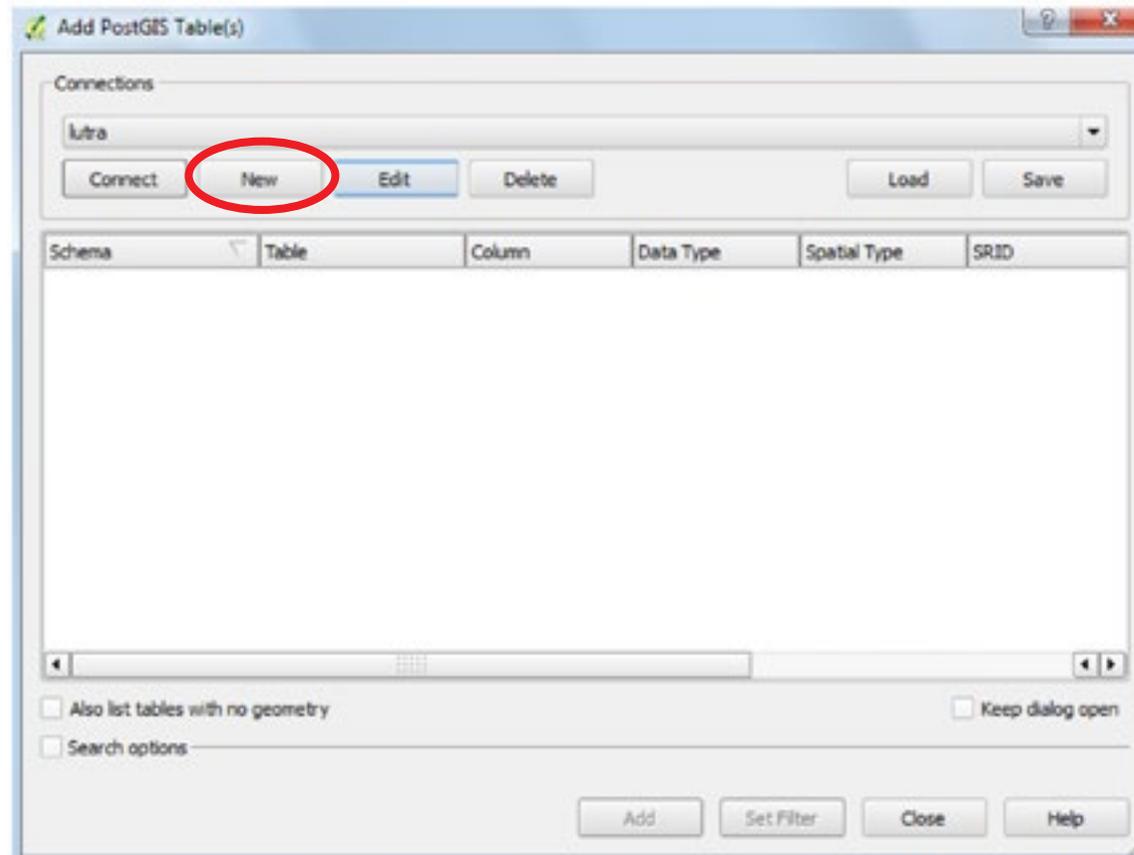
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3.3.2 Viewing the data in QGIS

In QGIS, click on the **'open PostGIS layer'** button on the left hand side of the window.



In the next window, a new connection will have to be set up to the newly created database containing the OS OpenMap-Local data. Click on **'new'**. Another window called **'create PostGIS connection'** will appear. Information will be required to be entered into this window to set up the new connection.

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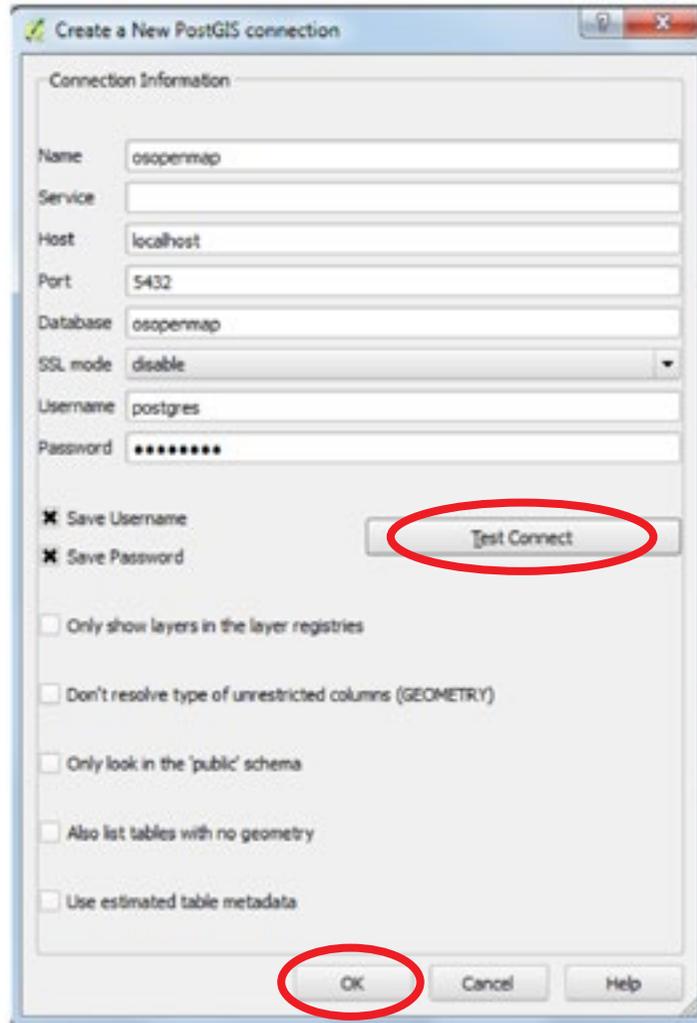
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In this example, the name '**osopenmap**' for the connection has been provided along with the name of the database which holds the data. Click on the '**Test Connect**' button to ensure that the correct connection is made. Once successful, click '**OK**'. If the save username and save password boxes have been clicked, click '**OK**' in the subsequent message box.

A new connection will now be available in the list of PostGIS database connections. Ensuring that the correct one is listed, click on '**connect**'. The schema containing the OS OpenMap-Local data can be seen.

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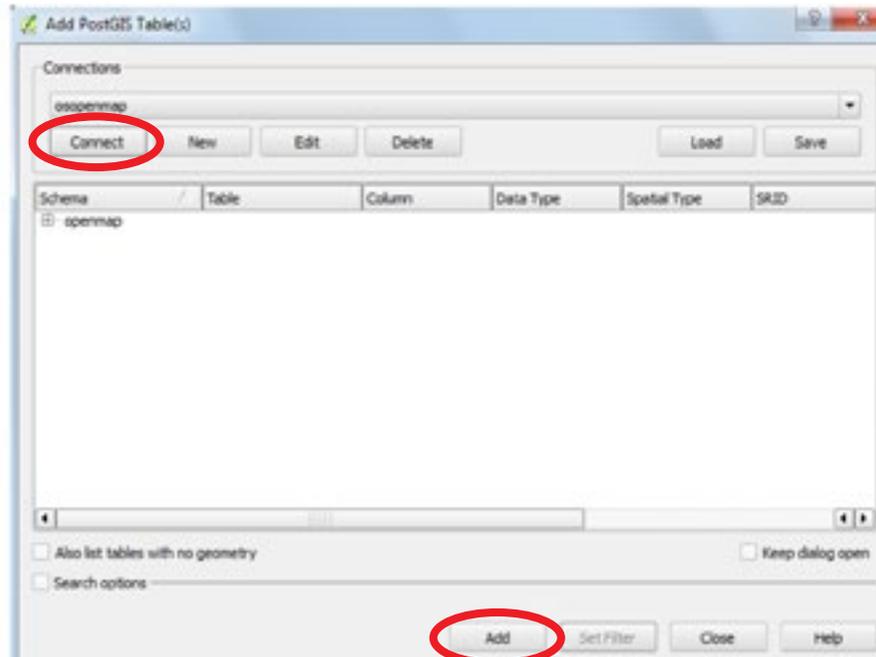
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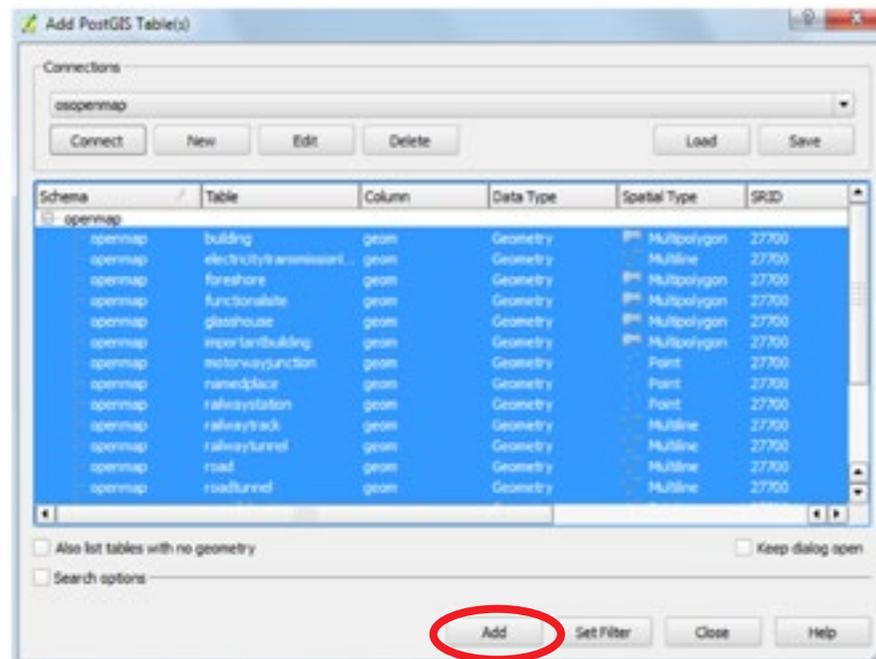
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Click on the + sign next to the schema to expand the list of tables. Select all of the tables within OS OpenMap-Local that are required to be loaded to QGIS. Once all have been selected, click 'Add'.



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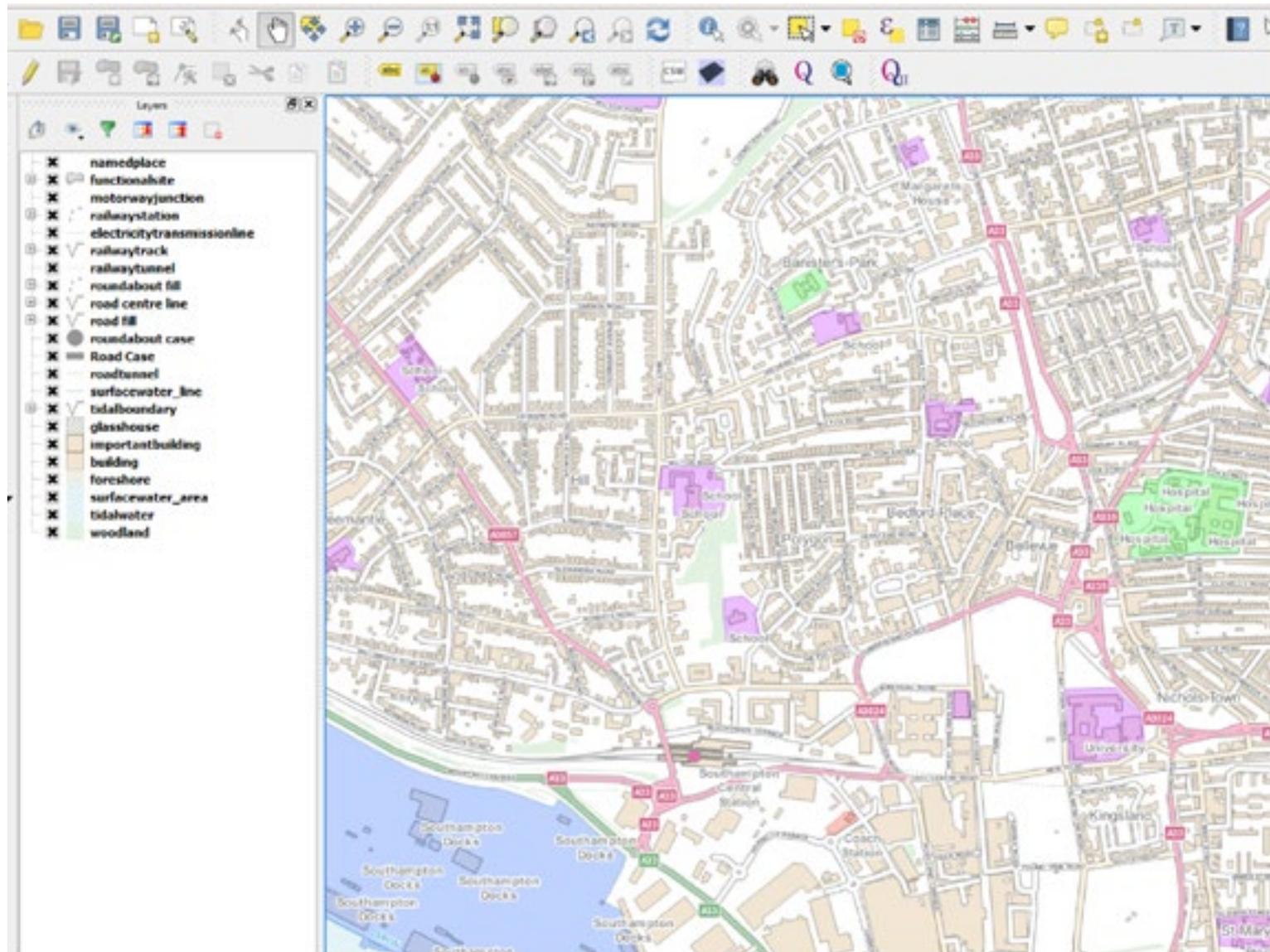
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The OS OpenMap-Local data will load into QGIS. The data will need to be re-ordered and then styled appropriately using personalised style files or the style files available from GitHub published by Ordnance Survey. If using these published files, please consult the accompanying 'Quick Start Guide' as to their use. It should be noted that there is no requirement to add a spatial index to the data from PostGIS as those indexes were added automatically during the loading of the data into PostgreSQL.



If using the published style files, the output should appear as shown above.

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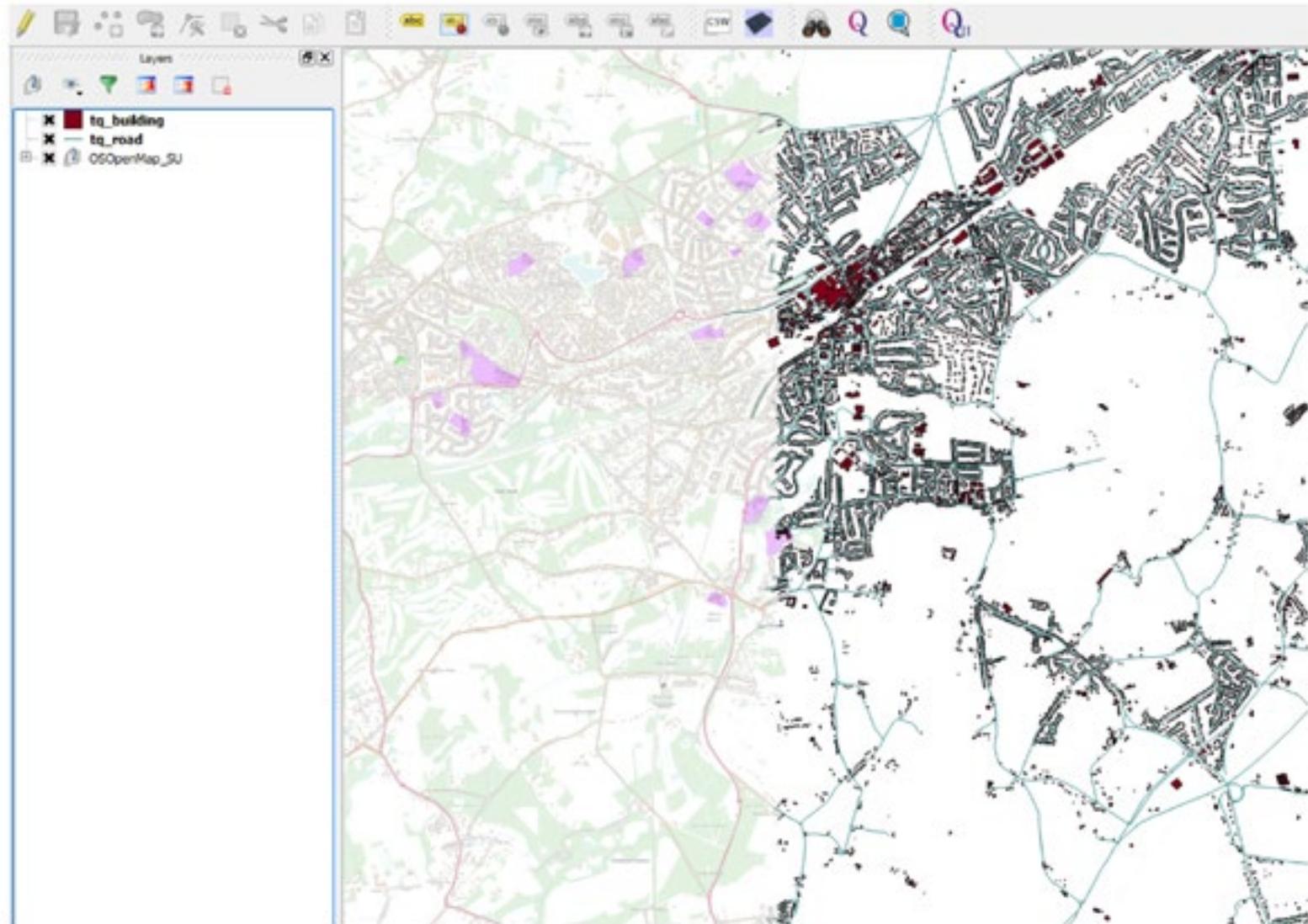
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3.3.3 Using multiple shapefiles in PostGIS

It is possible to load multiple 100km² grid tiles of data into the same schema in PostgreSQL. As the shapefiles have the 100km grid letters as a prefix in the filename, these files will go into separate tables in the schema. It will then be possible to view data across tile edges using QGIS or other GI applications which support PostGIS.



The screenshot above shows data from the SU grid tile (styled) and the buildings and roads from the TQ grid tile (un-styled). However, it should be noted that duplicate features will exist across the tile edges as the data is supplied as 'hairy tiles' as previously indicated.

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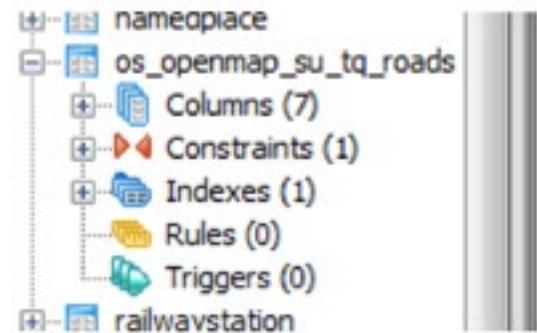
3.3.4 Removing duplicate features in PostGIS

As stated in point 2.3.3 above, if using multiple tiles of data in PostGIS, loading them as described, some features will be replicated across tile edges loaded in different tables of the same features, e.g. in SU_Buildings and TQ_Buildings. If the data is being used for contextual purposes only, this should not be an issue for the user. However, if the data is being used for any kind of analysis involving counts of features, these duplicates will need to be removed to avoid providing spurious results.

It is possible to remove these features using SQL commands in PostgreSQL itself.

- **Using SQL Commands**

Firstly, create a merged file containing the area required using the merge shapefile feature in QGIS documented earlier. In this example, the roads from TQ and SU will be merged. Once created, these merged shapefiles can be loaded into PostgreSQL using the shapefile loader plugin as described above.



Check to see that the merged file has been loaded. This table will contain duplicate features across the tile edges. Using the SQL window in PostgreSQL, a count of the features within the file can be determined using the following command;

```
SELECT COUNT(id)
FROM openmap.os_openmap_su_tq_roads
;
```

In the case above the command is querying the table os_openmap_su_tq_roads in the schema openmap used previously in this guide. The count returned will be as follows in this example;

Data Output	
	count bigint
1	491349

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Using the following command, a new table called os_openmap_su_tq_roads_dissolved will be created in the same schema osopenmap;

```
CREATE TABLE openmap.os_openmap_su_tq_roads_dissolved AS
```

```
SELECT id, distname, roadnumber, classifica, featcode, ST_UNION(geom) AS geom
```

```
FROM openmap.os_openmap_su_tq_roads
```

```
GROUP BY 1,2,3,4,5
```

```
;
```

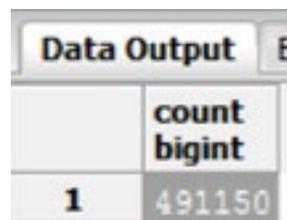
Finally the following command will provide a count of the features in the newly created dissolved table;

```
SELECT COUNT(id)
```

```
FROM openmap.os_openmap_su_tq_roads_dissolved
```

```
;
```

The result of this query is as follows;



	count bigint
1	491150

The user can see, from running this query that the number of features in the newly created table is less than in the original merged table. This indicates that the duplicate features along the tile edges have been removed. It will now be possible to load the dissolved table into QGIS and carry out the required analysis.

- **Using a graphical method in QGIS**

An alternative way to do what has been described above would be to merge the required shapefiles together and de-duplicate using QGIS as described earlier in this document. The user will then have a set of de-duplicated shapefiles which can then be loaded into PostgreSQL/PostGIS and displayed in QGIS using the methods described previously.

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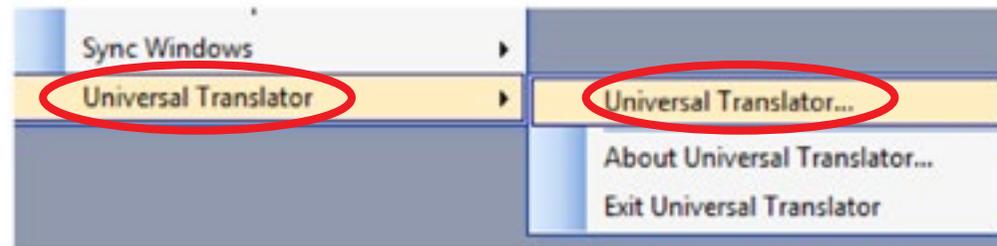
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3.4 MapInfo Professional

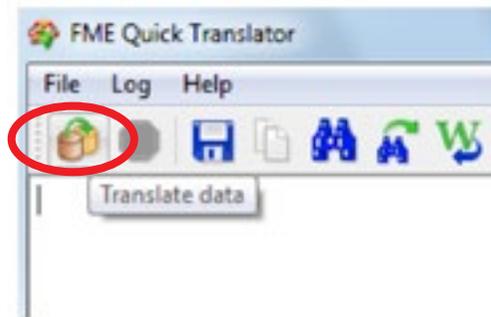
All current commonly used versions of MapInfo Professional are able to open ESRI shapefiles without direct translation. However, for ease of use within MapInfo, it is recommended that users use the universal translator within MapInfo to convert the shapefile supply to MapInfo .TAB files prior to loading the data. This will be described in the procedures for loading the data.

3.4.1 Loading and Displaying Shapefile Supply

In MapInfo Professional, start universal translator from the 'Tools' menu.



Select the translate button at the top left hand side of the dialog box.



In the next box, the user will need to select the translation parameters required. These will include the format of the files being translated, the format to which the data is being translated and the location of the data.

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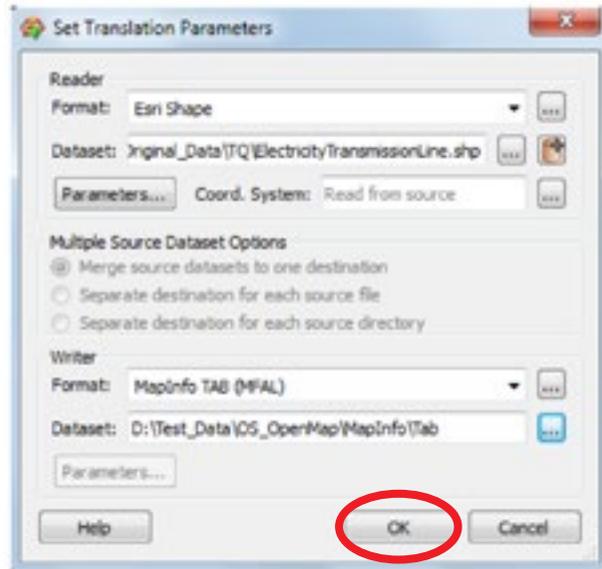
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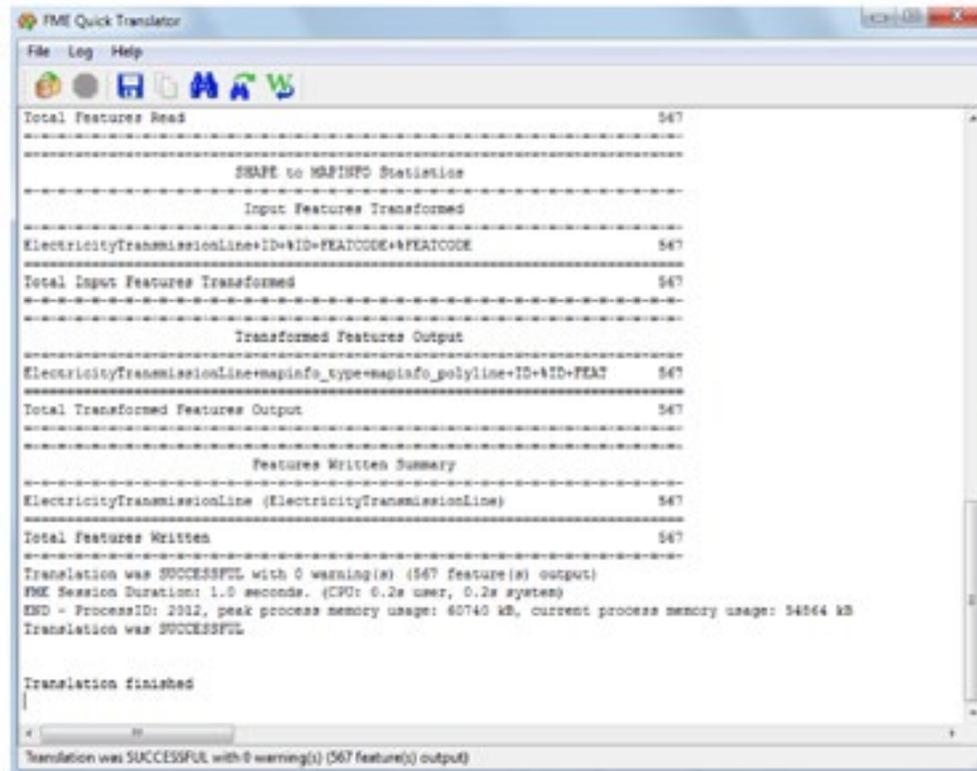
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Once selected, click 'OK'. The translation will then run.



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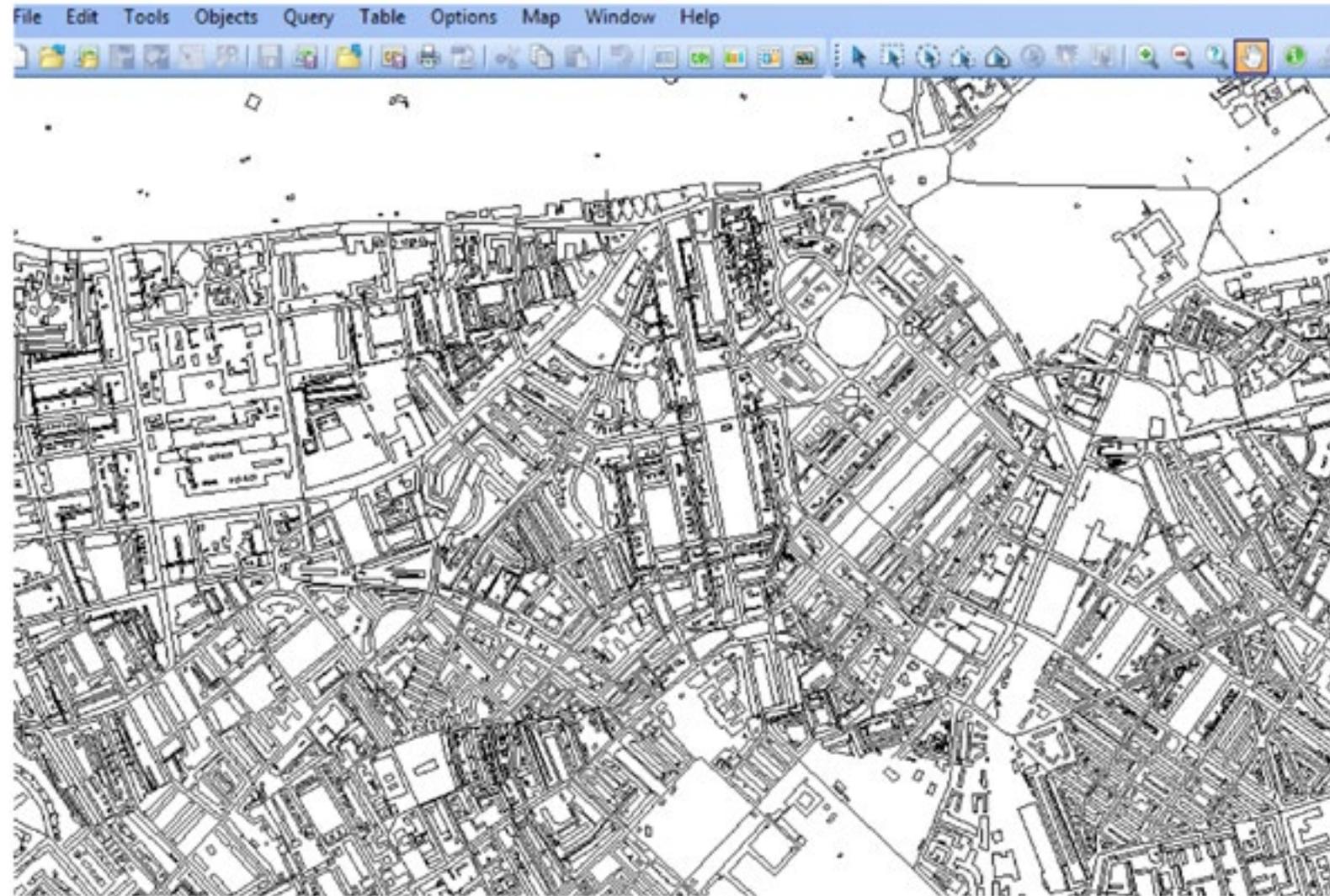
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A message box will appear when the process is complete. The user will now have a MapInfo .TAB file for the selected layer of OS OpenMap-Local. This procedure will have to be repeated for all of the layers within OS OpenMap-Local which are required.

To load the created MapInfo .TAB files into MapInfo Professional simply click '**File – Open**' and navigate to where the files reside. Select the file to be opened. Select '**new mapper**' from the drop-down menu and click '**OK**'. For successive layers (if loading one layer at a time) select 'current mapper' as some of the data is already loaded. A point to note is that MapInfo Professional will open the data un-styled. The screenshot below shows the TQ Buildings and roads layers loaded.



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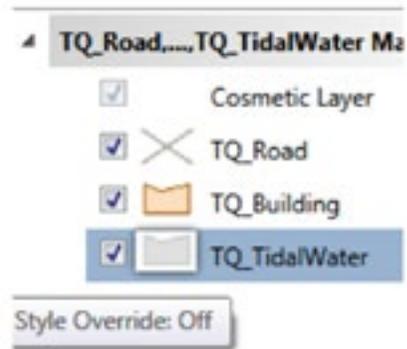
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3.4.2 Styling the data

MapInfo Professional, unlike many other GI applications, is better styled at translation stage because the .TAB format used by MapInfo can retain all of the styling information applied in the translation process – it does not use separate styling files to apply a style to the data. OS OpenMap-Local at the current time is not supplied in MapInfo .TAB format. Therefore, there is no Ordnance Survey published styling information for use in MapInfo Professional at the present time. It is however possible to style the data manually in MapInfo and achieve a pleasing result.

To add a style to a layer which has been loaded, open up the layer control window and then select the style override box;



Click the button and a new region style window will appear. It will then be necessary to select a colour for both the fill and the border for the layer to be styled. When the box containing a number of basic colours appears, select the very south east box (with the pattern in it) and the next window pops up which will allow a specific RGB value to be entered.

Select a suitable RGB layer for the foreground and then for the border. The selected style will now appear for the layer. Repeat this procedure for all of the other layers in OS OpenMap-Local.

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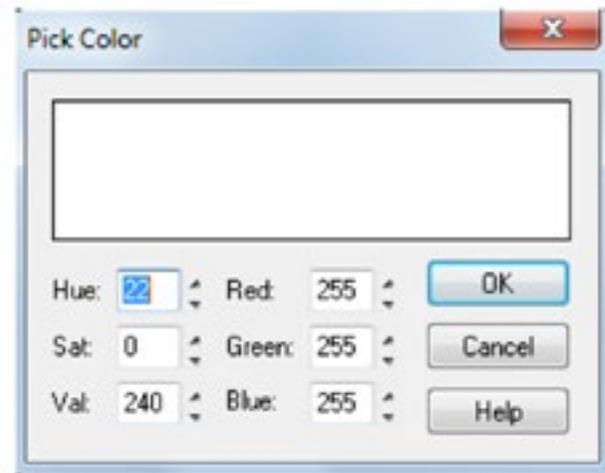
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For the layers within OS OpenMap-Local which require different styles to be applied to different attributes within the layer, it is necessary within MapInfo to select out the different attributes using a query. Once the attribute is selected, it will be possible to style on that attribute, either within the original .TAB file or by creating a new subset .TAB file. This second option will be described here as it allows the end user to have more flexibility in terms of layer ordering and allows different subsets of OS OpenMap-Local to be loaded and used for different requirements.

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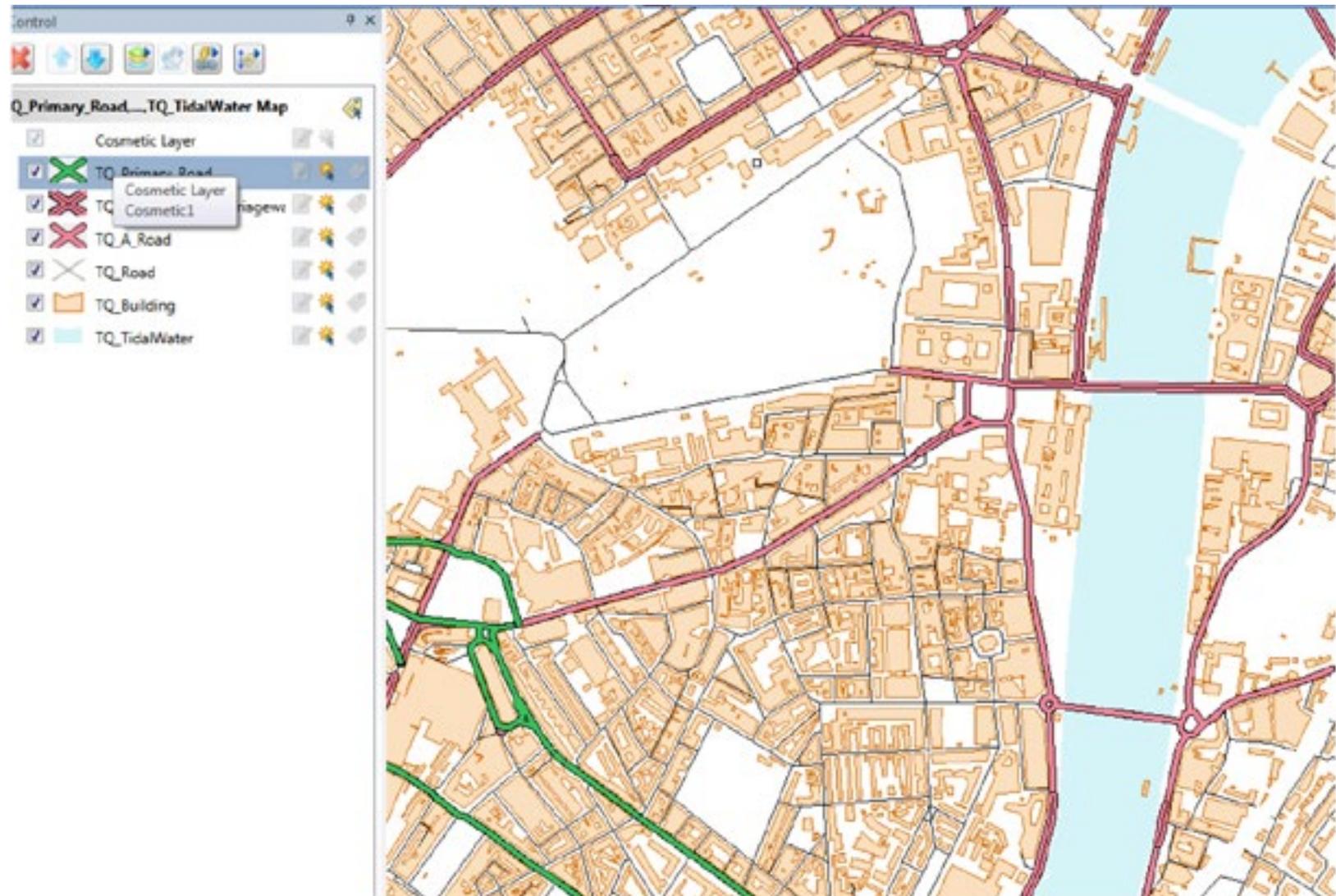
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The example below shows a few of the elements of the 'roads' layer have already been styled;



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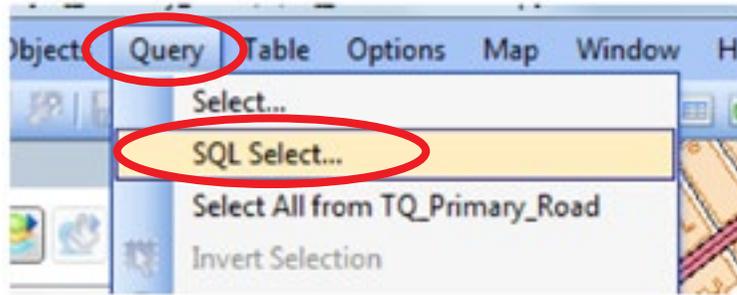
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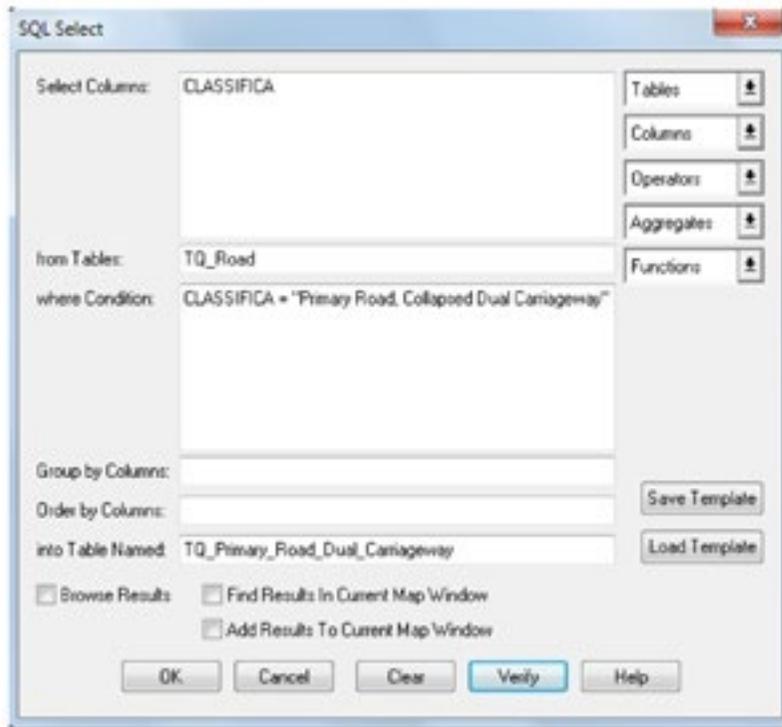
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In the example following, another element of the OS OpenMap-Local 'roads' layer will be styled by creating a new .TAB file for the 'Primary Roads Collapsed Dual Carriageway' element of the TQ_Roads layer.

Firstly, from the main menu, select 'Query' and 'SQL Select'.



In the window that follows enter into the relevant boxes the information required to pull out the primary roads, collapsed dual carriageway element of the roads layer;



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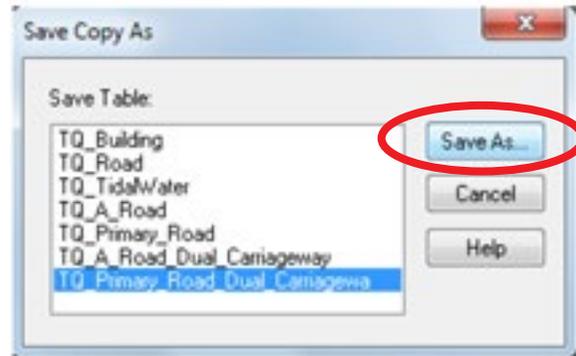
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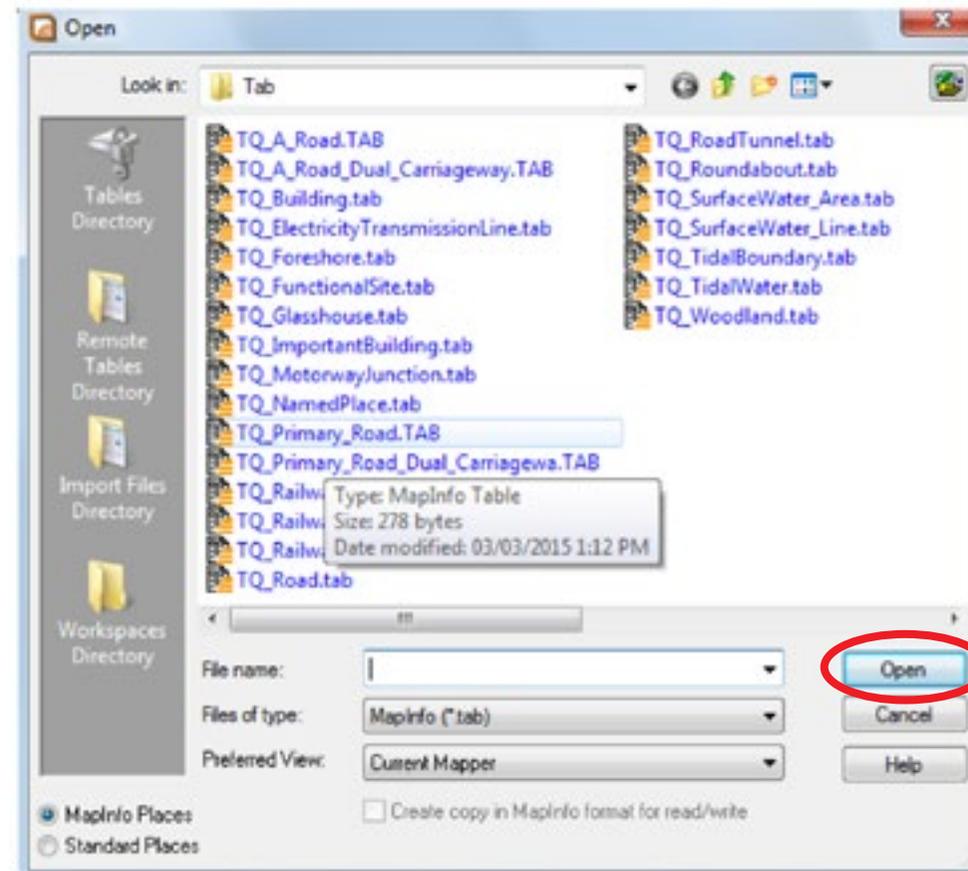
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When creating the new table be sure that the table name being assigned does not contain spaces. Click **'OK'**. MapInfo will now create a new .TAB file query for that element of the data. To save out this query as a .TAB file select from the main menu, **'File, Save Copy As..'** and then select the name of the table. Then click the **'Save As'** button.



At the next window, select the location for the .TAB file and then click **'OK'**. Click **'File, open'** at the main menu and select the newly created table.



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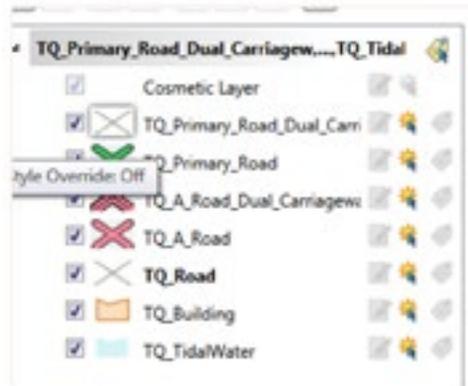
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Once selected, click 'OK'. The new table will appear in the layer control window.



The user can now style this table with an appropriate style as required. A result of this may look like the following depending upon what style is selected.



This procedure will have to be repeated for other elements of the roads layer as required. In OS OpenMap-Local, the functional sites, roundabouts and roads layers will require this approach. All of the other layer elements can be styled on a simple individual basis.

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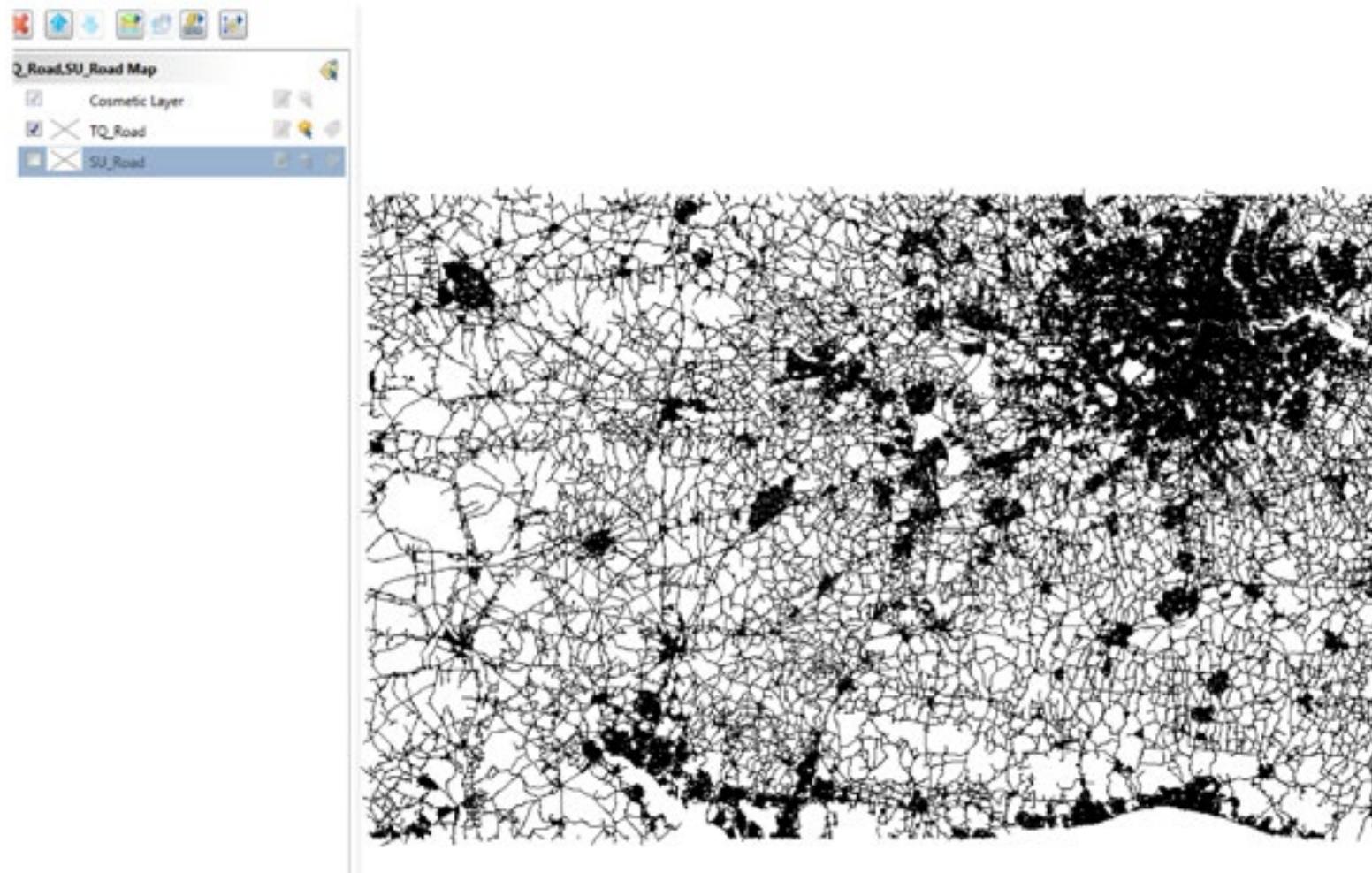
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3.4.3 Merging multiple .TAB files in MapInfo Professional

In MapInfo it is possible to merge the elements of two .TAB files together into one new table using the ‘**append**’ function. This only works for data tables of the same type and will only work for two .TAB files at a time. Please note that the file into which the new data is appended will need to be saved as a new table at the end of the process. This append process will have to be repeated for all elements of the OS OpenMap-Local data if two areas are required.

If the user wishes to merge elements of more than two .TAB files together at the same time, for example, if there was a requirement to combine the elements of TQ, SU and TL together; the user would have to use another solution. A number of custom built script files have been written for MapInfo and are available on the internet. An alternative would be to use the freely available open-source GIS QGIS to merge the shapefiles together before creating the .TAB files in MapInfo. The user should be aware that these merged tables will contain duplicate features.



The example shows the result of appending the SU_Roads element of OS OpenMap-Local into the TQ_Roads table. The ‘**TQ_Roads_merged**’ table should be saved as a copy of the TQ_Roads table to keep the merged data.

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3.4.4 Deleting Duplicate entries from the merged table

There are several ways of doing this in MapInfo Professional. One of the ways using SQL queries is described in the MapInfo knowledge base article which can be found here;

http://testdrive.mapinfo.com/techsupp/miproduct/nsf/kbase_by_product/0E37D7B26ED824168525629900805DD2

3.4.5 Loading GML data into MapInfo Professional

OS OpenMap-Local is supplied in GML version 3.2.1. At the current time, most versions of MapInfo Professional will not import this version of GML data. Version 12.5 of MapInfo Professional does read the latest version of GML data but this has not been tested. The only alternative way of loading GML data to MapInfo would be to use third party translation software. Some of this is open-source and some is commercial.

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