



ORDNANCE SURVEY GB

GETTING STARTED WITH VECTOR TILES

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Version history

Version	Date	Description
1.0	09/2021	Initial release.

Contact details

[OS website 'Contact us' page \(https://www.ordnancesurvey.co.uk/contact-us\)](https://www.ordnancesurvey.co.uk/contact-us).

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I. Introduction

This guide explains what vector tiles are, lists the key features and benefits of the format, and details the applications that support vector tiles. Section 2 provides step-by-step instructions on how to install vector tiles data in QGIS and Cadcorp. Section 3 details how to install vector tiles in Mapbox. Section 4 provides information on hosting and serving your own vector tiles, while Section 5 gives step-by-step instructions on using OS styles on vector tiles you have created.

In response to customer feedback on preferred data formats, a growing number of OS products have been made available in vector tile format, including OS Open Zoomstack, Boundary-Line, OS Terrain 50, OS Open Roads and OS Open Greenspace, to name a few. We also have the OS Vector Tile API on the [OS Data Hub \(https://osdatahub.os.uk/\)](https://osdatahub.os.uk/) if you want to connect directly to OS-hosted vector tiles.

I.1 What are vector tiles?

Vector tiles are clipped tiles, or grid squares, composed of layers of vector features which are optimised for caching, scaling, and producing map imagery quickly. They serve in a similar way to raster tiles but have the added functionality of being customisable by users.

A vector tile represents a specific area of the Earth's surface and contains geographic information about the coverage area. Each tile can contain many layers of features, such as buildings, roads, rivers, greenspaces, etc. Vector tiles are packets of geographic data which have been packaged into tiles for transfer over the web. The information they contain can be used to deliver styled vector data and web maps to the end-user.

Note: OS supplies data in the Mapbox Vector Tile Specification, packed in a single MBTiles file (which is based on the SQLite database). This is a Mapbox-specific vector tile format. Other specifications are available; however, this document will reference MBTiles only.

I.2 Key features and benefits of vector tiles

Vector tiles offer users the following key features and benefits:

- User customisation and styling functionality – customise your map with full and dynamic design control.
- Small file size – lightweight tiles that are efficient and quick to render in your client application.
- Pixel perfect maps – high-resolution, beautiful mapping for all devices (web and mobile devices).
- Snapping ability – due to the data being vector, data can be snapped to and traced.
- Smooth zooming and scaling effect – a seamless user experience when zooming in and out of maps.
- Advanced features – vector tiles contain geographic data (not just images) which can be interrogated and analysed.
- Offline maps – store the tiles locally to take your maps offline (for example, on mobile devices).
- Data will be supplied in Web Mercator projection (EPSG:3857).

2. Installing vector tiles in GIS software

The following sub-sections provide step-by-step instructions on how to install vector tiles data in QGIS and Cadcorp.

2.1 Installing vector tiles data in QGIS

Requirements:

- QGIS (version 2.10.1 or later)
- Vector Tiles Reader plugin for QGIS (if using older versions of QGIS)
- Vector tiles

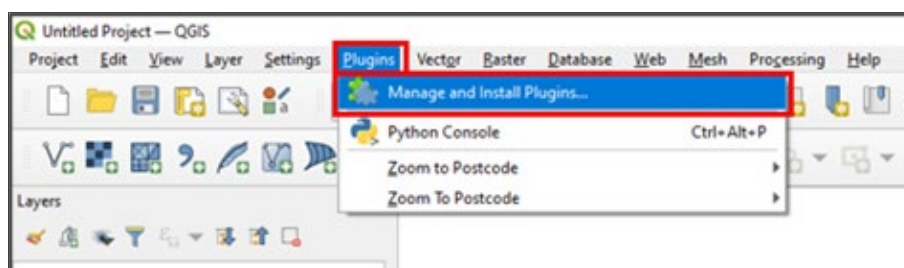
These instructions were created using QGIS version 3.14 – a Long Term Release version, but versions from 2.10.1 onward will also support vector tiles features.

*Note: In more recent versions of QGIS (i.e. from QGIS version 3.16 onward), vector tiles are supported natively and the MBTiles files can be dragged-and-dropped straight into a project; therefore, you won't need to use the Vector Tiles Reader plugin. **If you are using QGIS version 3.16 onward, the following instructions will still be applicable, but you can skip Step 3.***

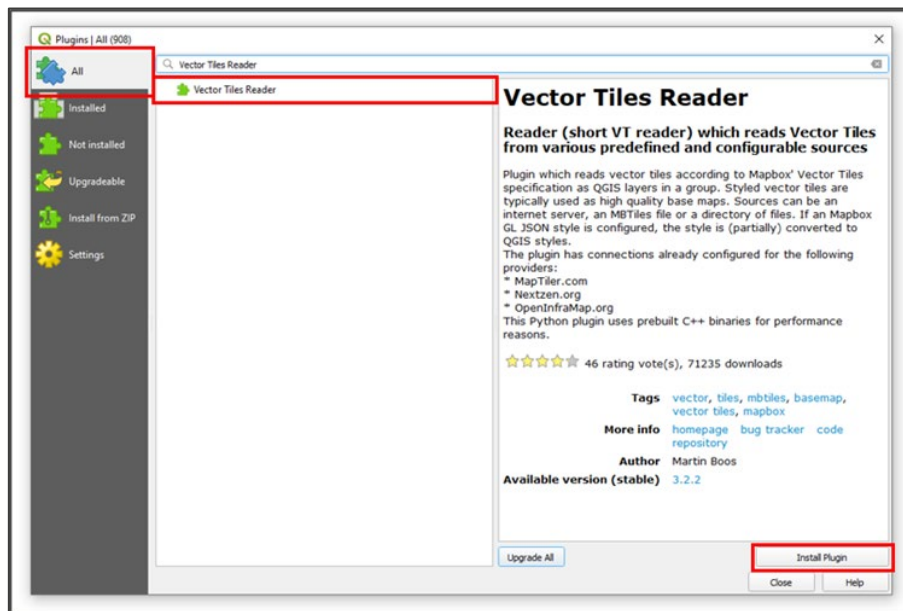
1. Download your vector tiles (MBTiles) and save them in your preferred location.
2. Load QGIS Desktop and open a new or existing project.
3. To use vector tiles in QGIS, the Vector Tiles Reader plugin must first be installed. If the plugin is already installed, skip to Step 4.

Note: These instructions are based on version 3.2.2 of Vector Tiles Reader plugin. [More information and help with the Vector Tiles Reader QGIS plugin](https://github.com/geometalab/Vector-Tiles-Reader-QGIS-Plugin/wiki/Help) (<https://github.com/geometalab/Vector-Tiles-Reader-QGIS-Plugin/wiki/Help>) can be found on GitHub.

- a. From the top ribbon of the workspace, click *Plugins > Manage and Install Plugins...*

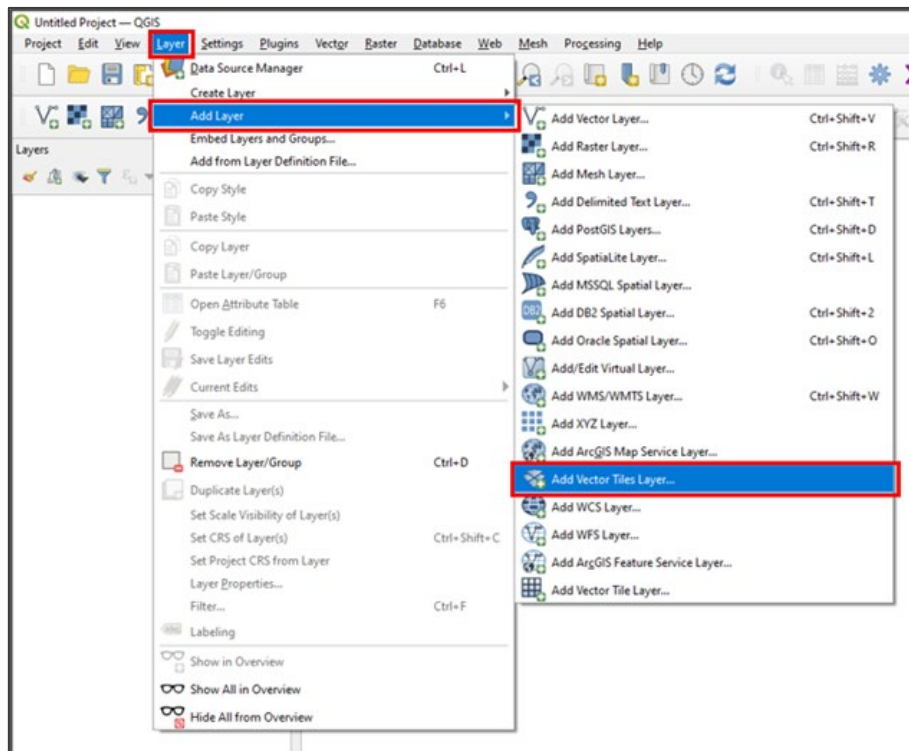


- b. In the dialog box, select the *All* tab, and either scroll to *Vector Tiles Reader* or type it into the search bar.

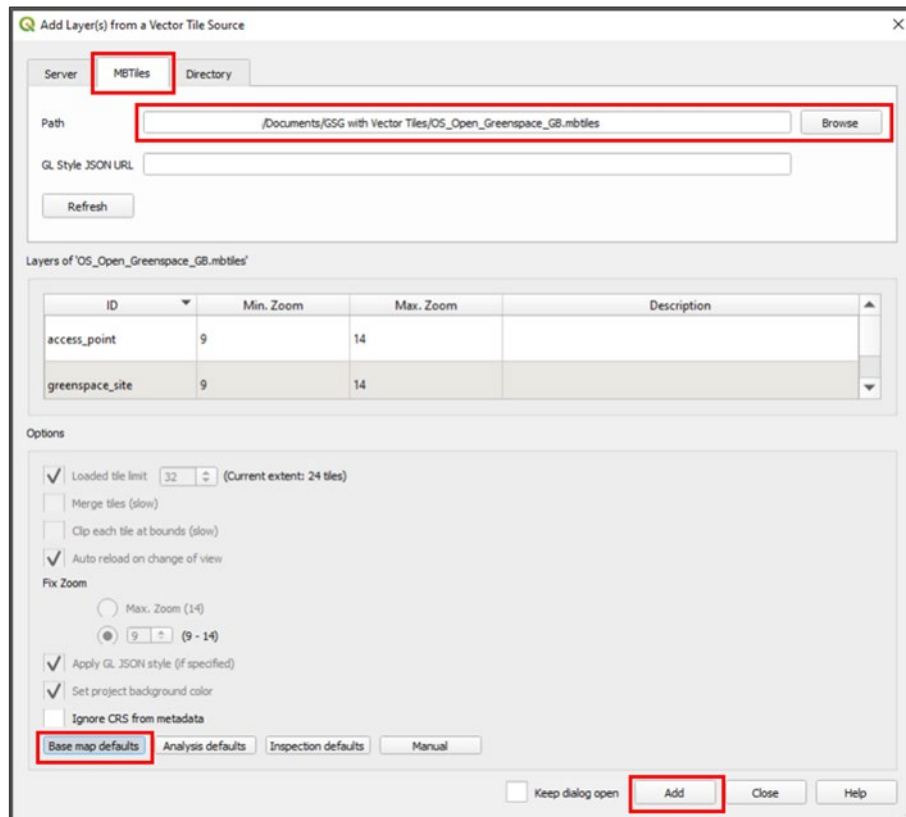


- c. Select the *Vector Tiles Reader* plugin and click *Install Plugin*. Wait for the plugin to install, and once complete, click *Close*.

4. From the top ribbon of the workspace, click *Layer > Add Layer > Add Vector Tiles Layer...*



5. In the Add Layer(s) from a Vector Tile Source dialog box, select the *MBTiles* tab and then click *Browse*.



6. In the file explorer, navigate to your saved vector tiles and click *Open*.
7. In the Options section, select the *Base map defaults* option.
- Note that the Base map defaults option sets the maximum number of loaded tiles as 32. You can decrease or increase this limit as preferred if you select the *Manual* option instead.
 - Note that the greater the number of tiles loaded, the greater the resulting impact on performance and the longer the loading times for the data.
8. Click *Add*.

The data will now appear in your Layers Panel and will render in your map window.

9. Click *Close* to return to the map window.

2.2 Installing vector tiles data in Cadcorp

Requirements:

- Cadcorp SIS Desktop (version 9)
- Vector tiles

The following sub-sections outline two methods for installing vector tiles in Cadcorp.

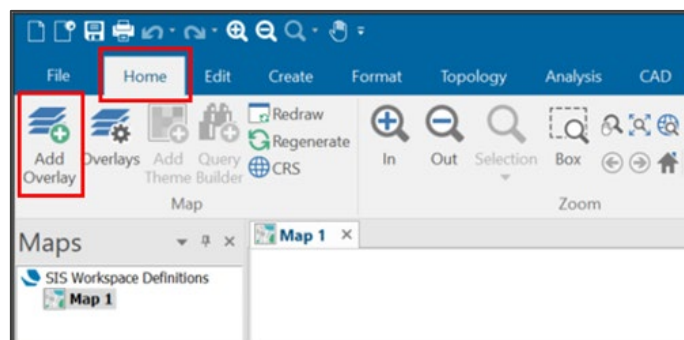
2.2.1 Method 1: Drag-and-drop

1. Download your vector tiles (MBTiles) and save them in your preferred location.
2. Start Cadcorp SIS Desktop and open a new or an existing map window.
3. Navigate to your saved vector tiles in file explorer and drag-and-drop the file into the map window.

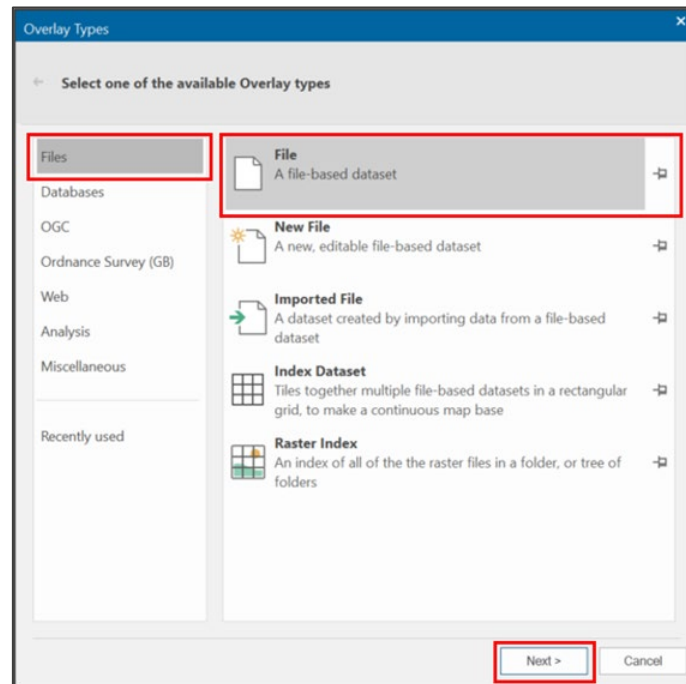
The data will appear in your Maps Control Bar and render in your map window.

2.2.2 Method 2: Add Overlay

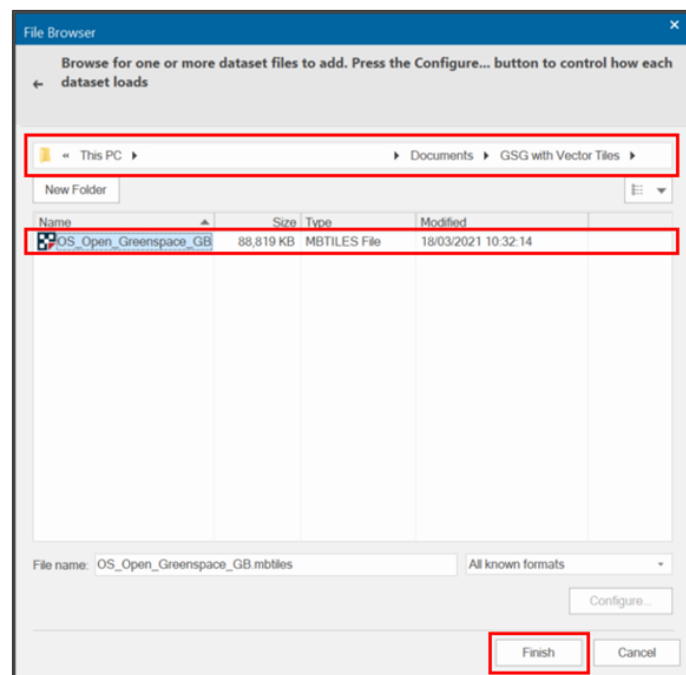
1. Download your vector tiles (MBTiles) and save them in your preferred location.
2. Start Cadcorp SIS Desktop and open a new or an existing map window.
3. In the upper ribbon, navigate to the *Home* tab and click *Add Overlay*.



4. In the Overlay Types dialog box, select *Files > File* as the Overlay type, then click *Next*.



5. In the File Browser dialog box, navigate to and select your saved vector tiles, then click *Finish*.

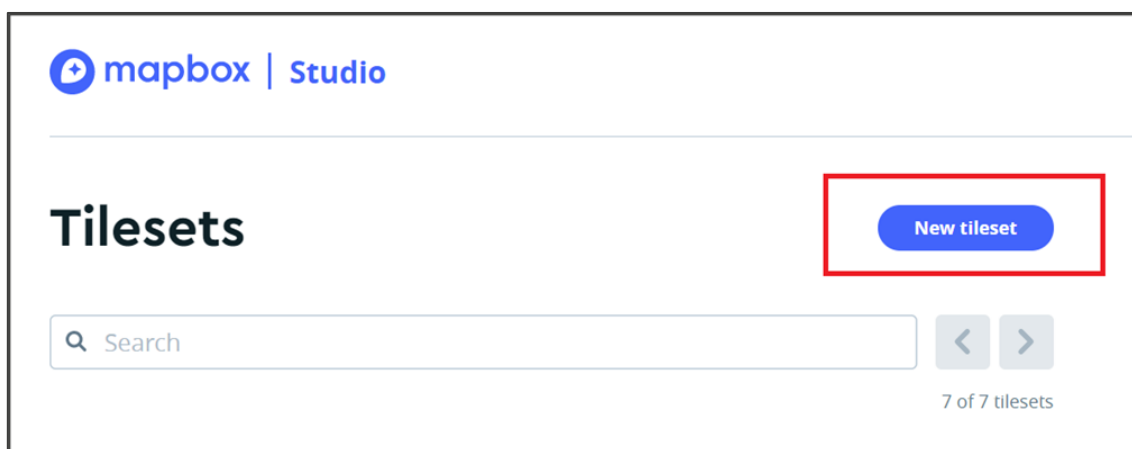


The data will now appear in your Maps Control Bar and render in your map window.

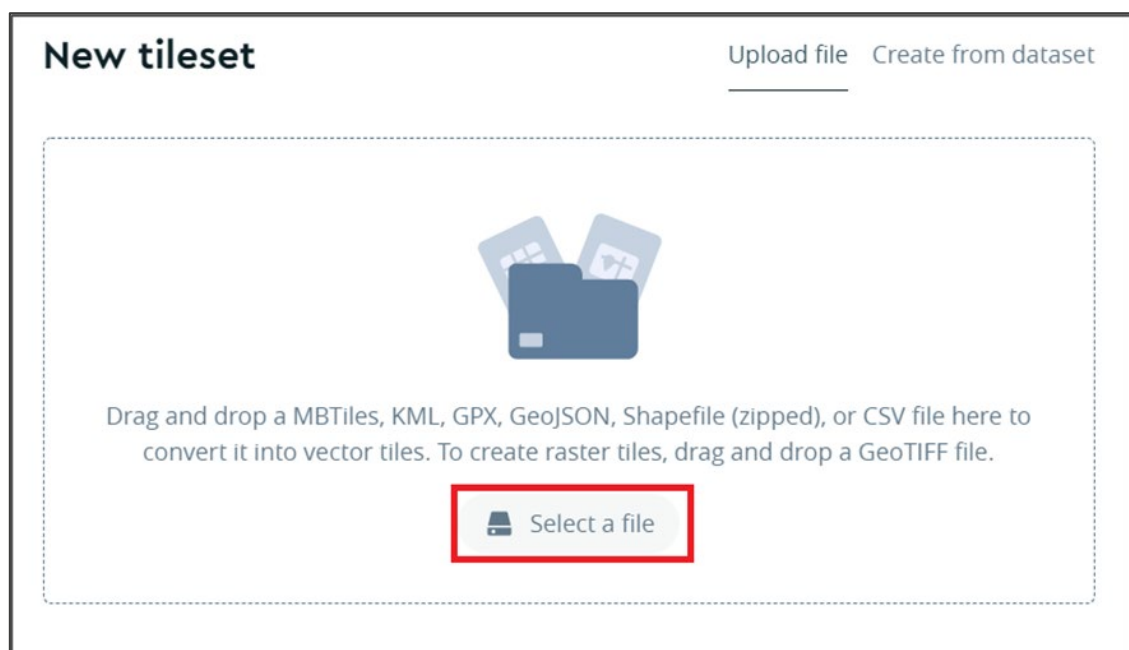
3. Installing vector tiles in Mapbox

Requirements:

- A Mapbox account
 - Vector tiles
1. Download your vector tiles (MBTiles) and save them in your preferred location.
 2. Navigate to [Mapbox Studio](https://www.mapbox.com/mapbox-studio/) (<https://www.mapbox.com/mapbox-studio/>) and login to your account.
 3. The vector tiles can be uploaded in the [Tilesets section of Studio](https://studio.mapbox.com/tilesets/) (<https://studio.mapbox.com/tilesets/>). In the Tilesets page, click *New tileset*.



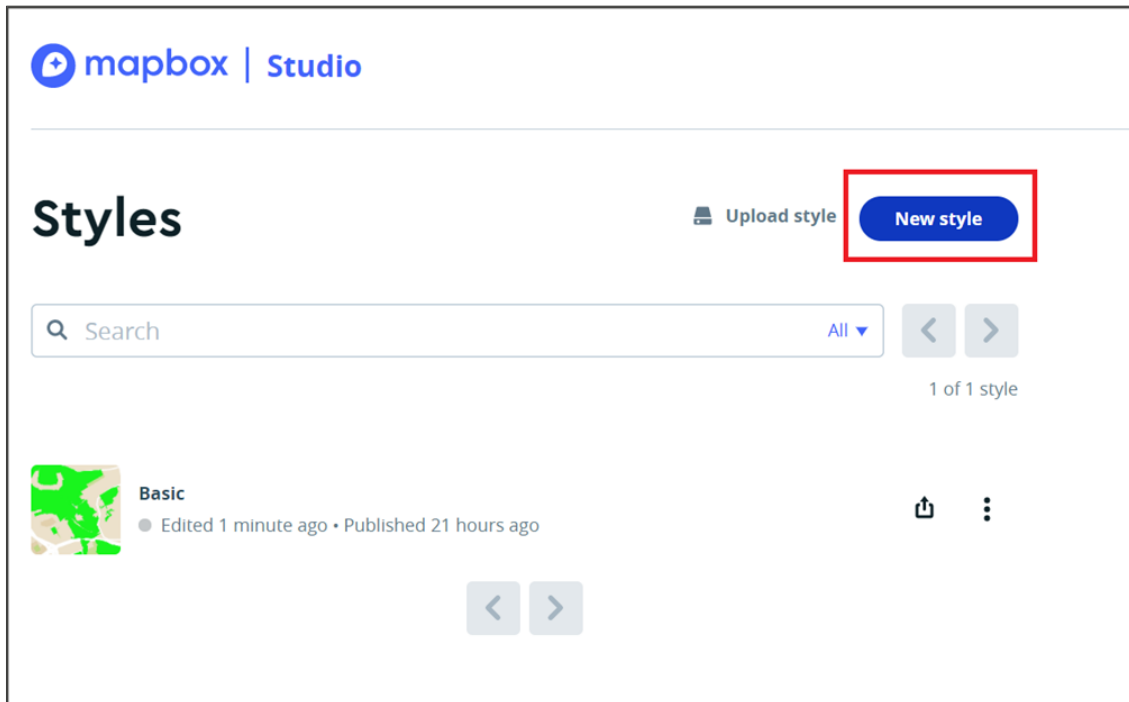
4. In the New tileset pop-up, click *Select a file* and navigate to the saved location of your MBTiles.



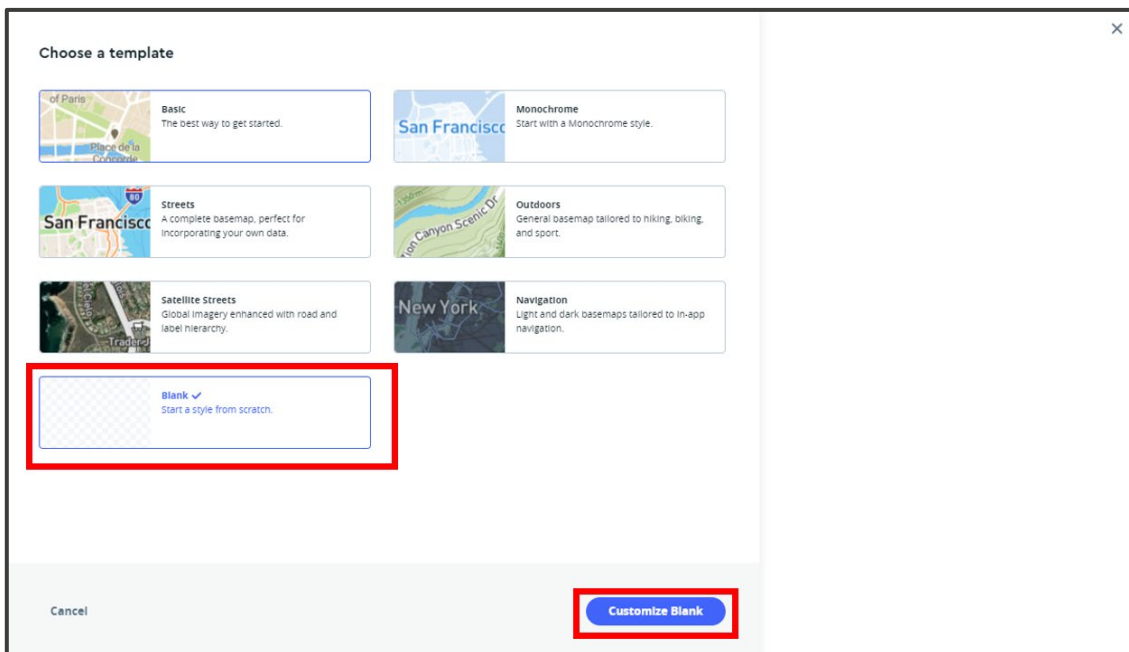
The upload will begin, and a notification will appear once it is complete.

Note: There is an upload limit within Mapbox Studio of 300mb per upload and 20 uploads per month.

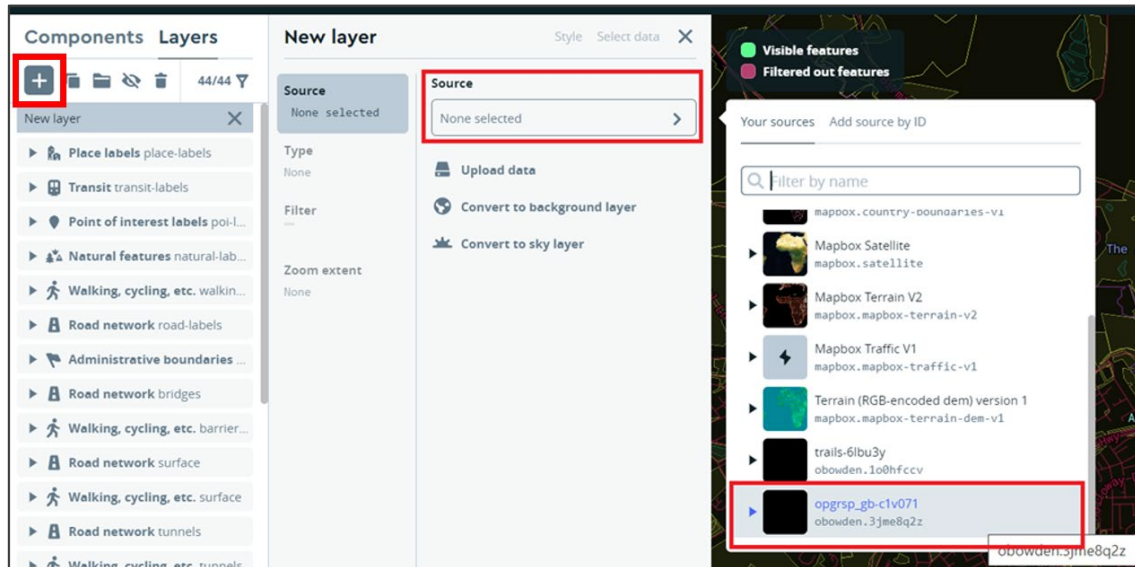
5. Navigate to your Styles page in Studio and either start a new style or customise an existing one.



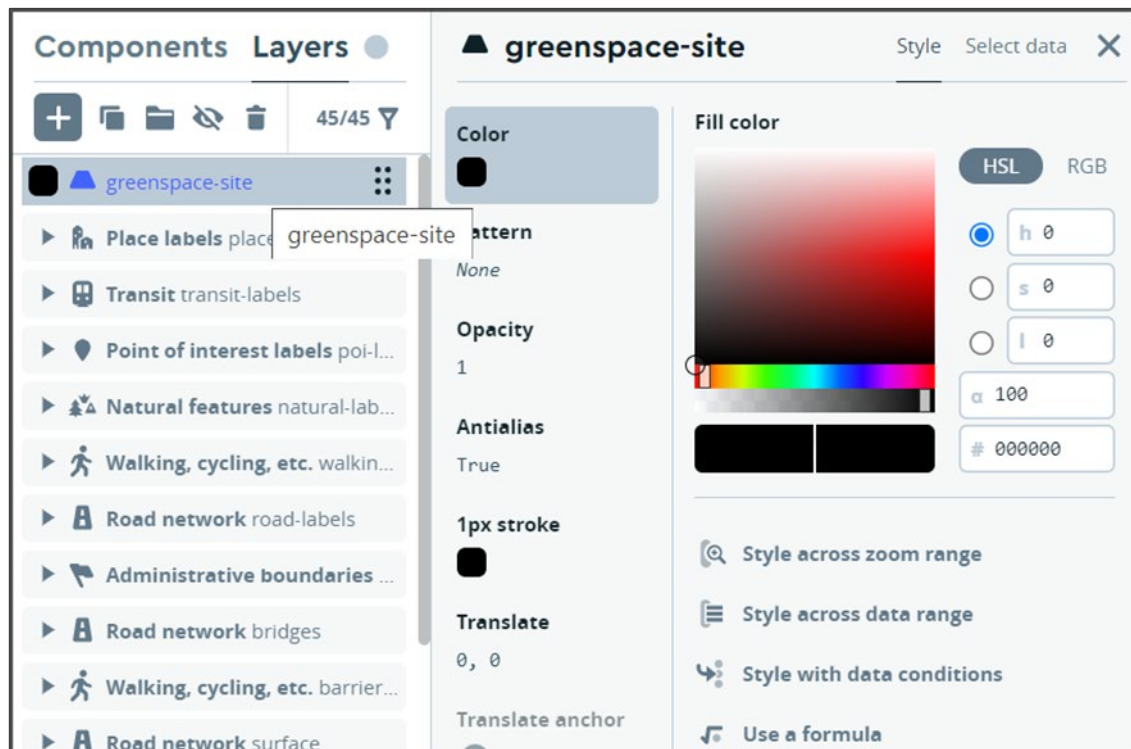
6. A pop-up will appear that allows you to select a template style or create one from scratch. Select the *Blank* template to begin styling your MBTile upload. Click *Customize Blank*.



7. From the Styles page, click **Add data** to start the process of uploading your vector tiles. Add layers by selecting the *plus icon* in the top left-hand corner. Click **Source** and, from the drop-down list, add your tileset to the Layers list.



8. Your MBTile layer will appear in your Layers list. From here, you can style the layer.



4. Hosting and serving your own vector tiles

There are a couple of benefits associated with hosting and serving your own vector tiles:

- There are no thresholds when uploading your own data to create the tiles.
- You don't need external connectivity to use the tiles as the hosting can be done locally (i.e. you can work offline with the vector tiles).

There are numerous options if you want to host and serve your own vector tiles. The following GitHub repositories have comprehensive lists of the available options for vector tiles and those available specifically for MBTiles:

- [GitHub repository listing choices available for hosting and serving your own vector tiles](https://github.com/mapbox/awesome-vector-tiles/blob/master/README.md) (<https://github.com/mapbox/awesome-vector-tiles/blob/master/README.md>).
- [GitHub repository listing choices available for hosting and serving your own MBTiles](https://github.com/mapbox/mbtiles-spec/wiki/Implementations) (<https://github.com/mapbox/mbtiles-spec/wiki/Implementations>).

If you want to export an MBTiles file to a directory of files, you can use open-source tools such as [Tippecanoe](https://github.com/mapbox/tippecanoe/) (<https://github.com/mapbox/tippecanoe/>) or [MBUtil](https://github.com/mapbox/mbutil) (<https://github.com/mapbox/mbutil>).

5. Using OS styles on vector tiles you have created

It is possible to use OS styles on vector tiles you've created. The following step-by-step instructions outline how to do this:

1. Download and unzip the appropriate product folder of stylesheets from [GitHub](https://github.com) ([https://github.com/](https://github.com)), for example, [OS's OS-Open-Zoomstack-Stylesheets repository on GitHub](https://github.com/OrdnanceSurvey/OS-Open-Zoomstack-Stylesheets) (<https://github.com/OrdnanceSurvey/OS-Open-Zoomstack-Stylesheets>).
2. Once you've downloaded and unzipped the folder of stylesheets, navigate to *Vector Tiles > Mapbox GL Styles*.
3. If appropriate, choose the style you want to use and open the .json file (for example, OS Outdoor.json) in a text editor.
4. Find the following piece of code near the top of the file and enter your data source URL where it says **ADD-SOURCE-URL-HERE**:

```
"sources": {  
  "composite": {  
    "url": "mapbox://ADD-SOURCE-URL-HERE",  
    "type": "vector"  
  }  
},
```

Note: You can find [more information on the different source types](https://docs.mapbox.com/mapbox-gl-js/style-spec/sources/) on Mapbox's documentation site (<https://docs.mapbox.com/mapbox-gl-js/style-spec/sources/>).

5. Save the .json file.

The style is now ready to use. You can customise the style if you want to (for example, you could adapt the style of a map to match your own brand colours). [Maputnik](https://maputnik.github.io/) (<https://maputnik.github.io/>) is a good open-source map editor tool for creating and customising vector tile styles.

Annex A: Additional resources

The following OS blog posts contain useful information about vector tiles:

- [OS blog post: The benefits of vector tiles](https://www.ordnancesurvey.co.uk/newsroom/blog/the-benefits-of-vector-tiles) (<https://www.ordnancesurvey.co.uk/newsroom/blog/the-benefits-of-vector-tiles>)
- [OS blog post: Creating your own vector tiles](https://www.ordnancesurvey.co.uk/newsroom/blog/creating-your-own-vector-tiles) (<https://www.ordnancesurvey.co.uk/newsroom/blog/creating-your-own-vector-tiles>)
- [OS blog post: An interactive house prices map with OS data](https://www.ordnancesurvey.co.uk/newsroom/blog/house-prices-map-os-data) (<https://www.ordnancesurvey.co.uk/newsroom/blog/house-prices-map-os-data>)