

QGIS Routing and Distance Tools

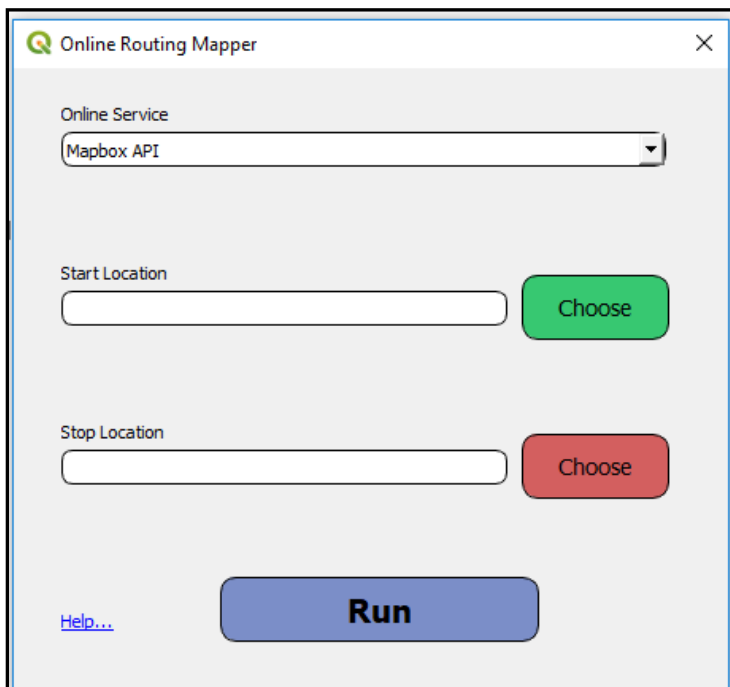
QGIS provides access to a number of different **Distance** and **Routing Tools**, some for free and others utilise API's which may have a monthly price plan. This blog provides an overview of some of the ones that Cadline have enjoyed using.

1 - Point to Point Routing:

If you wish to calculate the route from one location to another here are two useful tools.

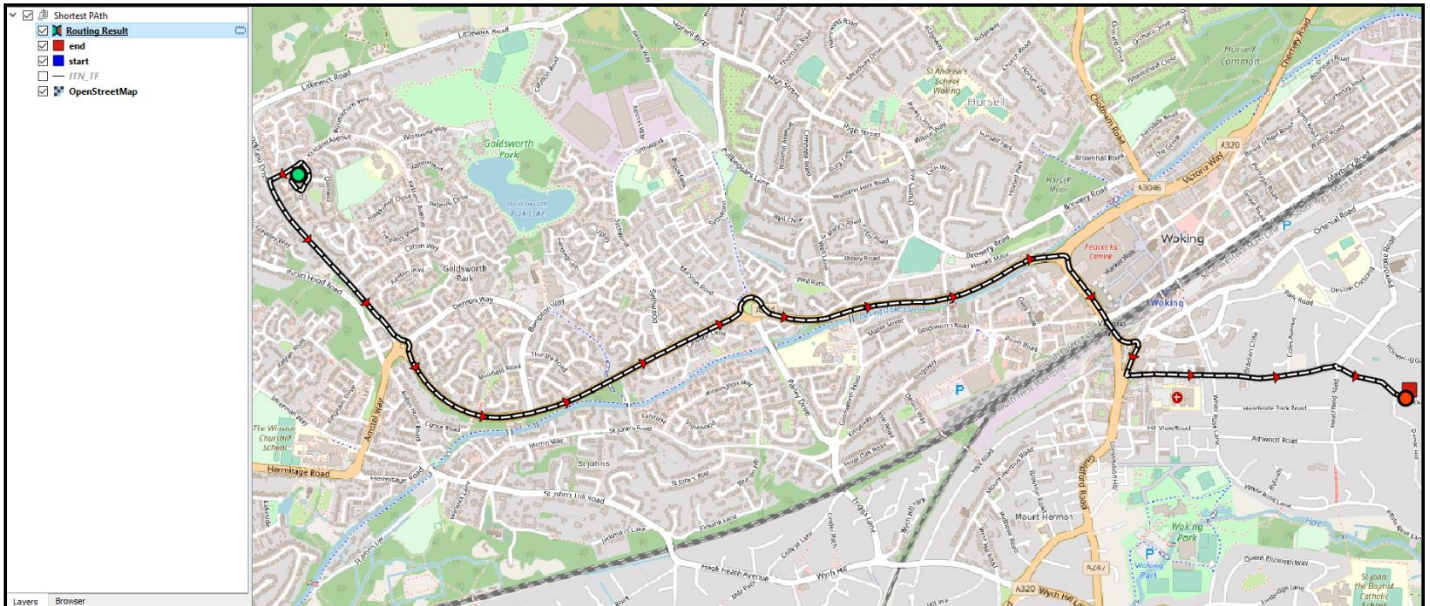
1.1 Online Routing Mapper:

The Online Routing Manager is a plugin available for QGIS. Once the plugin has been installed simply choose from the list of **Online Services** – some are free, and others require an API to use them – here we will use the OpenSource **Mapbox** service.



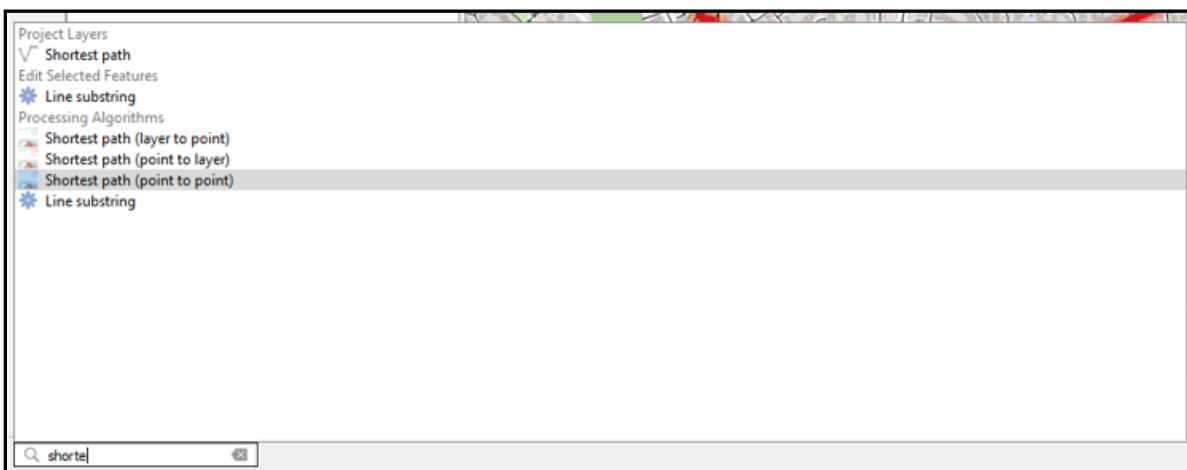
The screenshot shows the 'Online Routing Mapper' dialog box in QGIS. It features a dropdown menu for 'Online Service' with 'Mapbox API' selected. Below this are two input fields: 'Start Location' and 'Stop Location', each with a corresponding 'Choose' button. At the bottom, there is a 'Run' button and a 'Help...' link.

Then click the **Green Choose** button and click in the map to define the **START** location and then click the **Red Choose** button and click in the map to define the **END** location. Then press **RUN** and the route is calculated and added to the map as a **Scratch layer** that can be exported and shared with others.



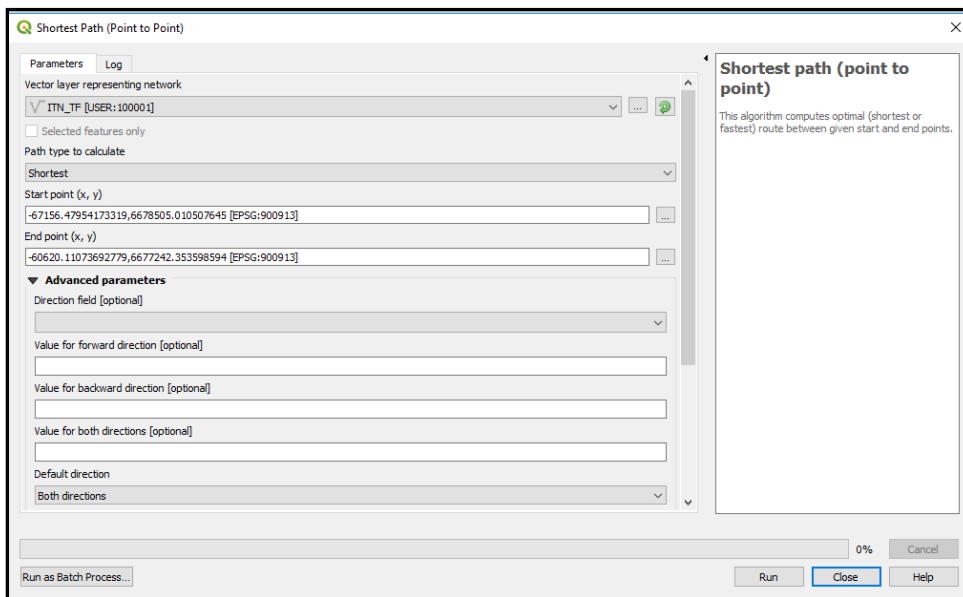
1.2 Shortest path:

If you wish to use your own Road Network e.g. **ITN** or the **Highways** Layer, then QGIS 3.4 onward now ships with the **Shortest Path** tool fully packaged. In previous versions of QGIS, you will need to install it as a Plugin. In QGIS 3.4 and onwards simply search for shortest in the **Search bar** and choose your tool e.g. **Point to Point**.

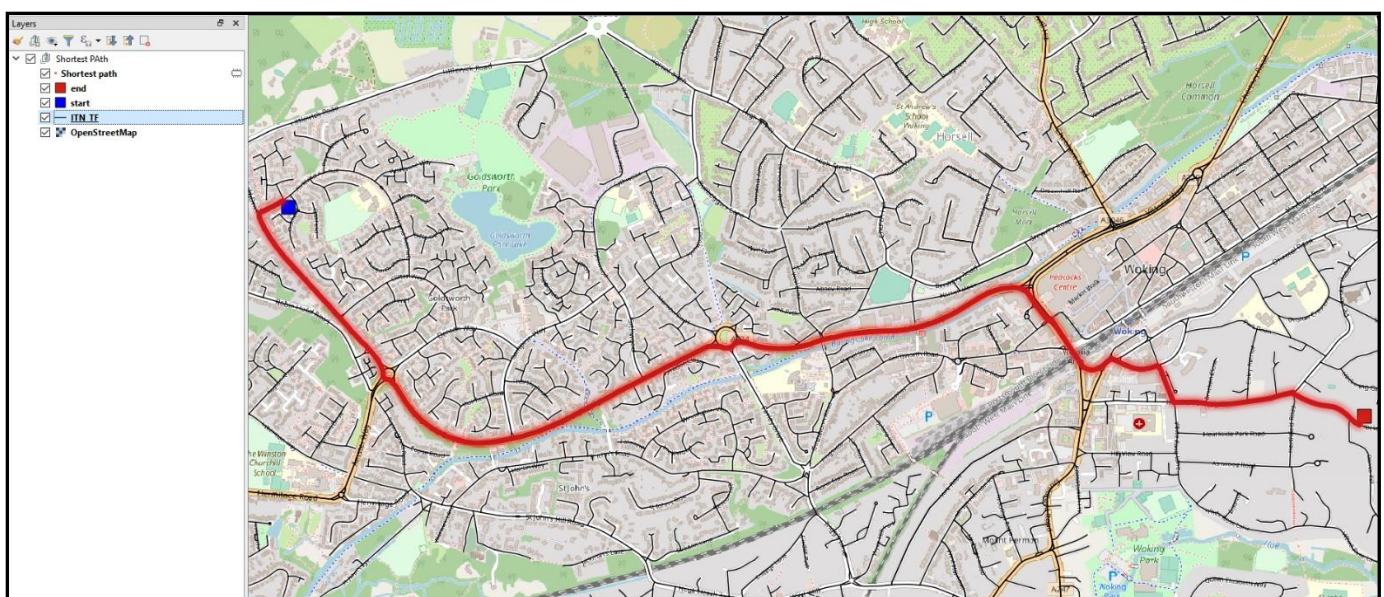


The tool now opens in its own window, allowing you to define;

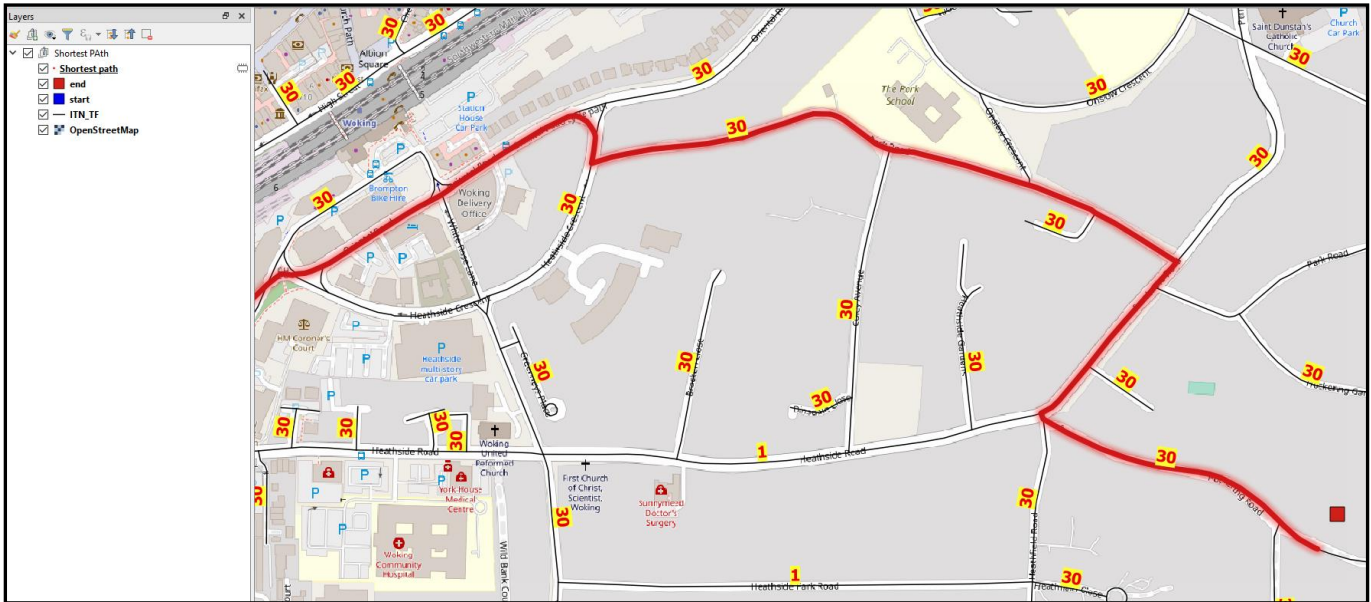
- the **road network** to use (in the image below this is represented by the black lines)
- the **start** and **end** locations
- and **advanced options** allow you to choose fields in the road layer that may contain **directions** and **road speeds**



Once it runs the route is added to the map as a new **Scratch Layer**.



By editing the **Road Speed** for certain roads e.g. setting Heathside Road in the bottom centre to be 1 mile per hour, this allows you to define **unsuitable roads** or areas to avoid. The Shortest Path tool when run using the fastest option now generates a new route as it now avoids these unsafe roads.

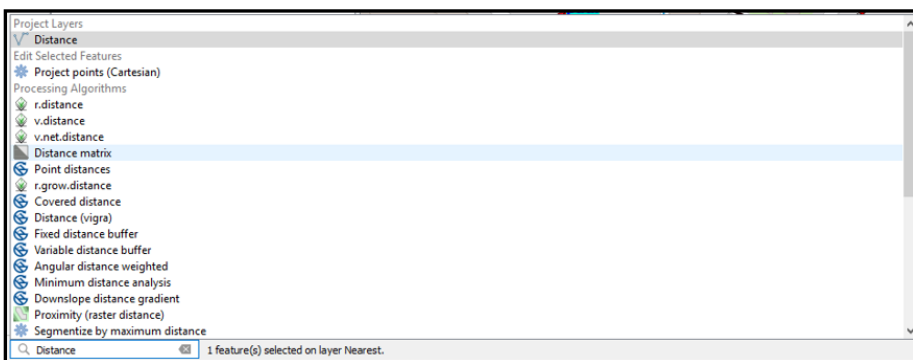


2 – Distance Tools:

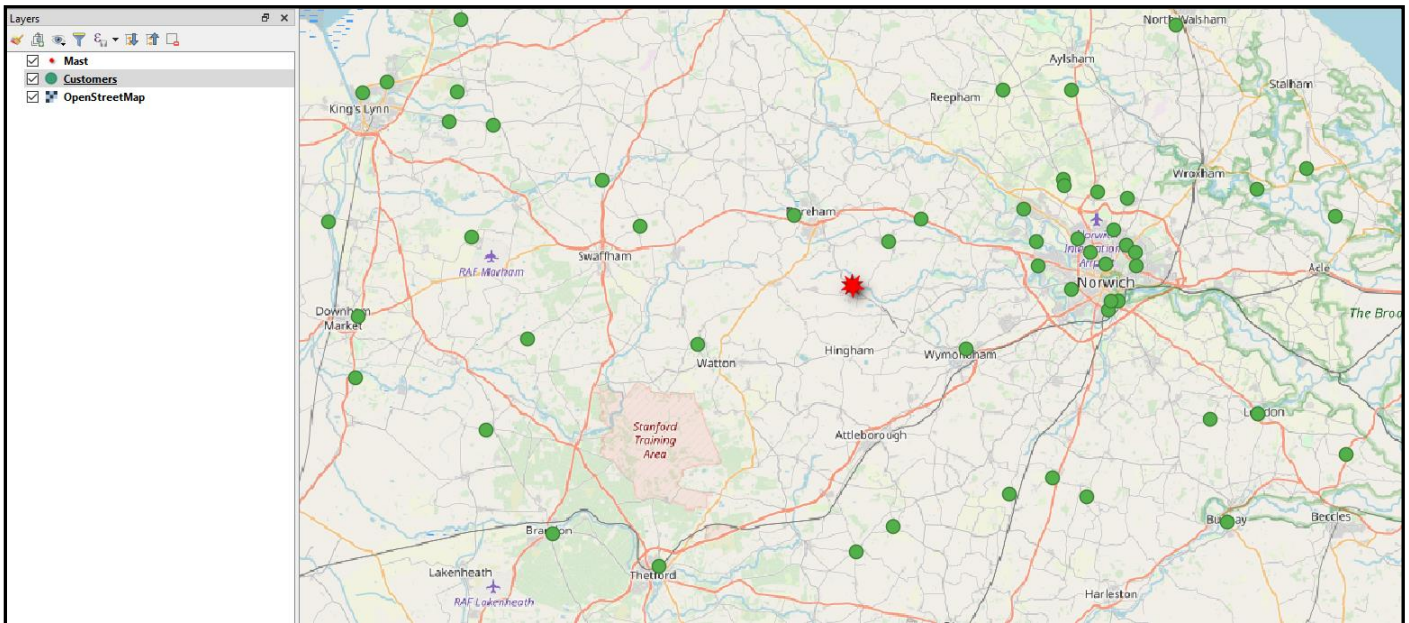
QGIS also allows you to undertake distance analysis, by creating distance matrices and calculating distances to nearest lines.

2.1 Distance Matrix:

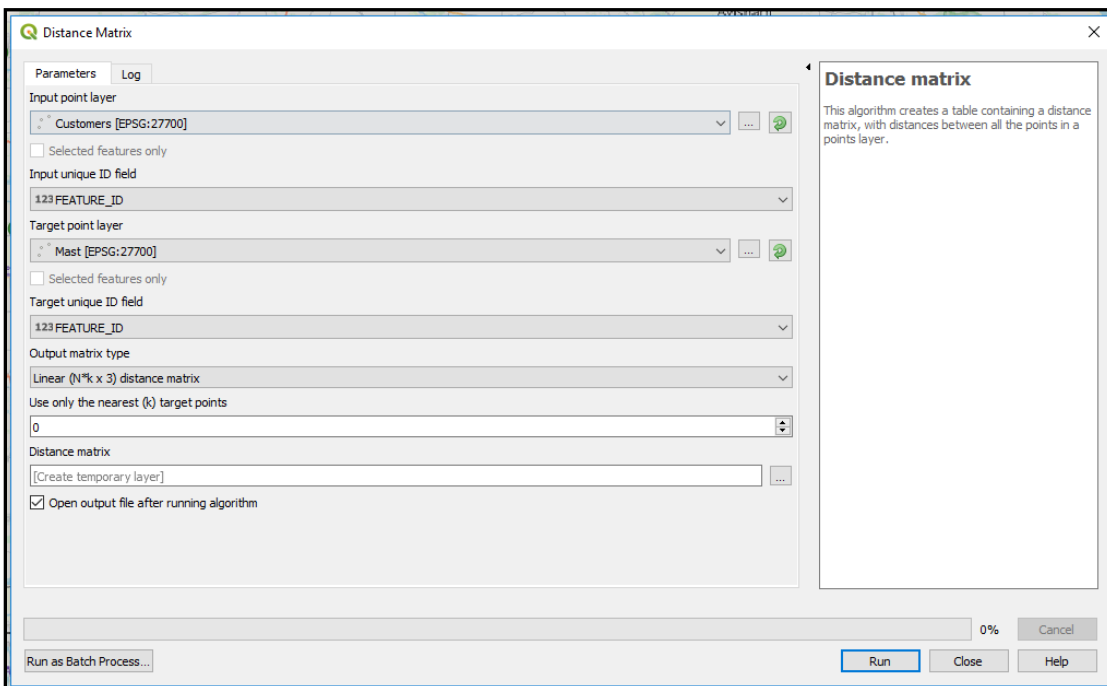
The Distance Matrix is available within the **Processing** toolbox and can be found easily by searching for the keyword **Distance**.



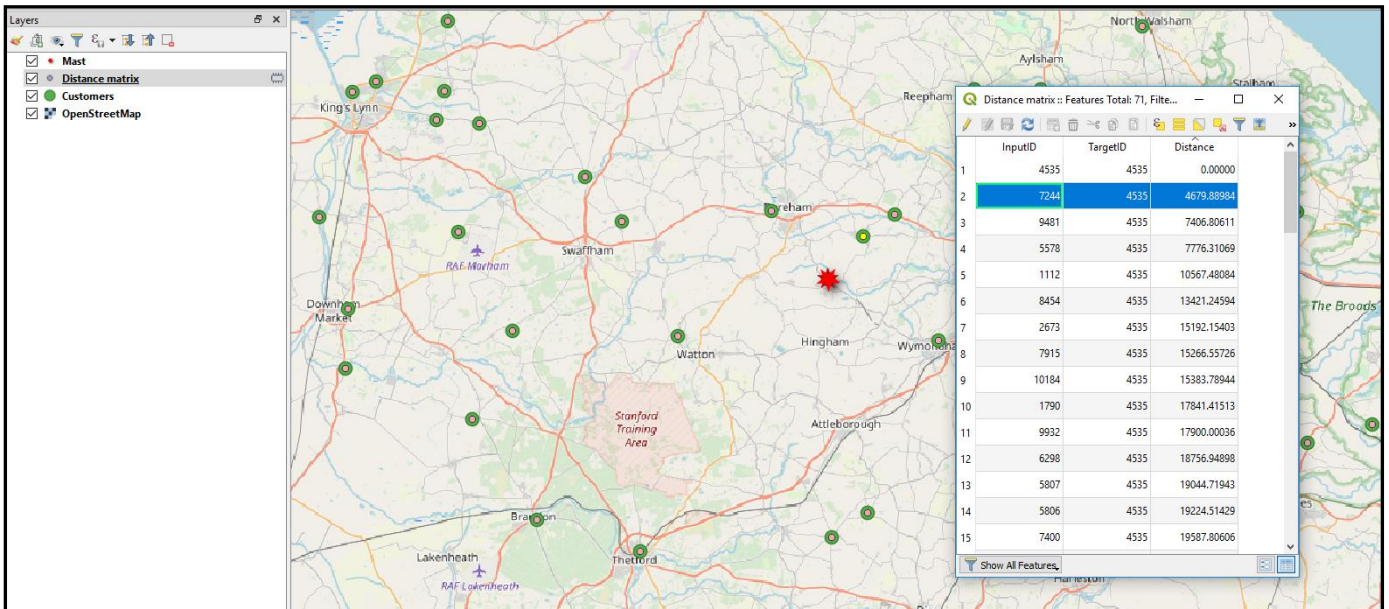
In this example we will calculate the straight-line distance between all **Customer Points** and a **Telecommunications Mast**.



In the **settings** simply set the **Input Layer** as the Customers and the **Target Layer** as the Telco Mast, choosing a field from each table to show in the output.

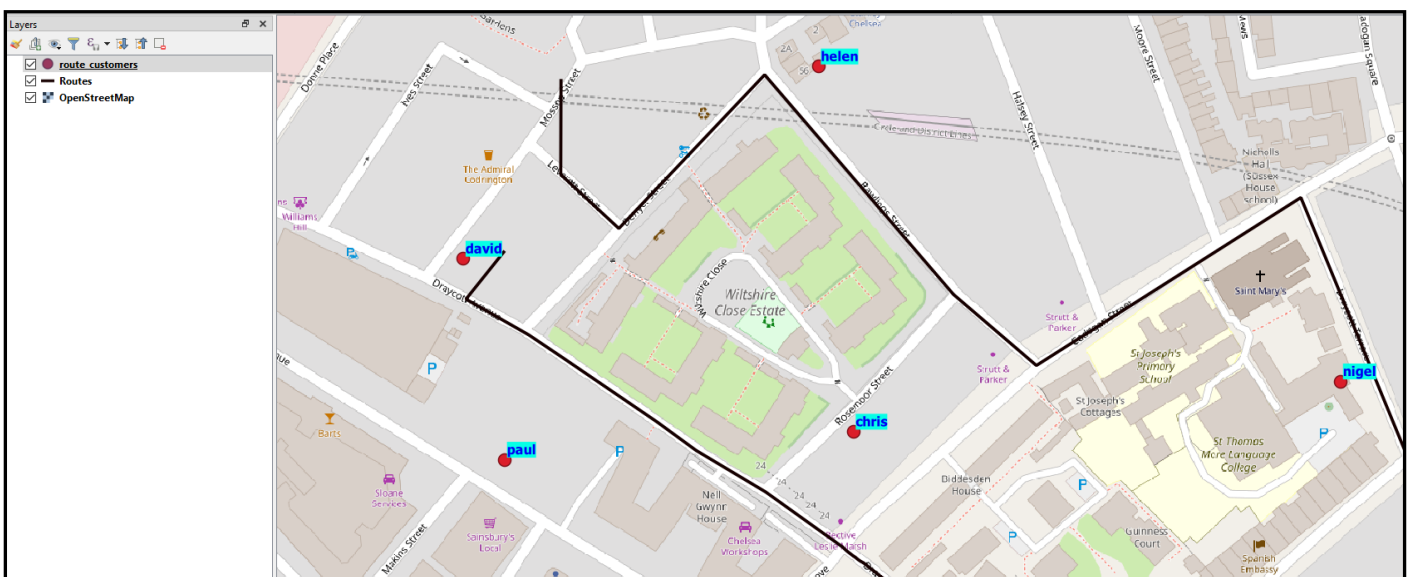


Once the process has ran a new layer is created on top of the Customer points, and their attributes now contain a new field defining the **straight-line distance** to the Telco Mast.

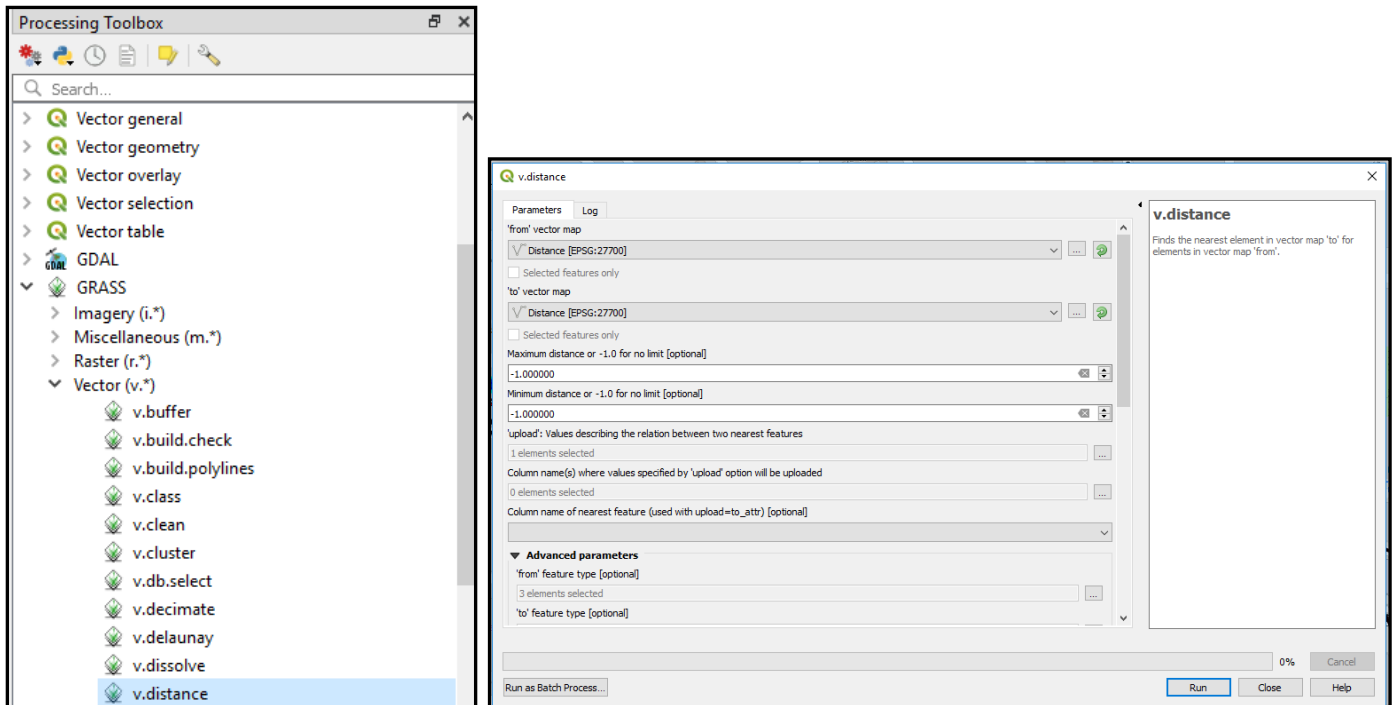


2.2 Distance to Line:

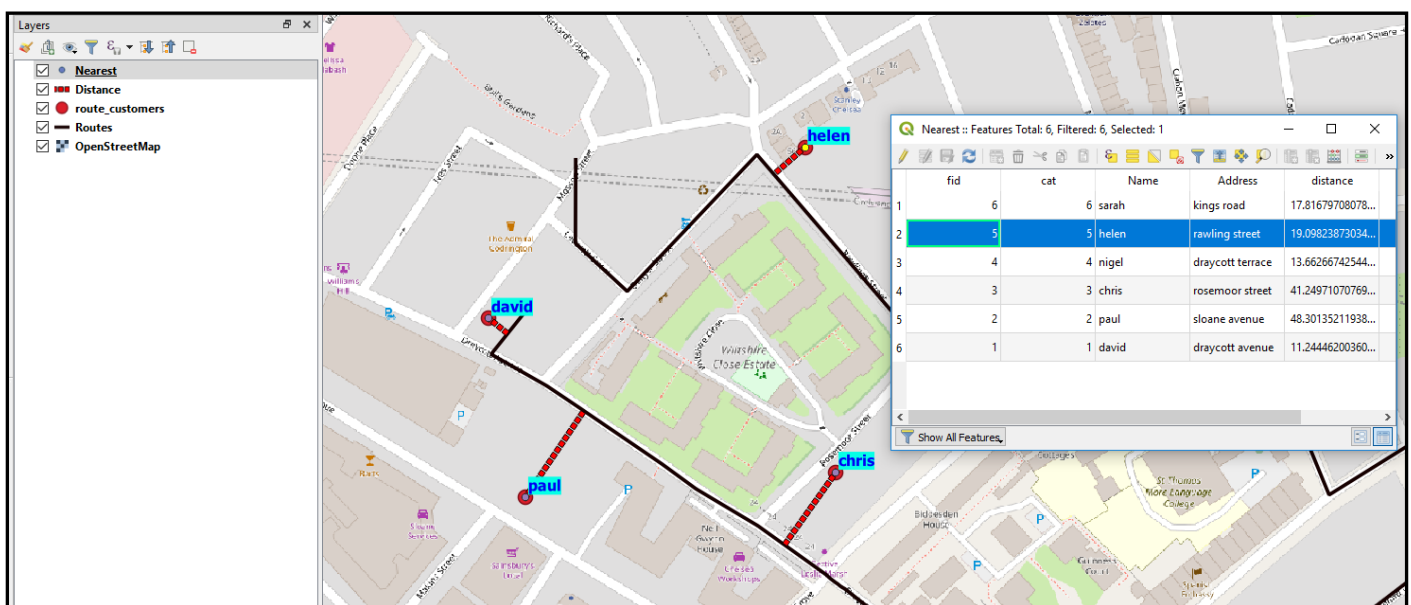
QGIS also has a tool for identifying the **nearest line** to existing point features. This could be used to help a company find the nearest Fibre Network to a list of clients on a map.



The **V.Distance** tool is available from the **Processing Toolbox** in the **GRASS** tool suite.



Having selected the options for the Nearest Line calculation the map will update with 2 new layers. One defining the **lines** between the Customer points and their nearest line (Fibre Network) and a duplicate copy of the Customer **points**, but now with the distance to the nearest line added.



3 – Isochrone Tools:

Finally, QGIS can also generate Isopolygons from a specified location. These allow you to calculate areas of equal distance and areas of equal time from a given location.

3.1 ISO4APP:

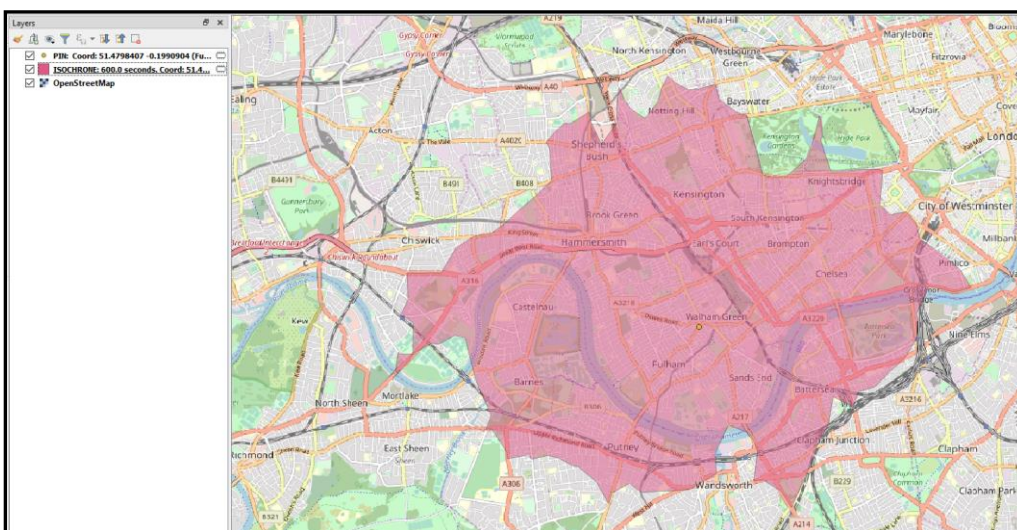
From the Plugins tool search for and install the **ISO4APP** plugin.



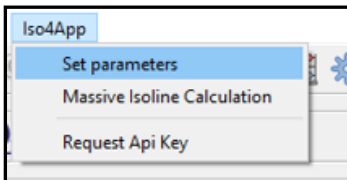
The ISO4APP tool is then added to the Plugins Toolbar.



To run the Isochrone tool, select the **ISO4APP** button and then **left click** anywhere in the map window and an Isochrone is calculated. By default, a demonstration 10-minute isochrone is created.

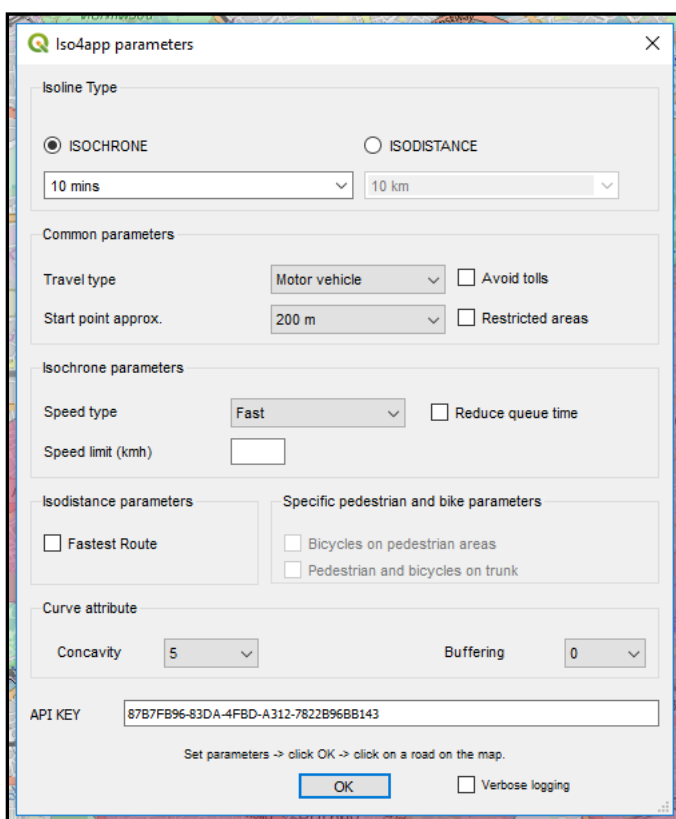


The settings for the ISO4APP Isochrone are available by choosing the **Iso4App** menu > **Set Parameters**.



The parameters include options to:

- Generate an **Isochrone** or **Isodistance** polygon
- The **Mode of Travel** e.g. Car, Walking, Bike
- Avoiding **Tolls** and **Restricted Areas**
- **Speed Settings**
- And other detailed settings dependent on Travel Type.



However, the ISO4APP is not free to use and requires an API key which can be purchased from here – <http://www.iso4app.com/#getapikey>