



Department  
for Environment  
Food & Rural Affairs

# Air Quality Compliance Assessment Map and Data Hub

Guidebook

Date: December 2021



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# Introduction

Under the [Air Quality Standards Regulations 2010](#), the UK undertakes an air quality assessment and reports the findings on an annual basis. The assessment is based on a range of high-quality evidence including measurements from established monitoring networks and supplementary assessment in the form of air quality modelling. This evidence is compared against Objective thresholds set for different pollutant/metric combinations associated for example with health effects and vegetation and ecosystem damage (see Table 1).

This guidebook provides simple usage instructions for the Compliance Map and Compliance Data Hub. These tools collate the evidence used to assess whether or not the UK has met the Objectives set out in the Air Quality Standards Regulations 2010

- [Compliance Map](#) – a streamlined viewer facilitating summaries of compliance status across different geographies for different pollutant metrics based on modelled background data, modelled roadside data and measurements. Summary data can be viewed and downloaded. See usage guidance below.
- [Compliance Data Hub](#) – a comprehensive data catalogue and extraction tool for the underlying data that serves the Compliance Map. The hub allows users to download the data behind the compliance assessment, either for a specific zone/agglomeration or Local Authority or for the whole of the UK in one process. See usage guidance below.

In addition to these tools, compliance data is available in XML format at the [XML file library](#) (a catalogue of download links for the machine-readable XML formats of the compliance data) and is summarised in the Air Pollution in the UK annual [report](#).

For any questions about these tools, please contact [aqinfo@ricardo.com](mailto:aqinfo@ricardo.com)

## Pollutants, metrics, and legislative thresholds

The table below summarises the pollutant metrics in the UK's Air Quality Standards Regulations (2010). These are the thresholds used to determine compliance and are referred to across the compliance map, compliance data hub, XML file library and in Air Pollution in the UK report. More information on these limits and targets can be found on UK-AIR (<https://uk-air.defra.gov.uk/air-pollution/uk-eu-limits>).

**Table 1 Summary of legislative thresholds and pollutant metrics**

<b>Pollutant</b>	<b>Averaging Period</b>	<b>Objective</b>	<b>Objective Type</b>
<b>NO<sub>2</sub></b>	Annual mean	40 µg m <sup>-3</sup>	Limit Value
<b>NO<sub>2</sub></b>	Hourly mean	200 µg m <sup>-3</sup> , 18 permitted exceedances each year	Limit Value
<b>NO<sub>x</sub></b>	Annual mean	30 µg m <sup>-3</sup>	Critical Level
<b>SO<sub>2</sub></b>	Hourly mean	350 µg m <sup>-3</sup> , with 24 permitted exceedances each year	Limit Value
<b>SO<sub>2</sub></b>	24-hour mean	125 µg m <sup>-3</sup> , with 3 permitted exceedances each year	Limit Value
<b>SO<sub>2</sub></b>	Annual mean	20 µg m <sup>-3</sup>	Critical Level
<b>SO<sub>2</sub></b>	Winter mean	20 µg m <sup>-3</sup>	Critical Level
<b>PM<sub>10</sub></b>	Annual mean	40 µg m <sup>-3</sup>	Limit Value
<b>PM<sub>10</sub></b>	24-hour mean	50 µg m <sup>-3</sup> , with 35 permitted exceedances each year	Limit Value
<b>PM<sub>2.5</sub></b>	Annual mean	20 µg m <sup>-3</sup>	Limit Value (stage 2 – came into force 01/01/2020)
<b>Benzene</b>	Annual mean	5 µg m <sup>-3</sup>	Limit Value

Pollutant	Averaging Period	Objective	Objective Type
<b>CO</b>	maximum daily 8-hour mean	10 mg m <sup>-3</sup>	Limit Value
<b>O3</b>	maximum daily 8-hour mean	120 µg m <sup>-3</sup> , not to be exceeded on more than 25 days per calendar year averaged over three years	Target Value
<b>O<sub>3</sub></b>	maximum daily 8-hour mean	120 µg m <sup>-3</sup>	Long Term Objective
<b>O<sub>3</sub></b>	AOT40 (calculated from 1-hour values, May to July averaged over five years)	18000 µg m <sup>-3</sup> .h	Target Value
<b>O<sub>3</sub></b>	AOT40 (calculated from 1-hour values, May to July)	6000 µg m <sup>-3</sup> .h	Long Term Objective
<b>As</b>	Annual mean	6 ng m <sup>-3</sup>	Target Value
<b>Cd</b>	Annual mean	5 ng m <sup>-3</sup>	Target Value
<b>Ni</b>	Annual mean	20 ng m <sup>-3</sup>	Target Value
<b>Pb</b>	Annual mean	0.5 µg m <sup>-3</sup>	Limit Value
<b>benzo(a)pyrene (B(a)P)</b>	Annual mean	1 ng m <sup>-3</sup>	Target Value

# Air Quality Compliance Map

## Context

The Compliance Map is an accessible dashboard viewer that summarises the compliance status of different geographies in the UK for a range of pollutants and provides easy access to the data. Compliance results for 2020 are currently available. The compliance status of a zone is determined using a combination of measurements from [national monitoring networks](#) and national dispersion modelling using Defra's [Pollution Climate Mapping models](#)<sup>1</sup>. The final compliance status is determined by the maximum concentration from all valid measurements and model results. Defra's [Air Pollution in the UK report](#) provides further information on the UK's annual compliance assessment, including information on our monitoring networks and modelling.

In order to assess compliance for each pollutant/metric combination (as summarised in Table 1) the UK is divided up into 28 agglomeration zones and 15 non-agglomeration zones.

The Compliance Map provides summaries of compliance status for these zones and also provides a breakdown of compliance status by Local Authority.

Users can view the data on screen in the main map pane or use the download link to obtain the data. Users can do this for different geographies by using the left-hand menu dropdowns, a mouse pointer to select an area of interest, or by using the search bar option. For comparison with the objective thresholds the concentrations from measurements and model results are rounded to integer or 2 significant figures for consistency with the rules for previous assessments and all data supplied through the compliance app is rounded according to these rules.

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<sup>1</sup> Please note that for hourly NO<sub>2</sub> limit value and the CO limit value are assessed using solely measurement data as there is no corresponding model to apply.

# How to use the compliance app

## Selecting data to view

The main control pane is on the left-hand side of the screen and provides user selection by dropdown menu for year, query layer (how the data is to be filtered spatially), pollutant metric (according to the table above), query list (zone, agglomeration, or Local Authority) and basemap. These dashboard controls are described in more detail below.

Once the dashboard selections have been made, the main map pane will update to show the background and roadside (where available) modelled data and monitoring locations according to the selection. Note that due to the data volume it may take a few seconds to fully render on the main map pane.

On-screen tooltips will be available on the right of the main map pane to guide users through use. These can be turned off as required to improve the visibility of the map.

Alternatives to using the Query Layer and Zone List dropdown menus are:

- Use the postcode/place search box in the top left of the map pane
- Use your mouse to select an area of the map

## Exploring the data

Once a Query Layer, Pollutant Metric and Zone List have been selected, the main map pane for that selected area will update with the relevant measurement locations and modelled data (background cells and roads). A summary box of information will also appear showing the summary statistics for that area for the pollutant metric and year selected.

By zooming into the map, the user can interrogate the individual underlying data components that make up the compliance assessment. These are:

- Fixed measurement points – Measurements from Defra's Automatic Urban Rural Network (AURN). The AURN is the UK's largest monitoring network and measures a range of pollutants to assess compliance with the Air Quality Standards Regulations 2010. These measurement points are displayed as black dots on the map. *Note that fixed monitoring stations in the national networks used for the compliance assessment are distributed according to air quality zones and some Local Authorities will not include these measurement points.*
- Modelled Roadside – Roadside concentrations modelled by Defra's Pollution Climate Mapping Models.
- Modelled Background – 1x1km background concentrations modelled by Defra's Pollution Climate Mapping Models.



The background modelled cells and modelled roads are coloured according to the legend in the main map pane.

For Nitrogen Dioxide only, the following is available

- Supplementary measurement points – Measurements from Defra's UK Urban NO<sub>2</sub> Network (UUNN).

By clicking on any of the above layers, an information box will appear. The content of this information box varies depending on whether a background cell or a modelled roadside or a monitoring location is selected. For example, a background cell will contain a concentration, units, pollutant metric and coordinates for the cell; a road will also contain information such as length (km) and road number; a monitoring location will include the name, location, and site code as well as classification and a link at the bottom to the specific metadata page for that monitoring station.

Selecting and interrogating the underlying data in this way does not affect the data selected and available in the Requested Information box – this will always be aligned with the zone/agglomeration or Local Authority selected so that downloads from the app will always cover the selected area.

Transparency controls are available on the dashboard pane on the left to allow the user to optimise the map data in conjunction with the basemap and other information being displayed. The transparency is pre-set to 50% to improve the visualisation (particularly where there is a modelled road layer present). Transparency sliders are also available on the Requested Information box in the top right of the main map pane after selection has taken place – this allows fine control of each separate layer available. Modelled roads and background data share the same colour scale so careful selection of transparency levels for each layer is required for the best visual result.

## Downloading data

Once a Query Layer, Pollutant Metric and Zone List have been selected, the user can press the 'Get Data' button which will open the Requested Information box in the top right of the main map pane. The Requested Information box shows the data layers available for the selection which will vary according to the pollutant metric selected (e.g., some pollutants are not modelled at roadside).

Each data layer has a separate transparency control and a download button. The download button will prompt the user to select a format for the data file. The downloadable file formats are comma separated variable (.csv), shapefile (.shp) or geodatabase (.gdb) for use in GIS applications. Once a file type is selected a link to the download is generated and the download will start upon clicking this link.

To obtain data sets that are not filtered according to a selected geography (i.e., the whole of the UK), the recommended route is to use the [Compliance Data Hub](#).

## **Dashboard controls**

### **Year**

At present the compliance data in the app is only available for 2020 so no other year is available to select. As the evidence base evolves year on year, updated data will be added to the compliance app and the user can select from the different years. New data is anticipated to become available each autumn representing the preceding year.

### **Query Layer**

To change the way the results are presented from zone/agglomeration to Local Authority boundaries. Note that the underlying data remains the same, but it is being subset using different geographies.

### **Pollutant Metric**

This allows the user to select the pollutant and compliance metric of interest. Table 1 above provides the complete list available, and Table 2 below provides a list of abbreviations used. These are consistent with previous assessments and use the pollutant metrics appropriate to human health and vegetation/ecosystem damage. Visually this is represented with coloured shading on the main map pane and to facilitate comparison against the underlying basemap the transparency can be altered with the slider control. The transparency is pre-set to 50% to improve the visualisation (particularly where there is a modelled road layer present).

### **Local Authority/Zone List**

The selection available to the user is determined by the selection of the Query Layer above and allows the user to choose one zone/agglomeration or one Local Authority. Upon selection, the main map window will update with a focussed view on the selected area. Clicking on the map will display data for each 1km square in a popup window, including the coordinates for the centroid of that square (British National Grid easting and northing), the units for the concentration value and the concentration associated with the pollutant/metric selected.

### **Base map**

A selection of different opensource basemaps are available which convey different levels of geographical information in both greyscale and colour according to the detail required. The scroll bar below provides access to the complete list.

The lowest button resets all criteria so that a new search can begin, and this will change the main map pane back to the maximum extent of the UK.

# Air Quality Compliance Data Hub

The air quality compliance data hub is an interactive data catalogue intended to facilitate access to the underlying data used to visualise compliance in the Compliance Map. As discussed previously, the compliance assessment uses a combination of data sources, listed on pages 8 and 9. The hub allows the user to download this data in a convenient way for the whole of the UK as well as filtering data for selected parts of the UK.

The options displayed on the landing page of the Data Hub allow users to select what way they would like to access the data, either by geography (local authority or zones and agglomeration) or by pollutant. A link to the Compliance Map, background information to the compliance assessment and comprehensive data licencing information is also shown.

## Data catalogue

After selecting one of the buttons or the Data tab at the top, the page shows a list of data items that meet the current selection criteria in the main pane. Each data item is in a box along with some metadata (e.g., tags and update dates).

The left-hand side provides expandable/collapsible options for filtering the selection and the items listed in the main pane will update accordingly.

A search bar at the top can be used to find specific files using keywords and tags.

## Data selection and download

On selection of a data item, a map will be displayed covering the area of the selection. In many cases, at the maximum UK extent, the underlying data will contain too many records to display but will become available at higher zoom levels.

The purpose of the map is not to visualise the concentration data itself (that is the purpose of the Compliance Map) but to preview the selection criteria before download. Data covered in the selection appear on the map as blue tiles (background modelled data) or blue lines (roadside modelled data) or blue dots (measurement data) and can be clicked to bring up the associated information about that data element.

A table view is available by pressing the button at the top right – this is a convenient way of seeing the different fields that will be provided in the download.

An expandable/collapsible dashboard control is available on the left-hand side from which summary information about the dataset is available (the ‘i’ button), and fine filtering controls can be applied. The download button is also available here once the user is happy with the selection criteria. Download offers the following formats, suitable for use in other applications such as GIS platforms):

- .CSV

- .kml
- Shapefile
- GeoJSON
- File Geodatabase

Note that these files are written 'on the fly' by the tool and may take some time to compile depending on the selection criteria.

In order to clear all filters and begin a new selection click the Air Quality Data Hub link in the top left corner of the screen to return to the main page.

# Abbreviations

**Table 2 – List of abbreviations used in the Compliance Map**

Abbreviation	Full name
<b>aMean</b>	Annual Mean
<b>AOT40</b>	Average over Threshold 40 ppb*
<b>CL</b>	Critical Level
<b>LTO</b>	Long Term Objective
<b>LV</b>	Limit value
<b>TV</b>	Target Value

\* The sum of the differences between hourly ozone concentration and 40 ppb (parts per billion) for each hour when the concentration exceeds 40 ppb during a relevant growing season, e.g., for forest and crops.