



Department
for Environment
Food & Rural Affairs

Air Quality Compliance Assessment Map and Data Hub

Guidebook

Date: September 2023



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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

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

Pollutant	Averaging Period	Objective	Objective Type
NO₂	Annual mean	40 µg m ⁻³	Limit Value
NO₂	Hourly mean	200 µg m ⁻³ , 18 permitted exceedances each year	Limit Value
NO_x	Annual mean	30 µg m ⁻³	Critical Level
SO₂	Hourly mean	350 µg m ⁻³ , with 24 permitted exceedances each year	Limit Value
SO₂	24-hour mean	125 µg m ⁻³ , with 3 permitted exceedances each year	Limit Value
SO₂	Annual mean	20 µg m ⁻³	Critical Level
SO₂	Winter mean	20 µg m ⁻³	Critical Level
PM₁₀	Annual mean	40 µg m ⁻³	Limit Value
PM₁₀	24-hour mean	50 µg m ⁻³ , with 35 permitted exceedances each year	Limit Value
PM_{2.5}	Annual mean	20 µg m ⁻³	Limit Value
Benzene	Annual mean	5 µg m ⁻³	Limit Value
CO	maximum daily 8-hour mean	10 mg m ⁻³	Limit Value

Pollutant	Averaging Period	Objective	Objective Type
O3	maximum daily 8-hour mean	120 µg m ⁻³ , not to be exceeded on more than 25 days per calendar year averaged over three years	Target Value
O₃	maximum daily 8-hour mean	120 µg m ⁻³	Long Term Objective
O₃	AOT40 (calculated from 1-hour values, May to July averaged over five years)	18000 µg m ⁻³ .h	Target Value
O₃	AOT40 (calculated from 1-hour values, May to July)	6000 µg m ⁻³ .h	Long Term Objective
As	Annual mean	6 ng m ⁻³	Target Value
Cd	Annual mean	5 ng m ⁻³	Target Value
Ni	Annual mean	20 ng m ⁻³	Target Value
Pb	Annual mean	0.5 µg m ⁻³	Limit Value
benzo(a)pyrene (B(a)P)	Annual mean	1 ng m ⁻³	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. Results for the preceding year are published around the end of September, annually. 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](#)¹. 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.

The logic used to determine the compliance status for the Nitrogen Dioxide annual mean metric was revised in 2021. A hierarchy approach is applied at individual link level, with measurements from the AURN taking priority over measurements from the UUNN which in turn take priority over the model results. This creates a compliance layer which then the maximum in zone for this layer alongside background measurements and modelling determines the overall zone compliance status.

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.

¹ Please note that for hourly NO₂ 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

On start up a wizard appears to guide through the user selection for year, region, area and pollutant metric.

Alternatively 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 selections 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. These layers sit under the 'All Data' heading and can be toggled on or off as required.

When Nitrogen Dioxide annual mean is selected an additional heading of 'Compliance Data' will appear above the 'All Data' heading. Two layers will be shown compliance background and compliance roadside. These layers present the compliance data using the revised logic for 2021 onward as described in the context section of this guidance. Note that compliance layers are shown pre 2021 for consistency although the logic underpinning these is not the revised logic for post 2021. Individual layers can be viewed by selecting the downward arrow by the 'All Data' heading.

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 NO₂ 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

Select the year to view. New data is published each September for the most recently available compliance year (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. This selection is found under the 'Region and Area' options of the wizard.

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
AOT40	Average over Threshold 40 ppb*
CL	Critical Level
LTO	Long Term Objective
LV	Limit value
TV	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.