



Department  
for Environment  
Food & Rural Affairs

## Defra UK-AIR GIS Tool Guidance

### Purpose of the Tool

The UK-AIR GIS tool has been developed to allow users to freely interact with, analyse and download modelled air pollution data from Defra and the Devolved Administration's annual assessment of compliance with EU air quality Directives. Whilst these datasets have always been available, this is the first time that users will be able to easily visualise and interrogate the results. Defra is seeking to add value to these data by increasing their use and accessibility. The data will also support local action planning and development control by identifying locations which exceed, or are at risk of exceeding, EU air quality limit values.

It is envisaged that the tool will be helpful for many people including **local authorities** and NGOs interested in understanding the UK's national air quality assessment. Researchers will be able to visualise spatial patterns and hotspots and extract local or regional data for investigation. Those local authorities or consultants involved in planning through the **National Planning Policy Framework**<sup>1</sup> (NPPF) will be able to extract and analyse relevant background or roadside concentration data and observe where exceedances of limit values have been assessed.

We would welcome your views on the tool and your thoughts on how it may be used both now and in the future. Please email [aqinfo@ricardo-aea.com](mailto:aqinfo@ricardo-aea.com).

### Scope of the Tool

The tool provides national modelled 1km background maps and roadside maps of 12 key pollutants (NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, SO<sub>2</sub>, Benzene, O<sub>3</sub>, Pb, As, Cd, and Ni in PM<sub>10</sub>, CO) which are updated annually. Data for the previous calendar year are made available in the Autumn of the following year. The data are the results of modelling using the UK's Pollution Climate Mapping (PCM) model for assessing compliance with the European AQ Directive 2008/50/EC and the Fourth Daughter Directive 2007/104/EC. There are no CO maps after 2010. Due to low concentrations assessed by Defra across the UK, the modelling for this pollutant is no longer required.

Not all roads in the UK are included in the national assessment; the assessment is conducted in line with the requirements of the relevant Directives. Approximately 9000 road links are included. These are all in urban areas and are all A roads and Motorways. The 9000 roads are included on the basis of their classification in the data which are provided to Defra by the Department for Transport. Where the classification is urban, the roads are included.

The full UK datasets are also available for download from the UK-AIR Modelling Data page at <http://uk-air.defra.gov.uk/data/modelling-data>. Defra undertakes other air pollution modelling for other purposes and makes available other modelled output data on request, a list of these datasets

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<sup>1</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/6077/2116950.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6077/2116950.pdf)

is available here [http://uk-air.defra.gov.uk/documents/public\\_datasets.pdf](http://uk-air.defra.gov.uk/documents/public_datasets.pdf). Monitored data are available through the data portal <http://uk-air.defra.gov.uk/data>.

In addition, Air Quality Management Areas (AQMAs), as designated by local authorities under the Environment Act 1995 can be viewed in the tool. The AQMA records in this tool are updated annually so may not capture recent changes.

### **Background to the modelled datasets**

Defra and the Devolved Administrations undertake an assessment of air quality across the UK annually. Modelling is used to supplement the assessment undertaken using monitoring data, to provide a more detailed picture of air quality concentrations across the UK. Using modelling allows the UK to reduce the total number of monitors required, to provide better value for money for the tax payer. The modelling is used as the basis for policy development and evaluation and provides important information on population exposure. The UK's air quality evidence base and compliance assessment results are described in more detail in the annual Air Pollution in the UK publication.

<http://uk-air.defra.gov.uk/library/annualreport/index>

### **National and Local Air Pollution Assessments**

Differences between Defra's modelled air pollution assessment and local air quality assessment by modelling or monitoring will occur in some locations. In addition, differences in locations of the Air Quality Management Areas, (areas at risk of exceeding the UK objectives as assessed by local authorities), and the locations identified as exceeding the corresponding EU Limit Values can be seen in the data in the GIS tool.

There are several reasons why these differences occur and these are outlined below with some examples. It is not the case that one assessment is correct and the other incorrect and the purpose, benefits and limitations and uncertainty of each must be considered.

Defra's assessment is designed to assess compliance with the air pollution limit and target values at locations defined within the Directives. The modelling provides an overview of air pollutant concentrations across the UK and is undertaken within very tight timescales each year using the Pollution Climate Mapping (PCM) model. There are 12 pollutants included in the modelling. The modelling is combined with monitoring data in a separate process to form the overall UK air quality assessment. The modelling provides, in effect, an interpolation between the national air pollution concentration measurements in the locations where it is required. The PCM modelling meets the requirements for uncertainty which are specified in the Directives and which should be taken into account when considering output data.

Local Authorities are required to carry out Review and Assessment of air quality under the Environment Act 1995, to identify locations at risk of exceedances of the UK air quality objectives. If new exceedances are identified, a Detailed Assessment is required which is likely to include dispersion modelling. Local authority modelling may differ from the national assessment in terms of inputs, outputs and approach. Local authority assessment is likely to focus on NO<sub>2</sub> or PM<sub>10</sub> and provides an assessment against UK air quality objectives.

Local assessment undertaken more widely as part of planning and development control may provide an assessment against both the limit values and objectives. The National Planning Policy Framework outlines the key considerations for air quality explaining that planning policies "should sustain compliance with and contribute towards EU limit values or national objectives for pollutants, taking into account the presence of Air Quality Management Areas and the cumulative impacts on air quality from individual sites in local areas".

The criteria for locations requiring assessment by local authorities are different to those modelled at national level. For example, junctions are explicitly required to be assessed by local authorities if in the Updating and Screening Assessment, new exceedances of objectives are identified, whereas Directive 2008/50/EC excludes junctions from assessment at national level.

Local Air Quality Management (LAQM) modelling aims to identify and assess hot-spots with focus on locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. The Directive takes a different approach, requiring assessment of the locations with highest concentrations, locations representative of general exposure and both of these only where there is public access. The level of detail and resolution of LAQM modelling is generally much greater in order to focus on local exposure and hotspots and to support the development of local measures.

Further specific examples of the differences between national and local approaches to air quality modelling are provided in the table below.

#### Examples of Differences between national air pollution modelling and LAQM modelling

	National Assessment - PCM	LAQM
Spatial Scale	Background concentrations for all pollutants on a 1km x 1km grid. Roadside concentrations as a single representative value adjacent to each of approximately 9000 major road links (A Roads and Motorways) in urban areas. A road link is defined as the stretch of road between junctions with other major roads.	Typical outputs are contour plots showing dispersion away from the source, on a fine resolution grid (often 10 m x 10 m).
Locations – public access compared with relevant exposure	Data are provided for roadside locations where there is public access. Limit values apply everywhere but the Directive specifies how and where to assess for compliance with them and rules out assessment where there is no public access, for example within industrial boundaries where H&S at work applies and on the centre of road carriageways.	Concentrations are assessed at relevant sensitive receptors or on a grid. An exceedance is only deemed to occur where there is exposure is relevant when compared with the averaging period of the objective.
Locations - Junctions	The Directive requires no assessment in the vicinity of major junctions (within 25 m). This is addressed by using a single value for each road link and thus any additive effect of the contributions to the micro environment at a junction from more than one road is not included.	Junctions are assessed where there is relevant exposure. Junctions are specifically included in Updating and Screening Assessments.
Locations – microscale environments	The Directive does not require assessment of small microenvironments which are defined as stretches of road where the concentrations are representative of less than 100 m in length, and industrial locations where the concentrations are representative of 250 m x 250 m or less.	LAQM focuses on hot spots where there is relevant exposure. Microscale environments may constitute exceedances of objectives.
Locations – distance from the road.	The Directive requires that roadside concentrations should be assessed at no more than 10 metres from the kerbside. The PCM	Concentrations at the roadside or nearest receptor may be quoted and used depending on

	model for roadside concentrations provides a concentration estimate for a receptor at approximately 4 metres from the kerbside. This is the average distance from the kerbside for traffic stations within the AURN.	the situation. Relevant exposure will be taken into account.
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In summary differences between national and local assessments are likely to occur for the following reasons, and uncertainty within both assessments must be taken into account:

- differing requirements and specifications for assessment in the air quality directives, local air quality management and planning/development control.
- different models used including different techniques and chemistry.
- different spatial or temporal inputs or outputs from modelling.
- different input data –e.g. local or national emissions data and activity data.
- different approach to model verification and validation using monitoring data.