



Department  
for Environment  
Food & Rural Affairs

# Air Pollution in the UK 2023 - Compliance Assessment Summary

September 2024

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# Executive Summary

The UK's Air Quality Standards Regulations (2010) and the Environment Act (2021) require reporting of compliance and progress made on an annual basis. These data are reported on behalf of Defra (the Department for Environment, Food and Rural Affairs) and the Devolved Administrations of Scotland, Wales and Northern Ireland.

This Compliance Assessment Summary has been prepared to accompany and summarise the UK's 2023 submission on air quality compliance. It presents a summary of the UK's compliance with the Air Quality Standards Regulations (2010), based on measurements from national air pollution monitoring networks and supplementary assessment (which includes air pollution modelling). It includes details of the exceedances of air quality limit values and target values reported in 2023, and a comparison with previous years since 2008. It also presents progress made towards the new PM<sub>2.5</sub> targets set in the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023).

This document is an extract from a larger report, 'Air Pollution in the UK 2023', which, in addition to the compliance summary, also provides background information on the pollutants covered by the above legislation; their sources, effects, how they are measured and modelled in the UK, and details of their spatial distribution and changes over time. The pollutants covered in the main report are:

- Nitrogen oxides (NO<sub>x</sub>) comprising NO and NO<sub>2</sub>
- PM<sub>10</sub> and PM<sub>2.5</sub> particles
- Ozone (O<sub>3</sub>)
- Sulphur dioxide (SO<sub>2</sub>)
- Carbon Monoxide (CO)
- Benzene
- 1,3-Butadiene
- Metals: lead, cadmium, nickel and mercury, and the metalloid arsenic
- Polycyclic aromatic hydrocarbons (PAH).

For the purposes of air quality monitoring and assessment of compliance with the Air Quality Standards Regulations (2010), the UK is divided into 43 zones. The 2023 results are detailed in **Section 3** of this report and summarised below:

- The UK met the limit value for hourly mean nitrogen dioxide (NO<sub>2</sub>) in all 43 zones.
- 34 zones met the limit value for annual mean NO<sub>2</sub>, with nine zones exceeding.

- All zones required to meet the critical level for annual NO<sub>x</sub> set for protection of vegetation (non-agglomeration zones) did so. This has been the case since 2008.
- All zones met the limit value for daily mean concentration of PM<sub>10</sub> particulate matter, without the need for the subtraction of the contribution from natural sources.
- All zones met the limit value for annual mean concentration of PM<sub>10</sub> particulate matter, without the need for the subtraction of the contribution from natural sources.
- All zones met the limit value for annual mean concentration of PM<sub>2.5</sub> particulate matter. Subtraction of natural source contribution is not permitted for PM<sub>2.5</sub>.
- The UK continues to meet its 2020 national exposure reduction target for PM<sub>2.5</sub>, based on the Average Exposure Indicator (AEI) statistic. In 2023, the three-year running mean AEI was 8 µg m<sup>-3</sup>; this statistic has therefore remained within the target value.
- The Environmental Targets (Fine Particulate Matter) (England) Regulations (2023) set a legally mandatory target of 10 µg m<sup>-3</sup> for annual mean PM<sub>2.5</sub> concentrations to be achieved by 2040. Legal compliance is assessed using measurements from monitoring stations in England of all site types. One monitoring station in England exceeded this target in 2023 (London Marylebone Road, a roadside site in central London). In 2023 no monitoring stations exceeded the interim target of 12 µg m<sup>-3</sup>, to be met by January 2028.
- The Environmental Targets (Fine Particulate Matter) (England) Regulations (2023) also set a legally mandatory PM<sub>2.5</sub> population reduction target of 35% compared to 2018 to be achieved by 2040. An interim target of 22% is to be met by January 2028. The population exposure value for 2023 was 7.88 µg m<sup>-3</sup>, which constitutes a reduction of 22% from the 2018 value. Therefore in 2023 England met the interim PERT of 22%.
- For ozone, there are two target values (which are being met) and two long term objectives (where there are exceedances).
  - All zones met both the target values based on the daily maximum eight-hour mean, which was set for the protection of human health.
  - All zones met the target value based on the AOT40 statistic (explained in **Section 3.2** of this Compliance Assessment Summary and Sections 4 and 5 of the main report), which was set for the protection of vegetation.
  - One zone out of 43 was compliant with the more stringent long-term objective for ozone, set for the protection of human health. This is based on the daily maximum eight-hour mean.

- 13 zones out of 43 were compliant with the more stringent long-term objective for ozone, set for the protection of vegetation. This is based on the AOT40 statistic, explained in **Section 3.2** of this Compliance Assessment Summary and Section 4 of the main report.
- There were 26 measured exceedances of the ozone population information threshold of 180  $\mu\text{g m}^{-3}$  in 2023.
- All zones met the limit values for sulphur dioxide, carbon monoxide, benzene and lead, and the target values for arsenic and cadmium.
- Three zones out of 43 have exceeded the target value for nickel.
- Two zones out of 43 have exceeded the target value for benzo[a]pyrene.

For more information on air quality in the UK visit the Defra website at [www.gov.uk/defra](http://www.gov.uk/defra) and the UK Air Quality websites at [uk-air.defra.gov.uk](http://uk-air.defra.gov.uk), [scottishairquality.scot/](http://scottishairquality.scot/), [airquality.gov.wales](http://airquality.gov.wales) and [airqualityni.co.uk/](http://airqualityni.co.uk/).

# 1 Introduction

Clean air is vital for people's health and the environment, essential for making sure our cities are welcoming places for people to live and work now and in the future, and for our prosperity. Improving air quality remains a key priority for the UK.

In the UK, concentrations of a range of pollutants in ambient air are regulated by the Air Quality Standards Regulations (2010) as follows:

- The Air Quality Standards Regulations (2010) (UK Government, 2010)
- The Air Quality Standards Regulations (2010) in England (UK Government, 2010), and their December 2016 amendment (UK Government, 2016)
- The Air Quality Standards (Scotland) Regulations (2010) in Scotland (Scottish Government, 2010), and their December 2016 amendment (Scottish Government, 2016)
- The Air Quality Standards (Wales) Regulations (2010) in Wales (Welsh Government, 2010)
- The Air Quality Standards Regulations (Northern Ireland) (2010) (Department of Environment Northern Ireland, 2010) and their January 2017 amendment (DAERA, 2017)
- The Air Quality Standards Regulations (Gibraltar) and their December 2016 amendment (HM Government of Gibraltar, 2016)

These Regulations have their origins in the following European Union legislation:

- Directive 2008/50/EC of 21<sup>st</sup> May 2008, on Ambient Air Quality and Cleaner Air for Europe (European Parliament and Council of the European Union, 2008).
- Directive 2004/107/EC of 15<sup>th</sup> December 2004 (European Parliament and Council of the European, 2004),

The Air Quality Standards Regulations (2010) set 'limit values', 'target values' and 'long-term objectives' for ambient concentrations of pollutants. These are explained below, as well as provisions regarding monitoring, and reporting of data.

**Limit values** must not be exceeded. They are set for individual pollutants and comprise a concentration value, an averaging period for the concentration value, a number of exceedances allowed (per year) and a date by which this must be achieved. Some pollutants have more than one limit value, for example relating to short-term average concentrations (such as the hourly mean) and long-term average concentrations (such as the annual mean). The UK is legally required to meet the limit values.

**Target values** are set for some pollutants and are configured in the same way as limit values. The UK is legally required to take all necessary measures not entailing disproportionate costs to meet the target values.

For ozone, there are also **Long-Term Objectives (LTOs)** as well as target values. These are based on the same statistics as the ozone target values but are more stringent and have no specified date by when they should be met. As with target values, the UK is legally required to take all necessary measures not entailing disproportionate costs to meet the long-term objectives, but achievement is not legally mandatory.

The Air Quality Standards Regulations (2010) include detailed provisions on the monitoring and reporting of air quality, including:

- The division of the UK into zones for the purposes of compliance reporting.
- The location and number of sampling points.
- The measurement methods to be used.
- Data quality objectives.
- Siting criteria each monitoring station must meet.
- Provision for reporting compliance.
- Provision of information to the public.

The UK has statutory monitoring networks in place to meet the requirements of the above legislation, with air quality modelling used to supplement the monitored data where applicable.

In addition, concentrations of fine particulate matter are regulated by more recent legislation: the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 (UK Government, 2023). These regulations, which came into force in January 2023, set two new **targets**: for ambient concentrations of particulate matter measured as PM<sub>2.5</sub>, and for PM<sub>2.5</sub> population exposure reduction over the period between 2018 and 2040.

The meaning of “**targets**” in this legislation is different to that of “target values” in the Air Quality Standards Regulations (2010). There is a legal requirement to meet the targets of the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 in England by the specified dates. In addition, legal compliance with these targets is assessed using measured pollutant concentrations from the Automatic Urban and Rural Network (AURN) only and modelling is not included in the assessment.

Further information on air quality monitoring in the UK can be found on Defra’s online UK Air Information Resource (UK-AIR), at <https://uk-air.defra.gov.uk>.



## 2 Definition of Zones

The UK is divided into 43 zones for air quality assessment. There are 28 agglomeration zones (large urban areas) and 15 non-agglomeration zones. Each zone has an identification code (**Table 2-1**). Zones are shown in **Figure 2.1**.

**Table 2-1 UK Zones for Ambient Air Quality Reporting 2023**

Zone	Zone code	Zone type
Greater London Urban Area	UK0001	Agglomeration
West Midlands Urban Area	UK0002	Agglomeration
Greater Manchester Urban Area	UK0003	Agglomeration
West Yorkshire Urban Area	UK0004	Agglomeration
Tyneside	UK0005	Agglomeration
Liverpool Urban Area	UK0006	Agglomeration
Sheffield Urban Area	UK0007	Agglomeration
Nottingham Urban Area	UK0008	Agglomeration
Bristol Urban Area	UK0009	Agglomeration
Brighton/Worthing/Littlehampton	UK0010	Agglomeration
Leicester Urban Area	UK0011	Agglomeration
Portsmouth Urban Area	UK0012	Agglomeration
Teesside Urban Area	UK0013	Agglomeration
The Potteries	UK0014	Agglomeration
Bournemouth Urban Area	UK0015	Agglomeration
Reading/Wokingham Urban Area	UK0016	Agglomeration
Coventry/Bedworth	UK0017	Agglomeration
Kingston upon Hull	UK0018	Agglomeration
Southampton Urban Area	UK0019	Agglomeration
Birkenhead Urban Area	UK0020	Agglomeration
Southend Urban Area	UK0021	Agglomeration
Blackpool Urban Area	UK0022	Agglomeration
Preston Urban Area	UK0023	Agglomeration
Glasgow Urban Area	UK0024	Agglomeration
Edinburgh Urban Area	UK0025	Agglomeration
Cardiff Urban Area	UK0026	Agglomeration
Swansea Urban Area	UK0027	Agglomeration
Belfast Metropolitan Urban Area	UK0028	Agglomeration
Eastern	UK0029	Non-agglomeration
South West	UK0030	Non-agglomeration
South East	UK0031	Non-agglomeration
East Midlands	UK0032	Non-agglomeration
North West & Merseyside	UK0033	Non-agglomeration
Yorkshire & Humberside	UK0034	Non-agglomeration
West Midlands	UK0035	Non-agglomeration
North East	UK0036	Non-agglomeration
Central Scotland	UK0037	Non-agglomeration
North East Scotland	UK0038	Non-agglomeration
Highland	UK0039	Non-agglomeration
Scottish Borders	UK0040	Non-agglomeration
South Wales	UK0041	Non-agglomeration
North Wales	UK0042	Non-agglomeration
Northern Ireland	UK0043	Non-agglomeration

**Figure 2.1 UK Zones for Ambient Air Quality Reporting 2023**



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## 3 Air Quality Assessment for 2023

The air quality assessment for compliance against the Air Quality Standard Regulations (2010) is derived from a combination of measured pollutant concentrations from the Automatic Urban and Rural Network (AURN) and supplementary assessment (that is, modelling using the Pollution Climate Mapping (PCM) model, supplementary NO<sub>2</sub> diffusion tube measurements from the UK Urban Nitrogen Dioxide Network - the UUNN - or objective estimation, as explained in Defra's technical report on UK air quality assessment (Pugsley, K. L. et al., 2024)). Where both measurements and supplementary assessment results are available for a zone, the assessment of compliance for each zone is based on the higher concentration of the two.

In the case of NO<sub>2</sub>, an additional rule was introduced in 2021. This is used where there is roadside monitoring (an AURN monitoring site, a UUNN diffusion tube monitoring site, or both) on a major urban road, which is also modelled by the PCM model. This rule determines the order of precedence of these data sources when used in compliance assessment and is described in **Section 3.1** below.

An objective estimation method has been applied for the 2023 reporting year in zones for which the maximum annual mean NO<sub>2</sub> concentration is determined by UUNN measurements with 9 or 10 months of data for the reporting year (as opposed to the usual UUNN requirement of 11 months). This is to ensure that available evidence that is representative of annual mean NO<sub>2</sub> concentrations is used in the air quality assessment to determine the compliance status of these reporting zones.

Compliance with the PM<sub>2.5</sub> targets set in the Environment Act (2021) for England only is based only on measured pollutant concentrations from the Automatic Urban and Rural Network (AURN) and modelling is not included in the assessment.

### 3.1 Approach for Nitrogen Dioxide at the Roadside

In compliance assessments for years up to and including 2020, the approach taken when assessing NO<sub>2</sub> concentrations at roadside locations where both modelled and measured concentrations were available was to report all concentrations, but to always use the highest concentration to determine the compliance status, whether measured or modelled. This was a conservative approach in which an exceedance was always reported if any of the data indicated one, but it did not consider the quality of the evidence available. The availability of a new source of evidence - measurements from the UUNN, which was established in 2020 - prompted a review of the approach for NO<sub>2</sub>.

A study led by Defra working closely with members of their independent Air Quality Expert Group (AQEG) compared the quality of modelled NO<sub>2</sub> concentrations from the PCM model to measured concentrations from the UUNN and AURN. This concluded that the AURN provides the most accurate assessment of NO<sub>2</sub> concentrations, followed by the UUNN, and then the PCM model.

The method for determining compliance with the annual mean limit value for NO<sub>2</sub> was therefore adjusted to reflect this. As of 2021, all modelled and measured NO<sub>2</sub> concentrations are still reported as part of the assessment, but the order of precedence, for any given major urban road, is as follows:

1. If AURN measurements are available, these have been used to assess compliance in preference to values from the UUNN and/or the PCM model for the same major urban road.
2. If UUNN measurements (but not AURN measurements) are available, the UUNN measurements have been used to assess compliance in preference to values from the PCM model for the same major urban road.
3. If no AURN or UUNN measurements are available, concentrations from the PCM model have been used to assess compliance.

This order of precedence only applies to results for the same major urban road. Therefore, the NO<sub>2</sub> compliance status of a given zone could in theory still be determined on the basis of modelling, if the highest concentration for that zone was a modelled value for a location without co-located monitoring.

No change has been made to the method for determining compliance for other pollutants. This means that the most appropriate evidence-based approach is taken for each pollutant.

## 3.2 Compliance Summary

The results of the air quality assessment for 2023 are summarised in the tables below. The tables have been completed as follows:

- Where all measurements were within the relevant limit values in 2023, the table shows this as 'OK'.
- In the above cases, where compliance was determined by supplementary assessment only, this is indicated by '(s only)', i.e. 'OK (s only)'.
- Where locations were identified as exceeding a limit value, target value or long-term objective, this is identified as '>LV', '>TV' or '>LTO' as applicable.
- Where a non-compliance was determined by supplementary assessment, this is indicated by '(s only)', as above.
- The abbreviation 'n/a' (not applicable) means that an assessment is not relevant for this zone, such as for the NO<sub>x</sub> vegetation critical level in agglomeration zones.

- Zones that complied with the relevant limit values, targets or long-term objectives are shaded blue, while those that did not are shaded red. For ozone, zones that met the relevant target value but not the long-term objective are shaded purple.

There are no longer any zones where margins of tolerance apply.

**Sulphur dioxide (SO<sub>2</sub>):** in 2023, all zones and agglomerations within the UK complied with the limit values for 1-hour mean and 24-hour mean SO<sub>2</sub> concentration, set for protection of human health. All non-agglomeration zones within the UK also complied with the critical levels for annual mean and winter mean SO<sub>2</sub> concentration, set for protection of ecosystems (these are not applicable to built-up areas).

**Carbon monoxide (CO), benzene and lead:** all zones and agglomerations were compliant with the limit values for these three pollutants in 2023. The 2023 compliance assessment for CO has been based on objective estimation, as explained in Defra's technical report on UK air quality assessment (Pugsley, K. L. et al., 2024). This is underpinned by NAEI emission trends, AURN measurement trends and historical modelling assessments.

**Nitrogen dioxide (NO<sub>2</sub>):** in 2023 not every zone was compliant with all the limit values. The results of the air quality assessment for nitrogen dioxide for each zone are summarised in **Table 3-1**.

All zones and agglomerations were compliant with the 1-hour limit value (200 µg m<sup>-3</sup>) in 2023, with none exceeding this limit value on more than the permitted 18 occasions. In recent years only a few zones (typically one or two) have exceeded this limit value; 2023 is the fourth consecutive year in which all zones have been compliant.

34 zones met the annual mean limit value for NO<sub>2</sub> (40 µg m<sup>-3</sup>) in 2023. The nine zones that exceeded this limit value were:

- Greater London Urban Area
- West Midlands Urban Area
- Greater Manchester Urban Area
- West Yorkshire Urban Area
- Liverpool Urban Area
- Nottingham Urban Area
- Bristol Urban Area
- Coventry/Bedworth
- The South East.

**Table 3-1 Results of Air Quality Assessment for Nitrogen Dioxide in 2023**

Zone	Zone code	NO <sub>2</sub> LV for health (1hr mean)	NO <sub>2</sub> LV for health (annual mean)	NO <sub>x</sub> critical level for vegetation (ann. mean)
Greater London Urban Area	UK0001	OK	> LV	n/a
West Midlands Urban Area	UK0002	OK	> LV (s only)	n/a
Greater Manchester Urban Area	UK0003	OK	> LV (s only)	n/a
West Yorkshire Urban Area	UK0004	OK	> LV (s only)	n/a
Tyneside	UK0005	OK	OK	n/a
Liverpool Urban Area	UK0006	OK	> LV (s only)	n/a
Sheffield Urban Area	UK0007	OK	OK	n/a
Nottingham Urban Area	UK0008	OK	> LV (s only)	n/a
Bristol Urban Area	UK0009	OK	> LV (s only)	n/a
Brighton/Worthing/Littlehampton	UK0010	OK	OK	n/a
Leicester Urban Area	UK0011	OK	OK	n/a
Portsmouth Urban Area	UK0012	OK	OK	n/a
Teesside Urban Area	UK0013	OK	OK	n/a
The Potteries	UK0014	OK	OK	n/a
Bournemouth Urban Area	UK0015	OK	OK	n/a
Reading/Wokingham Urban Area	UK0016	OK	OK	n/a
Coventry/Bedworth	UK0017	OK	> LV (s only)	n/a
Kingston upon Hull	UK0018	OK	OK	n/a
Southampton Urban Area	UK0019	OK	OK	n/a
Birkenhead Urban Area	UK0020	OK	OK	n/a
Southend Urban Area	UK0021	OK	OK	n/a
Blackpool Urban Area	UK0022	OK	OK	n/a
Preston Urban Area	UK0023	OK	OK	n/a
Glasgow Urban Area	UK0024	OK	OK	n/a
Edinburgh Urban Area	UK0025	OK	OK	n/a
Cardiff Urban Area	UK0026	OK	OK	n/a
Swansea Urban Area	UK0027	OK	OK	n/a
Belfast Urban Area	UK0028	OK	OK	n/a
Eastern	UK0029	OK	OK	OK
South West	UK0030	OK	OK	OK
South East	UK0031	OK	> LV (s only)	OK
East Midlands	UK0032	OK	OK	OK
North West & Merseyside	UK0033	OK	OK	OK (s only)
Yorkshire & Humberside	UK0034	OK	OK	OK
West Midlands	UK0035	OK	OK	OK (s only)
North East	UK0036	OK	OK	OK (s only)
Central Scotland	UK0037	OK	OK	OK (s only)
North East Scotland	UK0038	OK	OK	OK (s only)
Highland	UK0039	OK	OK	OK (s only)
Scottish Borders	UK0040	OK	OK	OK (s only)
South Wales	UK0041	OK	OK	OK
North Wales	UK0042	OK	OK	OK
Northern Ireland	UK0043	OK	OK	OK (s only)

LV = limit value, (s only) indicates the compliance or exceedance was determined by supplementary assessment only.

The year 2020 saw a large reduction in the number of zones exceeding the annual mean limit value: just five zones exceeded in 2020 compared to 33 zones in 2019. This was attributed to the reduced road traffic flows brought about by the COVID-19 pandemic lockdown restrictions. In the following year, 2021, 10 zones exceeded this limit value. In 2022, nine zones exceeded this limit value, and in 2023 also, nine zones exceeded this limit value.

All non-agglomeration zones within the UK complied with the critical level for annual mean NO<sub>x</sub> concentration, set for protection of vegetation, as has been the case for many years.

As part of the 2017 UK plan for tackling roadside nitrogen dioxide concentrations (Defra, 2017), local authorities in England with exceedances of the annual mean nitrogen dioxide limit value have been required to develop local plans or studies to consider measures to achieve the statutory limit value within the shortest possible time. These studies or plans may include local scale modelling and/or monitoring data, and in some cases the local data presents different results to the national air quality assessment. This is partly due to local monitoring being sited differently to national monitoring in order to target local pollution hotspots. Where possible, Defra is working to develop and improve the national NO<sub>2</sub> compliance assessment to better reflect local level NO<sub>2</sub> concentrations. This included establishing the UUNN in 2020, to provide more local NO<sub>2</sub> measurement data.

**Particulate Matter as PM<sub>10</sub>:** all zones and agglomerations were compliant with the annual mean limit value of 40 µg m<sup>-3</sup> for PM<sub>10</sub>. All zones and agglomerations were also compliant with the daily mean limit value of 50 µg m<sup>-3</sup>, which must not be exceeded more than 35 times a year. The results of the air quality assessment for PM<sub>10</sub> for each zone, with respect to the daily mean and annual mean limit values, are summarised in **Table 3-2**.

Under the Air Quality Standards Regulations (2010), the UK is required to identify any exceedances of PM<sub>10</sub> limit values which are due to natural sources (for example sea salt). Where this is the case, the exceedance does not count as non-compliance. Particulate matter from sea salt is modelled and has been used in the past to determine whether compliance with the limit values has been achieved after contribution from natural sources has been subtracted. However, in 2023 there were no modelled exceedances of either the 24-hr or annual mean limit values prior to any natural source correction. (Pugsley, K. L. et al., 2024).

**Table 3-2 Results of Air Quality Assessment for PM<sub>10</sub> in 2023**

Zone	Zone code	PM <sub>10</sub> LV (daily mean)	PM <sub>10</sub> LV (annual mean)
Greater London Urban Area	UK0001	OK	OK
West Midlands Urban Area	UK0002	OK	OK
Greater Manchester Urban Area	UK0003	OK	OK
West Yorkshire Urban Area	UK0004	OK	OK
Tyneside	UK0005	OK	OK
Liverpool Urban Area	UK0006	OK	OK
Sheffield Urban Area	UK0007	OK	OK
Nottingham Urban Area	UK0008	OK	OK
Bristol Urban Area	UK0009	OK	OK
Brighton/Worthing/Littlehampton	UK0010	OK (s only)	OK (s only)
Leicester Urban Area	UK0011	OK	OK
Portsmouth Urban Area	UK0012	OK	OK
Teesside Urban Area	UK0013	OK	OK
The Potteries	UK0014	OK	OK
Bournemouth Urban Area	UK0015	OK (s only)	OK (s only)
Reading/Wokingham Urban Area	UK0016	OK	OK
Coventry/Bedworth	UK0017	OK	OK
Kingston upon Hull	UK0018	OK	OK
Southampton Urban Area	UK0019	OK	OK
Birkenhead Urban Area	UK0020	OK	OK
Southend Urban Area	UK0021	OK	OK
Blackpool Urban Area	UK0022	OK	OK
Preston Urban Area	UK0023	OK	OK
Glasgow Urban Area	UK0024	OK	OK
Edinburgh Urban Area	UK0025	OK	OK
Cardiff Urban Area	UK0026	OK	OK
Swansea Urban Area	UK0027	OK	OK
Belfast Metropolitan Urban Area	UK0028	OK	OK
Eastern	UK0029	OK	OK
South West	UK0030	OK	OK
South East	UK0031	OK	OK
East Midlands	UK0032	OK	OK
North West & Merseyside	UK0033	OK	OK
Yorkshire & Humberside	UK0034	OK	OK
West Midlands	UK0035	OK	OK
North East	UK0036	OK	OK
Central Scotland	UK0037	OK	OK
North East Scotland	UK0038	OK	OK
Highland	UK0039	OK	OK
Scottish Borders	UK0040	OK (s only)	OK (s only)
South Wales	UK0041	OK	OK
North Wales	UK0042	OK	OK
Northern Ireland	UK0043	OK	OK

LV = limit value, (s only) indicates that the compliance or exceedance was determined by supplementary assessment only. Subtraction of natural source contribution was not carried out for any zones in 2023.



**Particulate Matter as PM<sub>2.5</sub>:** all zones met the annual mean limit value (20 µg m<sup>-3</sup> to have been achieved by 1<sup>st</sup> Jan 2020).

The results of the air quality assessment for PM<sub>2.5</sub> for each zone are summarised in **Table 3-3**. Subtraction of contributions due to natural sources is not permitted for PM<sub>2.5</sub>.

Under the Air Quality Standards Regulations (2010), the UK was required to achieve a National Exposure Reduction Target (NERT) for PM<sub>2.5</sub>, over the period 2010 to 2020. The UK achieved the NERT in 2016, well before the 2020 target year, but has continued to report compliance annually, even after 2020, to demonstrate that it remains compliant.

Compliance is assessed on the basis of the Average Exposure Indicator (AEI) statistic. The AEI for the UK is calculated as follows:

- (i) Each year, the annual arithmetic mean PM<sub>2.5</sub> concentration is calculated for the designated AEI subset of urban background sites<sup>1</sup>.
- (ii) The mean of the most recent three calendar years' values is taken as the AEI.

The detailed methodology and results of this calculation are presented in Defra's technical report on UK air quality assessment (Pugsley, K. L. et al., 2024).

The AEI for the reference year (2010) was 13 µg m<sup>-3</sup>; based on this, the Air Quality Standards Regulations (2010) set an exposure reduction target of 15%, which equated to reducing the AEI to 11 µg m<sup>-3</sup> by 2020.

Most recent annual mean urban background PM<sub>2.5</sub> concentrations were as follows:

- 2021: 8 µg m<sup>-3</sup>
- 2022: 8 µg m<sup>-3</sup>
- 2023: 7 µg m<sup>-3</sup>

The three-year running mean AEI for 2023 (calculated as the mean of the above annual values, to the nearest integer), is 8 µg m<sup>-3</sup>. Therefore, the UK remained compliant with the NERT in 2023.

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<sup>1</sup> The sites used for calculation of the AEI are all the urban background PM<sub>2.5</sub> monitoring sites that were in operation in the baseline year. Urban background sites that started monitoring PM<sub>2.5</sub> later, or were not classified as urban background in the baseline year, are not included. (The exception is where the new site is the relocation of an existing AEI site that has been moved by a short distance, and to a similar environment). This means that the AEI is calculated on a largely consistent group of sites from year to year.

**Table 3-3 Results of Air Quality Assessment for PM<sub>2.5</sub> in 2023**

Zone	Zone code	PM <sub>2.5</sub> annual mean limit value
Greater London Urban Area	UK0001	OK
West Midlands Urban Area	UK0002	OK
Greater Manchester Urban Area	UK0003	OK
West Yorkshire Urban Area	UK0004	OK
Tyneside	UK0005	OK
Liverpool Urban Area	UK0006	OK
Sheffield Urban Area	UK0007	OK
Nottingham Urban Area	UK0008	OK
Bristol Urban Area	UK0009	OK
Brighton/Worthing/Littlehampton	UK0010	OK (s only)
Leicester Urban Area	UK0011	OK
Portsmouth Urban Area	UK0012	OK
Teesside Urban Area	UK0013	OK
The Potteries	UK0014	OK
Bournemouth Urban Area	UK0015	OK
Reading/Wokingham Urban Area	UK0016	OK
Coventry/Bedworth	UK0017	OK
Kingston upon Hull	UK0018	OK
Southampton Urban Area	UK0019	OK
Birkenhead Urban Area	UK0020	OK
Southend Urban Area	UK0021	OK
Blackpool Urban Area	UK0022	OK
Preston Urban Area	UK0023	OK
Glasgow Urban Area	UK0024	OK
Edinburgh Urban Area	UK0025	OK
Cardiff Urban Area	UK0026	OK (s only)
Swansea Urban Area	UK0027	OK
Belfast Metropolitan Urban Area	UK0028	OK
Eastern	UK0029	OK
South West	UK0030	OK
South East	UK0031	OK
East Midlands	UK0032	OK
North West & Merseyside	UK0033	OK
Yorkshire & Humberside	UK0034	OK
West Midlands	UK0035	OK
North East	UK0036	OK
Central Scotland	UK0037	OK
North East Scotland	UK0038	OK
Highland	UK0039	OK
Scottish Borders	UK0040	OK (s only)
South Wales	UK0041	OK
North Wales	UK0042	OK
Northern Ireland	UK0043	OK

*Subtraction of natural source contribution is not permitted for PM<sub>2.5</sub>.*

*LV = limit value, (s only) indicates the compliance or exceedance was determined by supplementary assessment only.*

Also, as explained in **Section 1**, the Environmental Targets (Fine Particulate Matter) (England) Regulations (2023) (UK Government, 2023) contain the following long-term targets for PM<sub>2.5</sub>:

- An Annual Mean Concentration Target (AMCT) - to reduce maximum annual mean PM<sub>2.5</sub> concentrations in England to 10 µg m<sup>-3</sup> by 2040. Legal compliance with the Annual Mean Concentration Target is assessed using AURN measurements at individual PM<sub>2.5</sub> monitoring stations, regardless of their site type classification.
- A Population Exposure Reduction Target (PERT), to reduce population exposure to PM<sub>2.5</sub> in England by 35% compared to 2018, by 2040. Legal compliance with the PERT is assessed using an average of measurements from urban background and suburban background AURN monitoring sites.

The Annual Mean Concentration Target will be considered met if, at every relevant monitoring station, the annual mean concentration of PM<sub>2.5</sub> in ambient air, rounded to the nearest whole number of µg m<sup>-3</sup>, is equal to or less than the target level in the year 2040.

Compliance with the targets is a legal requirement from 2040 onwards, but progress against them and the interim targets (which are not legally mandatory) is reported below. The targets apply only in England. One AURN site in England exceeded the AMCT of 10 µg m<sup>-3</sup> in 2023. This was London Marylebone Road, a roadside site in central London.

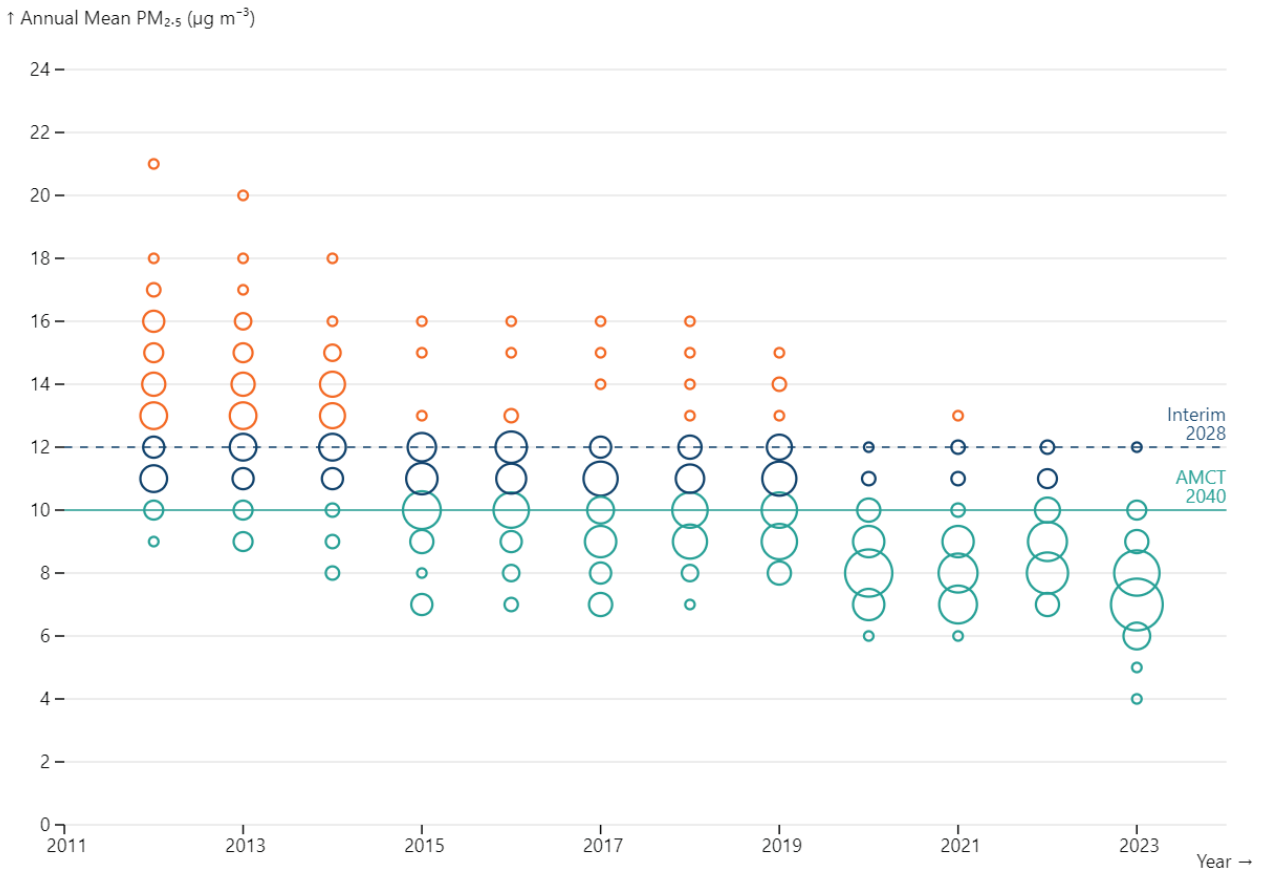
All AURN sites met the *interim* AMCT in 2023. This is a maximum of 12 µg m<sup>-3</sup> to be achieved by January 2028. **Figure 3.1** shows how measured concentrations are changing over time and compares them to the long-term and interim targets.

Progress towards meeting the PERT is assessed using a 'Population Exposure Indicator' (PEI<sub>year</sub>) - a measure of average population exposure in the three-year period ending on 31<sup>st</sup> December in a given year. The reduction in population exposure is found by comparing the PEI<sub>year</sub> against the Baseline Population Exposure Indicator ('PEI<sub>base</sub>') - the average for the three years 2016, 2017 and 2018. PEI<sub>base</sub> is 10.09 µg m<sup>-3</sup>. A statistical method to account for changes in the monitoring network is used in the calculation of the percentage reduction, so the comparison is not direct.

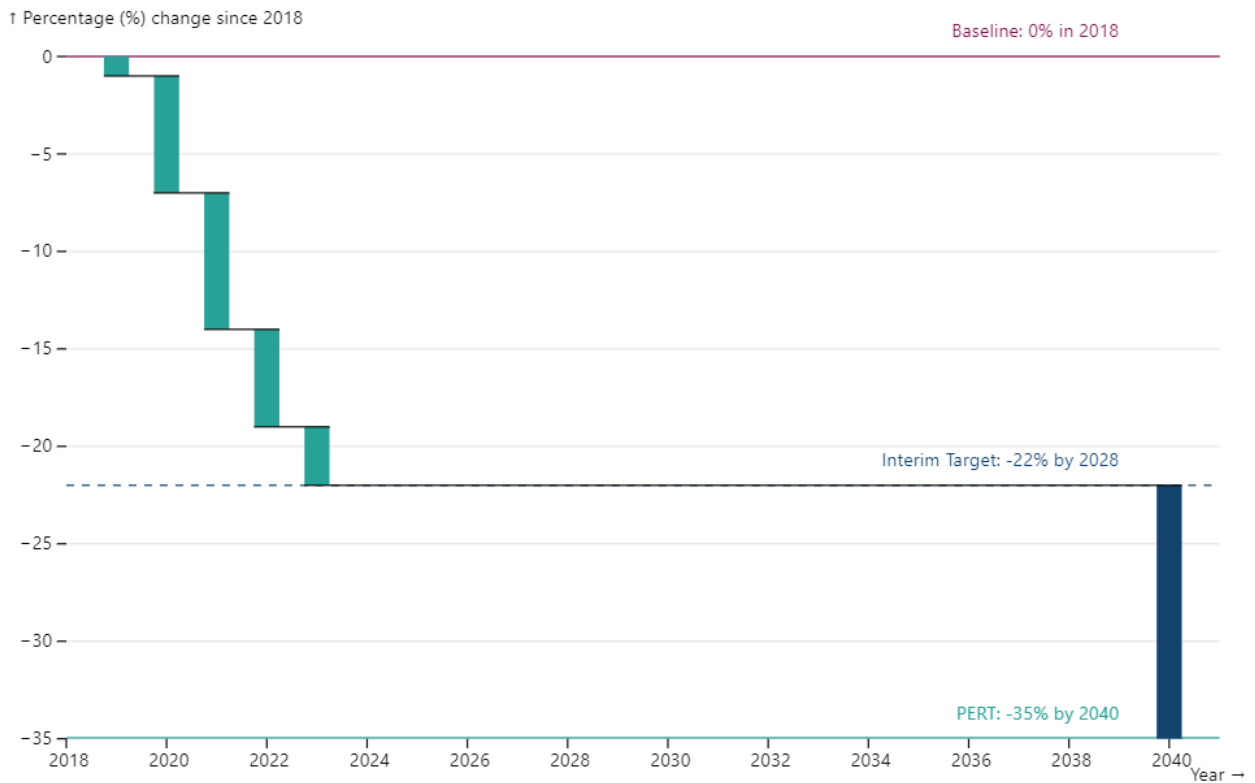
PEI<sub>2023</sub> is 7.88 µg m<sup>-3</sup>. The reduction in population exposure from 2018 to 2023 is 22%: England therefore met the interim PERT of 22% in 2023, though not the long-term target of 35% to be met by December 2040. **Figure 3.2** illustrates progress towards meeting the PERT and the interim target.

Information on progress towards meeting the PM<sub>2.5</sub> targets is available on UK-AIR, at <https://uk-air.defra.gov.uk/pm25targets/progress> and the full calculation methodology for the PERT and AMCT can be found here <https://uk-air.defra.gov.uk/pm25targets/calculation>.

**Figure 3.1 AMCT progress from 2012 to 2023**



**Figure 3.2 PERT progress from 2018 to 2023**



**Ozone:** all zones and agglomerations met the target values for health and for protection of vegetation. The results of the air quality assessment for ozone are summarised in **Table 3-4**.

For ozone (O<sub>3</sub>), there is a target value based on the maximum daily 8-hour mean. All 43 zones and agglomerations were compliant with this target value. There is also a more stringent long-term objective for protection of human health, also based on the maximum daily 8-hour mean. Only one of the 43 zones and agglomerations was compliant with the long-term objective (LTO) for health in 2023: Edinburgh Urban Area.

There is also a target value based on the AOT40 statistic. The AOT40 statistic (expressed in µg m<sup>-3</sup> hours) is the sum of the difference between hourly concentrations greater than 80 µg m<sup>-3</sup> (= 40 ppb) over a given period using only the hourly mean values measured between 08:00 and 20:00 Central European Time each day. All 43 zones and agglomerations met the target value based on the AOT40 statistic. There is also a more stringent long-term objective, for protection of vegetation, also based on the AOT40 statistic; 30 zones exceeded this long-term objective for vegetation in 2023. The UK met all target values for O<sub>3</sub> in 2023 as it has done for many years.

Ozone concentrations – and hence the number of zones exceeding the LTOs - fluctuate from year to year as ozone is a transboundary pollutant and its formation is influenced by meteorological factors. The year 2023 contained two notable periods of high ozone concentration, during hot, sunny weather in June and September. There were more exceedances of the LTO for vegetation in 2023 than in 2022.

In 2023 there were 26 measured exceedances of the ozone population information threshold of 180 µg m<sup>-3</sup>, considerably fewer than the 88 exceedances reported in 2022. There were no exceedances of the population warning threshold of 240 µg m<sup>-3</sup>. The population information threshold exceedances are detailed in **Table 3-5**. These occurred during two specific periods of hot summer and early autumn weather. These were as follows:

- 10<sup>th</sup>, 11<sup>th</sup>, 13<sup>th</sup> and 14<sup>th</sup> June 2023. Measured ozone concentrations exceeded the population information threshold during the afternoons and early evenings of these days at several sites in the South East of England, London, Essex and Bournemouth.
- 7<sup>th</sup> – 9<sup>th</sup> September 2023. Exceedances of the population information threshold occurred in the afternoons of these days at several sites in London, the South East of England, Reading and East Anglia.

**Table 3-4 Results of Air Quality Assessment for Ozone in 2023**

Zone	Zone code	O <sub>3</sub> TV and LTO for health (8hr mean)	O <sub>3</sub> TV and LTO for vegetation (AOT40)
Greater London Urban Area	UK0001	Met TV, > LTO	Met TV, > LTO
West Midlands Urban Area	UK0002	Met TV, > LTO	Met TV, > LTO
Greater Manchester Urban Area	UK0003	Met TV, > LTO	Met TV, > LTO (s only)
West Yorkshire Urban Area	UK0004	Met TV, > LTO	Met TV, > LTO (s only)
Tyneside	UK0005	Met TV, > LTO (s only)	OK
Liverpool Urban Area	UK0006	Met TV, > LTO	Met TV, > LTO (s only)
Sheffield Urban Area	UK0007	Met TV, > LTO	Met TV, > LTO
Nottingham Urban Area	UK0008	Met TV, > LTO	Met TV, > LTO (s only)
Bristol Urban Area	UK0009	Met TV, > LTO	Met TV, > LTO (s only)
Brighton/Worthing/Littlehampton	UK0010	Met TV, > LTO	Met TV, > LTO (s only)
Leicester Urban Area	UK0011	Met TV, > LTO	Met TV, > LTO (s only)
Portsmouth Urban Area	UK0012	Met TV, > LTO	Met TV, > LTO
Teesside Urban Area	UK0013	Met TV, > LTO (s only)	OK
The Potteries	UK0014	Met TV, > LTO	Met TV, > LTO (s only)
Bournemouth Urban Area	UK0015	Met TV, > LTO	Met TV, > LTO
Reading/Wokingham Urban Area	UK0016	Met TV, > LTO	Met TV, > LTO (s only)
Coventry/Bedworth	UK0017	Met TV, > LTO	Met TV, > LTO (s only)
Kingston upon Hull	UK0018	Met TV, > LTO	Met TV, > LTO (s only)
Southampton Urban Area	UK0019	Met TV, > LTO	Met TV, > LTO (s only)
Birkenhead Urban Area	UK0020	Met TV, > LTO	Met TV, > LTO (s only)
Southend Urban Area	UK0021	Met TV, > LTO	OK
Blackpool Urban Area	UK0022	Met TV, > LTO	OK
Preston Urban Area	UK0023	Met TV, > LTO	OK
Glasgow Urban Area	UK0024	Met TV, > LTO	OK
Edinburgh Urban Area	UK0025	OK	OK
Cardiff Urban Area	UK0026	Met TV, > LTO	Met TV, > LTO
Swansea Urban Area	UK0027	Met TV, > LTO	Met TV, > LTO (s only)
Belfast Metropolitan Urban Area	UK0028	Met TV, > LTO	OK
Eastern	UK0029	Met TV, > LTO	Met TV, > LTO
South West	UK0030	Met TV, > LTO	Met TV, > LTO
South East	UK0031	Met TV, > LTO	Met TV, > LTO
East Midlands	UK0032	Met TV, > LTO	Met TV, > LTO
North West & Merseyside	UK0033	Met TV, > LTO	Met TV, > LTO
Yorkshire & Humberside	UK0034	Met TV, > LTO	Met TV, > LTO
West Midlands	UK0035	Met TV, > LTO	Met TV, > LTO
North East	UK0036	Met TV, > LTO (s only)	Met TV, > LTO (s only)
Central Scotland	UK0037	Met TV, > LTO (s only)	OK
North East Scotland	UK0038	Met TV, > LTO (s only)	OK
Highland	UK0039	Met TV, > LTO	OK
Scottish Borders	UK0040	Met TV, > LTO	OK
South Wales	UK0041	Met TV, > LTO	Met TV, > LTO (s only)
North Wales	UK0042	Met TV, > LTO	Met TV, > LTO (s only)
Northern Ireland	UK0043	Met TV, > LTO	OK

*TV = target value, LTO = long-term objective, (s only) indicates that the compliance or exceedance was determined by supplementary assessment only.*

**Table 3-5 Measured Exceedances of the Ozone Information Threshold Value in 2023**

Site name	Zone name	Number of 1-hour exceedances of information threshold	Maximum 1-hour concentration ( $\mu\text{g m}^{-3}$ )
Bournemouth	Bournemouth Urban Area	5	191
Rochester Stoke	South East	5	190
London Harlington	Greater London	4	190
London N. Kensington	Greater London	3	188
Canterbury	South East	2	187
St Osyth	Eastern	2	184
London Bloomsbury	Greater London	1	184
London Haringey Priory Park South	Greater London	1	182
Lullington Heath	South East	1	181
Reading New Town	Reading/Wokingham Urban Area	1	184
Sibton	Eastern	1	186

Table 3-5 shows the exceedances of the ozone information threshold in the verified dataset. The highest value is rounded to the nearest integer before counting, so values greater than  $180 \mu\text{g m}^{-3}$  but less than  $180.5 \mu\text{g m}^{-3}$  do not count towards the total.

**Arsenic, cadmium, nickel and benzo[a]pyrene:** the air quality assessments for arsenic (As), cadmium (Cd), nickel (Ni) and benzo[a]pyrene (B[a]P) are summarised in **Table 3-6**. All zones met target values for arsenic and cadmium, but some zones exceeded the target value for nickel and/or benzo[a]pyrene.

Concentrations of Ni exceeded the target value in Sheffield Urban Area, Swansea Urban Area and South Wales. These exceedances are attributed to emissions from industrial sources.

Concentrations of B[a]P were above the target value in two zones: Swansea Urban Area and South Wales. These exceedances are also attributed to emissions from industrial sources.

**Table 3-6 Results of Air Quality Assessment for As, Cd, Ni and B[a]P in 2023**

Zone	Zone code	As TV	Cd TV	Ni TV	B[a]P TV
Greater London Urban Area	UK0001	OK	OK	OK	OK
West Midlands Urban Area	UK0002	OK	OK	OK	OK
Greater Manchester Urban Area	UK0003	OK (s only)	OK (s only)	OK (s only)	OK
West Yorkshire Urban Area	UK0004	OK (s only)	OK (s only)	OK (s only)	OK
Tyneside	UK0005	OK (s only)	OK (s only)	OK (s only)	OK
Liverpool Urban Area	UK0006	OK (s only)	OK (s only)	OK (s only)	OK
Sheffield Urban Area	UK0007	OK	OK	> TV (s only)	OK
Nottingham Urban Area	UK0008	OK (s only)	OK (s only)	OK (s only)	OK
Bristol Urban Area	UK0009	OK (s only)	OK (s only)	OK (s only)	OK
Brighton/Worthing/Littlehampton	UK0010	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Leicester Urban Area	UK0011	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Portsmouth Urban Area	UK0012	OK (s only)	OK (s only)	OK (s only)	OK
Teesside Urban Area	UK0013	OK (s only)	OK (s only)	OK (s only)	OK
The Potteries	UK0014	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Bournemouth Urban Area	UK0015	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Reading/Wokingham Urban Area	UK0016	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Coventry/Bedworth	UK0017	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Kingston upon Hull	UK0018	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Southampton Urban Area	UK0019	OK (s only)	OK (s only)	OK (s only)	OK
Birkenhead Urban Area	UK0020	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Southend Urban Area	UK0021	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Blackpool Urban Area	UK0022	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Preston Urban Area	UK0023	OK (s only)	OK (s only)	OK (s only)	OK
Glasgow Urban Area	UK0024	OK (s only)	OK (s only)	OK (s only)	OK
Edinburgh Urban Area	UK0025	OK (s only)	OK (s only)	OK (s only)	OK
Cardiff Urban Area	UK0026	OK (s only)	OK (s only)	OK (s only)	OK
Swansea Urban Area	UK0027	OK	OK	OK	> TV
Belfast Urban Area	UK0028	OK	OK	OK	OK
Eastern	UK0029	OK	OK	OK	OK
South West	UK0030	OK	OK	OK	OK
South East	UK0031	OK	OK	OK	OK
East Midlands	UK0032	OK	OK	OK	OK
North West & Merseyside	UK0033	OK (s only)	OK (s only)	OK (s only)	OK
Yorkshire & Humberside	UK0034	OK	OK	> TV (s only)	OK
West Midlands	UK0035	OK	OK	OK	OK (s only)
North East	UK0036	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Central Scotland	UK0037	OK	OK	OK	OK
North East Scotland	UK0038	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Highland	UK0039	OK (s only)	OK (s only)	OK (s only)	OK
Scottish Borders	UK0040	OK	OK	OK	OK (s only)
South Wales	UK0041	OK	OK	> TV (s only)	> TV (s only)
North Wales	UK0042	OK (s only)	OK (s only)	OK (s only)	OK (s only)
Northern Ireland	UK0043	OK (s only)	OK (s only)	OK (s only)	OK

TV = target value, (s only) indicates the compliance or exceedance was determined by supplementary assessment only.



## 4 Comparison with Previous Years

This section provides information on non-compliances in previous years from 2008 onwards. (2008 is the year that the Air Quality Directive - which was subsequently transposed into UK legislation by the Air Quality Standards Regulations (2010) – came into force.)

For **SO<sub>2</sub>**, **lead**, **benzene** and **CO**, the UK has been compliant with all Air Quality Standards Regulations (2010) limit values since 2008. For **PM<sub>2.5</sub>**, the UK has been compliant with the AQSR limit value (20 µg m<sup>-3</sup> to have been achieved by 1<sup>st</sup> Jan 2020) since 2015. For information on compliance with the 1<sup>st</sup> and 2<sup>nd</sup> Daughter Directives for all pollutants in earlier years, please see the 2012 or earlier reports in this series, which can be found here: <https://uk-air.defra.gov.uk/library/annualreport/>.

The UK has been compliant with the limit values for both **lead** and **CO** since 2003, and for **benzene** since 2007: these limit values are the same as those contained in the 1<sup>st</sup> and 2<sup>nd</sup> Daughter Directives, which the Air Quality Directive (and therefore the Air Quality Standards Regulations (2010)) superseded.

For nitrogen dioxide, **Table 4-1** summarises the results of the air quality assessment in years from 2008 to 2023. This table shows the numbers of zones exceeding the limit value (plus any agreed margin of tolerance, in cases where a time extension had been granted). The right-hand column contains notes on the effects of any time extensions, the last of which ended on 1<sup>st</sup> January 2015.

All non-agglomeration zones within the UK have complied with the critical level for annual mean NO<sub>x</sub> concentration, set for protection of vegetation, in years 2008 onwards.

For PM<sub>10</sub>, **Table 4-2** summarises the results of the air quality assessment in years from 2008 to 2023. There are notes in the right-hand column explaining the effects of the time extensions which were in place up to the end of 2011 for some zones.

This is only the second year in which compliance against the PM<sub>2.5</sub> targets of the Environmental Targets (Fine Particulate Matter) (England) Regulations 2023 has been reported, so no table is included for PM<sub>2.5</sub>.

For ozone, **Table 4-3** summarises annual exceedances of the target value for human health (based on the maximum daily 8-hour mean), the target value for protection of vegetation (based on the AOT40 statistic), and the two long-term objectives (LTOs) based on these two metrics.

Finally, for the pollutants formerly covered by the Fourth Daughter Directive - arsenic (As), cadmium (Cd), nickel (Ni) and benzo[a]pyrene (B[a]P) - **Table 4-4** summarises the numbers of zones with exceedances of target values in previous years.

**Table 4-1 Non-Compliances with Limit Values for Nitrogen Dioxide, 2008-2023**

Year	Zones Exceeding NO <sub>2</sub> LV for health (1hr mean)	Zones Exceeding NO <sub>2</sub> LV for health (annual mean)	Notes on Time Extensions
2008	3 zones (London, Glasgow, N.E. Scotland)	40 zones	-
2009	2 zones (London, Glasgow)	40 zones	-
2010	3 zones (London, Teesside, Glasgow)	40 zones	-
2011	3 zones (London, Glasgow, South East)	35 zones	A further 5 zones exceeded the annual mean NO <sub>2</sub> LV in 2011 but were covered by time extensions and within the LV+ Margin of Tolerance (MOT), therefore compliant.
2012	2 zones (London, South East)	34 zones	A further 4 zones exceeded the annual mean NO <sub>2</sub> LV in 2012 but were covered by time extensions and within the LV+ MOT, therefore compliant.
2013	1 zone (London)	31 zones	A further 7 zones exceeded the annual mean NO <sub>2</sub> LV in 2013 but were covered by time extensions and within the LV+ MOT, therefore compliant.
2014	2 zones (London, South Wales)	30 zones	A further 8 zones exceeded the annual mean NO <sub>2</sub> LV in 2014 but were covered by time extensions and within the LV+ MOT, therefore compliant.
2015	2 zones (London, South Wales)	37 zones	2015 was the first year with no time extensions for NO <sub>2</sub> , hence the apparent increase in zones exceeding in 2015.
2016	2 zones (London, South Wales)	37 zones	No time extensions in place.
2017	2 zones (London, South Wales)	37 zones	No time extensions in place.
2018	2 zones (London, South Wales)	36 zones	No time extensions in place.
2019	1 zone (South Wales)	33 zones	No time extensions in place.
2020	None	5 zones	No time extensions in place.
2021	None	10 zones	No time extensions in place.
2022	None	9 zones	No time extensions in place.
2023	None	9 zones	No time extensions in place.

**Table 4-2 Non-Compliances with the Limit Values for PM<sub>10</sub>, 2008-2023**

Year	PM <sub>10</sub> LV (annual mean)	PM <sub>10</sub> LV (daily mean)	Notes on Time Extensions and Subtraction of Natural contribution
2008	None	2 zones (1 zone after subtraction of natural contribution)	-
2009	None	3 zones (1 zone after subtraction of natural contribution)	-
2010	None	None (after subtraction of natural contribution)	One zone exceeded the daily mean PM <sub>10</sub> limit value > 35 times in 2010, after subtraction of natural contribution. This zone was covered by a time extension and was within the LV+MOT so was therefore compliant.
2011	None	None (after subtraction of natural contribution)	One zone exceeded the daily mean PM <sub>10</sub> limit value > 35 times in 2011, after subtraction of natural contribution. This zone was covered by a time extension and was within the LV+MOT so was therefore compliant.
2012	None	None (after subtraction of natural contribution. No time extension.)	-
2013	None	None (after subtraction of natural contribution. No time extension.)	-
2014	None	None (after subtraction of natural contribution. No time extension.)	-
2015	None	None (after subtraction of natural contribution. No time extension.)	-
2016	None	None	-
2017	None	None	-
2018	None	None	-
2019	None	None	-
2020	None	None	-
2021	None	None	-
2022	None	None	-
2023	None	None	-

**Table 4-3 Exceedances of Target Values for Ozone (Health) and Long-Term Objectives, 2008-2023**

<b>Year</b>	<b>8-Hour Mean Target Value</b>	<b>AOT40 Target Value</b>	<b>8-Hour Mean LTO</b>	<b>AOT40 LTO</b>
<b>2008</b>	1 zone measured (Eastern)	None	43 zones	41 zones
<b>2009</b>	None	None	39 zones	10 zones
<b>2010</b>	None	None	41 zones	6 zones
<b>2011</b>	None	None	43 zones	3 zones
<b>2012</b>	None	None	41 zones	3 zones
<b>2013</b>	None	None	33 zones	8 zones
<b>2014</b>	None	None	32 zones	3 zones
<b>2015</b>	None	None	43 zones	1 zone
<b>2016</b>	None	None	42 zones	5 zones
<b>2017</b>	None	None	34 zones	None
<b>2018</b>	None	None	43 zones	38 zones
<b>2019</b>	None	None	43 zones	6 zones
<b>2020</b>	None	None	40 zones	16 zones
<b>2021</b>	None	None	39 zones	1 zone
<b>2022</b>	None	None	43 zones	11 zones
<b>2023</b>	None	None	42 zones	30 zones

**Table 4-4 Zones Exceeding Target Values for As, Cd, Ni and B[a]P, 2008-2023**

Year	As	Cd	Ni	B[a]P
2008	None	None	2 (Swansea, South Wales)	6 (Yorks. & Humberside, Teesside, Northern Ireland, Swansea, South Wales, Belfast)
2009	None	None	2 (Swansea, South Wales)	6 (Yorks. & Humberside, Northern Ireland, Teesside, Swansea, North East, South Wales)
2010	None	None	2 (Swansea, South Wales)	8 (Yorks. & Humberside, N. Ireland, Teesside, Belfast, W Midlands, North East, South Wales, North Wales.)
2011	None	None	2 (Swansea, South Wales)	7 (Yorks. & Humberside, N. Ireland, Teesside, Swansea, Belfast, North East, South Wales)
2012	None	None	2 (Swansea, South Wales)	8 (Yorks. & Humberside, Teesside, Swansea, Belfast, the North East, South Wales, North Wales, N. Ireland.)
2013	None	None	2 (Swansea, South Wales)	6 (Yorks. & Humberside, Teesside, Swansea, East Midlands, North East, South Wales.)
2014	None	None	3 (Sheffield, Swansea, South Wales)	6 (Yorks. & Humberside, Teesside, Swansea, East Midlands, North East, and South Wales).
2015	None	None	2 (Swansea, South Wales)	5 (Yorks. & Humberside, Teesside, Swansea, the North East and South Wales).
2016	None	None	3 (Sheffield, Swansea, South Wales)	4 (Yorks. & Humberside, Swansea, South Wales and Northern Ireland).
2017	None	None	None	3 (Yorks. & Humberside, Swansea and South Wales)
2018	None	None	4 (Sheffield, Yorks. & Humberside, Swansea and South Wales)	3 (Yorks. & Humberside, Swansea and South Wales)
2019	None	None	4 (Sheffield, Yorks. & Humberside, Swansea and South Wales)	3 (Yorks. & Humberside, Swansea and South Wales)
2020	None	None	4 (Sheffield, Yorks. & Humberside, Swansea and South Wales)	3 (Yorks. & Humberside, Swansea and South Wales)
2021	None	None	4 (Sheffield, Yorks. & Humberside, Swansea and South Wales)	2 (Swansea and South Wales)
2022	None	None	3 (Sheffield, Yorks. & Humberside and South Wales)	2 (Swansea and South Wales)
2023	None	None	3 (Sheffield, Yorks. & Humberside and South Wales)	2 (Swansea and South Wales)

Additional information from the Devolved Administrations of Scotland, Wales and Northern Ireland can be found at:

- The Scottish Government Air Quality web page at <https://www.scotland.gov.uk/Topics/Environment/waste-and-pollution/Pollution-1/16215>
- The Welsh Government Environment and Climate Change web pages at <https://gov.wales/environment-climate-change> .
- The Northern Ireland Department of Agriculture, Environment and Rural Affairs (DAERA) web page at <https://www.daera-ni.gov.uk/topics/protect-environment> .

## 5 References

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