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Air Quality Assessment Regime Review for the Ambient Air Quality Directive 2008/50/EC

Version 1, December 2013



Llywodraeth Cymru
Welsh Government



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Glossary

Term	Definition/Meaning
AQD, Directive, Air Quality Directive	EU Ambient Air Quality Directive 2008/50/EC
4DD	EU Fourth Daughter Directive 2004/107/EC
UAT	Upper Assessment Threshold, defined in the Directives.
LAT	Lower Assessment Threshold, defined in the Directives.
CO	Carbon monoxide
PM	Particulate matter
NO _x	Oxides of nitrogen
NO ₂	Nitrogen dioxide
SO ₂	Sulphur dioxide
O ₃	Ozone
Pb	Lead
AURN	Automatic Urban and Rural Network
PCM	Pollution Climate Mapping
UK-AIR	Defra's air quality website, http://uk-air.defra.gov.uk/
UB	Urban Background – monitoring station classification
UT	Urban Traffic – monitoring station classification
RB	Rural Background – monitoring station classification
SB	Suburban Background – monitoring station classification

AOT40	Accumulated amount of ozone over the threshold value of 40 ppb, a metric defined in the Air Quality Directive for the protection of vegetation.
AEI	Average Exposure Indicator
Micro and macroscale siting criteria	Criteria in the Air Quality Directive which are used to define the locations where monitoring is required and how monitoring stations should be sited.
CEN	European Committee for Standardization
Affiliate site	A monitoring station which has been brought into Defra's national network, typically owned by a local authority.
Zones and agglomerations	Geographical areas which are defined for the purpose of air quality management and assessment, as required by the Air Quality Directive.
Information and Alert Thresholds	Thresholds for public information defined in the Air Quality Directive.
LTO	Long term objective – defined in the Air Quality Directive.

Executive Summary

An assessment regime review of the UK's air quality monitoring under the Ambient Air Quality Directive 2008/50/EC has been undertaken. This document sets out the proposed changes and provides details of the future monitoring network.

As a result of the review, increases in monitoring for particulate matter (PM) and nitrogen dioxide (NO₂) will be made. A reduction in monitoring of carbon monoxide (CO) and sulphur dioxide (SO₂) has been implemented due to the low concentrations present. Minor changes have also been made to ozone and benzene monitoring. There is potential for future rationalisation of lead monitoring but this will be considered alongside the other metals (arsenic, cadmium and nickel) which are regulated under the 4th Daughter Directive (2004/107/EC).

Finding new stations, securing planning permission and managing the logistics of network expansion is a resource intensive and complex process which requires expert input and can take a number of years. Station locations need to be researched to try and avoid future relocations due to planning and development needs. It is necessary to manage the pace and cost of expansion against available budgets to ensure it is affordable, realistic and undertaken with sufficient attention to detail. To achieve this, the changes have been divided into three manageable work packages, termed Phases 1 to 3, which are defined in this document. The details and logistics will be reviewed before the next phase commences to ensure the proposals remain valid.

As the network is developed, options for site affiliations, sharing of infrastructure, further consideration of the scientific value of individual measurements or the availability of supplementary assessment using models may alter the final network structure and this document may need to be updated. The proposed changes to the network are summarised in Table 1.

Table 1: Overview of Network and Changes

Pollutant	Network Stations pre 2012	Changes made or in process of being made.	Proposed Future Changes	Phase 1 Changes		Phase 2 Changes		Phase 3 Changes
NO ₂ and NO _x	118		44 new station locations (1 station relocated).	16 new station locations (1 station relocated). Total stations = 133	Review Point	16 new stations, total stations = 149	Review Point	12 new stations, total stations = 161
Particulate Matter	144		19 new station locations, (11 station relocations).	7 new station locations including 6 station relocations. Total stations = 145		5 new station locations (all station relocations). Total stations = 145		7 new station locations. Total stations = 152
Carbon Monoxide	24	17 stations removed in 2012. Total stations remaining =7		None		None		None
Sulphur Dioxide	45	16 stations removed in 2012. Total stations remaining = 29.		None		None		None
Ozone	81	3 stations to close in 2013, total stations remaining = 78		None		None		None
Benzene	40	2 stations closed in 2012, 4 stations relocated in 2012. 2 stations relocated in		None		None		None

Pollutant	Network Stations pre 2012	Changes made or in process of being made.	Proposed Future Changes	Phase 1 Changes	Review Point	Phase 2 Changes	Review Point	Phase 3 Changes
		2013. Total stations remaining = 38.						
Lead	35	To be reviewed with other metals under 4 th Daughter Directive.						

Introduction

An assessment regime review of the UK's statutory air quality monitoring networks has been undertaken in accordance with the requirements of Articles 5 and 9 of the Ambient Air Quality Directive (AQD)¹. Previous assessments which this review follows are a Preliminary Assessment of the assessment requirements of the Ambient Air Quality Directive² and an initial Article 5 Review³ to determine the requirements of the Directive 96/62/EC on Ambient Air Quality Assessment and Management and the 1999/30/EC 1st Daughter Directive for monitoring. The review ensures that the monitoring remains compliant with the requirements of the legislation.

The UK is currently divided into forty-three zones and agglomerations for the purpose of air quality assessment, which is undertaken using a combination of fixed measurements and modelling. These zones and agglomerations have been classified against assessment thresholds outlined in Section A of Annex II of the AQD. Paragraph 2 of Article 5 of the AQD requires this assessment to be reviewed at least once every five years. Data from the period 2006-2010 have been reviewed and a zone assessment threshold classification report has been published setting out further details of the classification process⁴.

Zone classification is the first stage in a complex process to review the number of monitoring stations under the AQD to ensure that the assessment remains compliant. The classifications are then used in accordance with criteria in the AQD to evaluate potential changes in the number of stations and their distribution over the network. Evaluating the target number of stations requires consideration of the UK approach to assessment using modelling. If a Member State uses supplementary assessment (modelling) as part of its annual compliance assessment then there is some flexibility on station numbers but this requires professional judgement as to the number of stations needed for adequate model calibration and validation.

In addition to the 5-yearly classification reviews, the existing network is kept under regular review to meet the requirements of Annex III of the AQD and to ensure the stations continue to meet the macroscale and microscale siting criteria for sampling points which are set out in the same Annex. The macroscale criteria set out overarching principles for placement of sampling points, including the following:

- the areas within zones and agglomerations where the highest concentrations occur to which the population is likely to be directly or indirectly exposed for a period which is significant in relation to the averaging period of the limit value(s);

¹ 2008/50/EC <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:152:0001:0044:EN:PDF>

² [http://uk-air.defra.gov.uk/reports/cat09/1101181027_Prelim_rpt_for_CAFE_\(8\).pdf](http://uk-air.defra.gov.uk/reports/cat09/1101181027_Prelim_rpt_for_CAFE_(8).pdf)

³ [http://uk-air.defra.gov.uk/reports/cat09/0502100920_Art5_v9commission2\(final_draft\).pdf](http://uk-air.defra.gov.uk/reports/cat09/0502100920_Art5_v9commission2(final_draft).pdf)

⁴ http://uk-air.defra.gov.uk/library/reports.php?report_id=772

- levels in other areas within the zones and agglomerations which are representative of the exposure of the general population.

The microscale criteria include additional details such as ensuring a free 270 degree arc of air around the inlet and ensuring stations are not placed within 25 metres of a major junction.

The network was reviewed in 2010⁵ and the following stations have been removed:

- Brighton Roadside
- Bristol Old Market
- Bury Roadside
- Leicester Centre
- London Cromwell Road 2

It is important to recognise the complexities of the management of a national monitoring network and the need to ensure it provides value for money for the tax payer. The network has many purposes beyond statutory compliance assessment. It must also aim to meet the needs of researchers, scientists, policy makers, developers and requirements for public information.

Defra's compliance network contains a large number of stations which are shared with local authorities to reduce costs to both parties and many local authorities also undertake monitoring separately for the purpose of Local Air Quality Management. The majority of local authority monitoring stations are not part of Defra's national monitoring network. Local authority monitoring is separate for several reasons including that the stations fulfil a different purpose focusing on hotspots and because the stations may not meet the prescriptive quality and station location criteria set out in the Directive. Defra supplements the national network with modelling to achieve an evidence base which is equivalent to monitoring in all required locations.

The network must be designed to maximise its value and stability should be ensured as far as possible. A phased approach to network reconfiguration is therefore proposed as the most flexible solution with a review at the end of each phase to ensure that potential subsequent phases remain appropriate before commencing.

The first chapter of this report summarises the UK air quality compliance monitoring network. The report then outlines the monitoring for each pollutant including the target number of stations and detail of the proposed changes for nitrogen dioxide and particulate matter. The details of the phasing and station selections may change as logistics such as potential local authority site affiliations, planning policy requirements and further consideration to the scientific value of measurements is given. Updates to this document may therefore be required. Annexes provide a detailed overview of the network and proposed changes.

⁵ http://uk-air.defra.gov.uk/reports/cat13/1011121246_Site_Classifications_Report_v2.pdf

The UK Air Quality Compliance Monitoring Network

Existing network and approach

The review has been undertaken to ensure the monitoring network remains compliant with the requirements of the Ambient Air Quality Directive. The Directive sets out how monitoring for the purpose of compliance assessment should be undertaken, including how many stations are required and detailed criteria on where to locate stations and the equipment that should be used. The number of stations required is calculated for each pollutant for each zone and is based on an assessment of concentrations over a five year period, together with population information for that zone. The Directive also allows use of supplementary assessment using modelling and the number of stations required is more flexible where modelling is used.

The existing national monitoring network (i.e. the network in place prior to 2012) is the product of previous monitoring regime assessments⁶ and legacy monitoring networks dating as far back as the 1950s. The purpose of the approach is to:

- ensure that the monitoring network continues to provide a fit-for-purpose assessment under the AQ Directive;
- ensure monitoring is retained to support supplementary assessment techniques (air quality modelling);
- ensure monitoring of specific scientific value is retained;
- ensure the network provides value for money.

The approach adopted draws on information from both measurements and atmospheric dispersion models (Defra's Pollution Climate Mapping (PCM) model⁷). Key inputs are the data from measurements and models used for annual compliance reporting under the AQD between 2006 and 2010. These data sources have been used to evaluate pollutant levels within the UK air quality zones relative to AQD assessment thresholds and long-

⁶ Bush, T. et al. (2010) Preliminary Assessment for the Ambient Air Quality Directive (2008/50/EC) for the United Kingdom (AEAT/ENV/R/2961 Issue 1) [http://uk-air.defra.gov.uk/reports/cat09/1101181027_Prelim_rpt_for_CAFE_\(8\).pdf](http://uk-air.defra.gov.uk/reports/cat09/1101181027_Prelim_rpt_for_CAFE_(8).pdf)

⁷ Brookes, D. et al. (2011) UK modelling under the Air Quality Directive (2008/50/EC) for 2010 covering the following air quality pollutants: SO₂, NO_x, NO₂, PM₁₀, PM_{2.5}, lead, benzene, CO, and ozone (AEAT/ENV/R/3215 Issue 1) http://uk-air.defra.gov.uk/reports/cat09/1204301513_AQD2010mapsrep_master_v0.pdf

term objectives (set out in Articles 5 and 9 of the AQD) and for each pollutant, to assign a classification in each zone⁸.

Information on the population and area of each zone and the UK as a whole has been used to calculate the number of monitors in accordance with Article 6 and Article 10 of the AQD. Measurement data, network and station metadata have been compiled from the UK-AIR database⁹ for all relevant pollutants.

Supplementary Assessment

In accordance with Articles 7 and 10 of the AQD, the UK utilises atmospheric dispersion model outputs (Defra's Pollution Climate Mapping, PCM model) as a source of supplementary assessment information (SA). This approach has several advantages. It provides a more comprehensive compliance assessment (covering each 1x1 km square of the UK and major urban roads) than fixed point monitoring alone. Air quality modelling also provides useful policy-relevant outputs to facilitate scenario evaluation and future projections which are associated with the results of the compliance assessment.

The application of modelling for the compliance assessment enables the UK to provide an assessment with greater spatial coverage than fixed measurement alone, with up to 50% flexibility on monitoring station numbers than would be required if supplementary assessment was not used. This applies for all pollutants other than ozone for which the flexibility in monitoring is governed by its own set of rules set out in Article 10 of the AQD. Supporting information on the models used is presented in a separate technical report to Defra¹⁰. The models utilised are compliant with the data quality objectives for model data set out by Annex I of the AQD.

Before making any reductions or additions in the number of fixed measurements, the scientific value of supporting or research monitoring must be considered. For example additional monitoring may be retained in addition to the statutory requirement where it is valuable for the calibration or checking of the model outputs. It is important that there is sufficient monitoring to achieve a quality model output for supplementary assessment.

Point sources

Point sources are emissions sources at fixed locations and are typically industrial in nature. Monitoring to assess contributions from point sources is referred to in Annex V,

⁸ http://uk-air.defra.gov.uk/library/reports.php?report_id=772

⁹ <http://uk-air.defra.gov.uk/networks/>

¹⁰ Brookes, D. et al. (2011) UK modelling under the Air Quality Directive (2008/50/EC) for 2010 covering the following air quality pollutants: SO₂, NO_x, NO₂, PM₁₀, PM_{2.5}, lead, benzene, CO, and ozone (AEAT/ENV/R/3215 Issue 1) http://uk-air.defra.gov.uk/reports/cat09/1204301513_AQD2010mapsrep_master_v0.pdf

Section A, Part 2 of the AQD. Existing stations in the UK network that have been classified as urban industrial are used to assess contributions from both diffuse sources and contributions from point sources.

Where industrial stations fall within the footprint of a point source they provide additional information on that point source. However supplementary assessment techniques alone adequately assess contributions from point sources. Therefore no additional stations are proposed to be included with the specific intention of assessing contributions from point sources. Existing industrial stations are proposed to be retained for model calibration and verification scientific purposes and to preserve long data records (where there are no extenuating circumstances forcing station closure for other reasons).

Diffuse sources

Diffuse sources are emissions sources that cannot be represented by a defined set of location-specific release parameters, either because they are not known or they are too numerous to be characterised effectively in this way. Monitoring for diffuse sources (for pollutants other than ozone, for which there is a specific set of rules) is referenced in the AQD using the table in Annex V, Section A and is based on the assessment threshold classification (lower than the Lower Assessment Threshold, between the Lower and the Upper Assessment Threshold, or above the Upper Assessment Threshold)¹¹ for each zone and its population.

Further criteria in the AQD seek to ensure that a balance of urban background (UB) to urban traffic (UT) monitoring is achieved and that zones where concentrations have exceeded the UAT contain at least one UB and UT station, provided this does not increase station numbers. Such zones, without a specific UB station but with other appropriate monitoring (e.g. existing combinations of urban traffic and urban industrial/rural background/suburban background stations) have been accounted for within the UK compliance assessment approach and it is considered that existing non-UB stations provide the necessary information required by the Directive without the need to establish a specific UB station. In addition the UB assessment in these zones is supplemented by modelling which provides a comprehensive assessment over all area types.

Ozone monitoring is specified by a different set of requirements provided by Article 10 of the AQD which describe how supplementary assessment techniques can be applied and the number of monitors should be determined. Article 10 (paragraph 3.c.) prescribes a minimum number of stations for each zone based on a combination of population or area (with at least one monitoring station within each zone) as long as other criteria in the Article 10 are also met.

¹¹ http://uk-air.defra.gov.uk/library/reports.php?report_id=772

Additional criteria on the breakdown of station classifications (urban, suburban, rural) for ozone given in Annex IX are not relevant because the UK uses modelled supplementary assessment. These classification criteria are only applicable if fixed monitoring is the only source of data. The application of air quality modelling ensures that the compliance assessment represents all area types irrespective of specific monitoring locations. The required monitoring can therefore be located freely within each zone.

Consideration of different pollutant metrics

A key feature of the UK regime assessment approach (specifically in classifying each zone according to the assessment thresholds in the AQD) has been to ensure that pollutant levels are not underestimated or over estimated. In doing so, where pollutants have more than one averaging period specified for assessment thresholds, a conservative approach has been taken whereby the most “stringent metric” i.e. the metric which is hardest to comply with and which leads to the requirement for the greatest number of stations in a zone has been used in the calculation.

Table 2 summarises the metrics used for the calculation of monitoring requirements for each pollutant. For NO₂ the assessment thresholds have been compared against the annual mean metric which is typically the more stringent. Additionally since there is no 1-hr metric output from the model, the annual metric is the most appropriate to use. For PM₁₀ it is not possible to generalise the stringency of one metric over another as it varies between zones. In this case the most stringent metric of either the annual mean or the 24-hr mean metric has been used on a zone by zone basis to calculate the monitoring requirements to ensure a conservative approach to calculating station numbers. Similarly for ozone, the most stringent metric has been used on a zone by zone basis to determine requirements.

Table 2: Averaging periods used in the UK AQD regime assessment

Pollutant	Averaging Period used in this assessment
NO _x /NO ₂ for health protection	Annual mean
NO _x /NO ₂ for vegetation & ecosystem protection	Annual mean
PM	Annual mean/ 24-hour mean*
CO	8-hour mean
SO ₂ for health protection	24-hour mean
SO ₂ for vegetation protection	Winter mean
Benzene	Annual mean
Lead	Annual mean
Ozone for health protection/ Ozone for vegetation protection	Maximum daily 8-hour mean/AOT40*

* most stringent metric on a zone by zone basis

Calculated station requirements and existing monitoring

Summary tables have been compiled for each pollutant to show the existing monitoring network, the target number of stations, the current station numbers and the difference between current and target monitoring site numbers. These tables are presented in each pollutant chapter (with the exception of carbon monoxide):

- Table 3 oxides of nitrogen and nitrogen dioxide;
- Table 5 particulate matter;
- Table 9 sulphur dioxide;
- Table 11 ozone; and
- Table 13 benzene

The tables present this information by zone. The information contained within these tables also includes the zone classification relative to the assessment thresholds and the target number of monitoring stations calculated for the diffuse sources criteria. The tables also signify where an urban traffic station is suggested for the zone (signified as a '-1') due to the zonal classification of >UAT (above the upper assessment threshold) and the need for more than one station within the zone for diffuse sources.

The existing monitoring is presented as the number of stations at urban background, urban traffic and other classifications (e.g. suburban, industrial, rural). A column is included to show in terms of plus (+) and minus (-) values, what the target number of monitors is and how this compares with the current network.

The “+/-“ column includes information relating to the target number of monitors for the diffuse criteria and a separate information on urban traffic monitors. In many cases, the difference in urban traffic target monitoring is coincident with the change in the general monitoring target for diffuse sources, hence a proposed additional urban traffic monitor would also satisfy the target station to fulfil the diffuse requirement. In this case the simple sum of these columns would overstate the target changes.

Table 5 (showing PM monitoring) also includes data on the size fraction of the instrument at each station so that the individual stations can be reconciled with the count for urban background, urban traffic and other categories. Note that the PM monitoring numbers are calculated for PM₁₀ and PM_{2.5} combined but size fraction specific instruments count as individual stations for this assessment even when at the same location. Additional collocated measurement methods for the same size fractions would not be counted as additional stations.

To illustrate this point, London Marylebone Road has for example, both PM₁₀ and PM_{2.5} and is an urban traffic station. This therefore accounts for one of the UB stations in both the PM₁₀ and PM_{2.5} columns. There are additional PM instruments (often gravimetric instruments – Partisols) that are collocated. These instruments fulfil additional science and research functions but where there are several different instruments measuring the same size fraction at a single location, only one set is counted towards the requirement for compliance with the AQD. For example, despite the broad range of different PM monitoring at Auchencorth Moss, this one station cannot be allowed to satisfy the whole of the diffuse monitoring target for Central Scotland.

Ongoing network maintenance and station changes

A number of stations have been closed and new stations opened since the previous assessment regime exercise was undertaken. In addition there are a number of changes underway at the time of writing this report. Changes implemented between 2010 and 2012 and changes being implemented in 2013 are summarised in Annex 2.

As detailed in Annex III, part D and Annex VIII, part C of the AQD, Defra keeps the compliance monitoring network under regular review and reviewed all stations against the AQD siting criteria in 2010¹². Defra has periodically reviewed available air quality monitoring from the local authorities to determine if the compliance network and supplementary modelling have provided an adequate assessment of the macroscale siting criteria in the Directive. Stations which record higher concentrations than the national assessment have been considered further for suitability in the compliance network.

¹² http://uk-air.defra.gov.uk/reports/cat13/1011121246_Site_Classifications_Report_v2.pdf

Where these stations indicate previously unidentified air quality issues, a review of the station, the exceedance situation and local action plans has been undertaken. Ensuring air quality improves at these locations is the priority for all parties involved regardless of the status of the site. Factors such as the importance of a stable network for useful data and value for money must be taken into account in the decision making process.

As a result of the latest assessment, the following local authority managed stations are being proposed for affiliation to the network:

England

- PM₁₀: Horn Lane, Ealing, Greater London Urban Area

Northern Ireland

- NO₂: Belfast Stockman's Lane, Belfast Metropolitan Urban Area

Review of approach to station classification

Since the previous assessment regime review, station classifications have been reviewed as has been required by the 2011 Commission Decision on the reciprocal exchange of information and reporting on ambient air quality (2011/850/EU)¹³. Classifications have been determined on a pollutant specific basis for all AQD pollutants based on the predominant emissions source. An overall classification has been determined based on source apportionment information from the Pollution Climate Mapping model.

Where a station is industrial for any pollutant, the classification is industrial overall. All traffic stations must be within ten metres of the kerb. For metals in PM₁₀, a single classification has been made based on the contribution of any of the regulated metals in PM₁₀ in the AQD or the Fourth Daughter Directive (2007/104/EC)¹⁴. Some station classifications have been updated as a result of this review. Further information is available in a report summarising the approach and new classifications¹⁵.

PM_{2.5} Average Exposure Indicator (AEI)

The number of stations to be used for the PM_{2.5} national exposure reduction target have been calculated in accordance with AQD Annex V paragraph 2B, requiring one sampling

¹³ 2011/850/EC <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:335:0086:0106:EN:PDF>

¹⁴ 2004/107/EC <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2005:023:0003:0016:EN:PDF>

¹⁵ http://uk-air.defra.gov.uk/reports/cat13/1309250915_130923_Review_of_air_quality_monitoring_station_classification_s.pdf

point per million inhabitants of agglomerations and other urban areas in excess of 100,000 inhabitants across the remainder of the UK.

The approach defines an overall AEI monitoring target which may subsequently be applied to any relevant urban background or suburban location within urban areas with $\geq 100,000$ population and is consistent with AQD Annex V guidance. 33 AEI monitoring stations are needed for the UK and the UK has 45 urban background $PM_{2.5}$ monitoring stations suitable for use.

In order to undertake a valid calculation of the AEI it is advisable to maintain more than the minimum stations required. This is because obtaining the required 90% data capture is challenging using the real time monitoring instrumentation. In addition site closures are sometimes forced through planning decisions. Therefore the actual AEI calculations in 2010, 2015 and 2020 are not likely to contain data from exactly the same stations. A definitive list of urban background $PM_{2.5}$ monitoring stations that have been classified for use in the AEI calculations is provided in Annex 3.

Other Monitoring – Ecosystems, VOCs, and $PM_{2.5}$ Speciation

Ecosystem and vegetation zones

Monitoring for the protection of ecosystems and vegetation (relevant to NO_x and SO_2 only) is limited to defined ecosystem areas, the criteria for which are set out in the AQD (Annex III, para. B. 2). These criteria exclude areas within 5 km of major roads with traffic counts of more than 50,000 vehicles per day. Measured and modelled data for SO_2 and NO_x were used to determine the assessment threshold classification. To calculate the monitoring needed for protection of ecosystems and vegetation, the maximum observed NO_x and SO_2 model observations were used in conjunction with the area of the UK designated as an ecosystem and vegetation area ($120,690 \text{ km}^2$) to establish the monitoring needed for the UK as a whole. Annex V Section C of the AQD provides guidance on this.

Historically the UK has used measurements from all rural and remote monitoring stations measuring NO_x and SO_2 for assessments relative to the ecosystem and vegetation thresholds, rather than the more limited subset of these stations specifically located in ecosystem and vegetation areas. As a result, the UK's assessment approach is conservative; being more representative of locations closer to emission sources with higher observed concentrations.

Volatile organic compounds (VOCs)

A suite of recommended volatile organic compounds (VOCs) is listed in Annex X of the AQD and are to be measured by at least one station in the territory according to Article 10 para. 6, in order to assess concentrations of ozone precursor substances. The station that fulfils this role within the UK networks is London Eltham.

PM_{2.5} monitoring for speciation

One rural background measurement for PM_{2.5} speciation is needed per 100,000 km² in the UK. The current network includes 2 stations for this function (Auchencorth Moss in Central Scotland zone and Harwell in South East zone). The AQD states that PM_{2.5} monitoring stations nominated to fulfil this role are additional to those required to satisfy Article 6 paragraphs 2, 3 and 4. There are currently individual MARGA (ion-chromatograph) instruments at these stations specifically for the purpose of obtaining speciated PM_{2.5} data for compliance with the AQD.

Oxides of Nitrogen and Nitrogen Dioxide

Overview of Changes

Historically annual mean modelling has been used to assess compliance for both the annual mean metric and the 1-hour NO₂ metric on the premise that the annual mean was the most stringent metric. Evidence has shown that the annual mean to hourly mean relationship is changing and consequently it is evident that additional monitoring would ensure a more robust assessment of the 1-hour metric. This document details the number of stations that would be needed to be added into the national network to undertake an assessment of the 1-hour NO₂ metric on the basis of fixed measurements alone. The availability of models to supplement this assessment of the hourly mean will be investigated to inform the final number of additional NO₂ stations to be added.

Table 3 shows the proposed maximum number of stations for NO₂ compared with monitoring in the existing network. In summary, a maximum of 44 monitoring stations are proposed of which 17 should be traffic oriented. The total maximum additional stations proposed to meet the diffuse count is 42. Of the 17 traffic stations, all except two (Sheffield Urban Area and Teesside Urban Area) coincide with zones where stations are needed for the diffuse source requirement, meaning the total stations proposed is 44.

In Sheffield and Teesside, additional traffic stations are needed to balance the number of urban background to traffic stations because the zone is above the UAT. It should be noted that the classification of stations in Teesside has been looked into in more detail than displayed in Table 3, and both the Middlesbrough and Billingham stations are representative of background NO₂, although the station is classified industrial overall. Therefore, because these zones are above the UAT and urban background concentrations are represented by existing stations, a traffic station is proposed to achieve the necessary balance between UB and UT stations. The scope for reduction of stations in London, Swansea and Scottish Borders has not been taken into account at this point in time as these stations are proposed to be continued to support a viable model or for scientific purposes.

The urban background to urban traffic monitoring ratio resulting from these changes is 0.94 and is therefore compatible with the AQD criteria.

Table 3: Existing NO_x and NO₂ Monitoring Network and Monitoring Targets

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring			(+/-) to Meet Target	
					UB	UT	OTH	diffuse	traffic
UK0001	Greater London Urban Area	>UAT	10	1	6	5	3	-4	0
UK0002	West Midlands Urban Area	>UAT	6	1	3	1	0	2	0
UK0003	Greater Manchester Urban Area	>UAT	5	1	1	1	2	1	0
UK0004	West Yorkshire Urban Area	>UAT	4	1	1	1	0	2	0
UK0005	Tyneside	>UAT	2	1	1	1	0	0	0
UK0006	Liverpool Urban Area	>UAT	2	1	0	1	1	0	0
UK0007	Sheffield Urban Area	>UAT	2	1	2	0	0	0	1
UK0008	Nottingham Urban Area	>UAT	2	1	1	0	0	1	1
UK0009	Bristol Urban Area	>UAT	2	1	1	0	0	1	1
UK0010	Brighton/Worthing/Littlehampton	>UAT	2	1	1	0	0	1	1
UK0011	Leicester Urban Area	>UAT	2	1	1	0	0	1	1
UK0012	Portsmouth Urban Area	>UAT	2	1	1	0	0	1	1
UK0013	Teesside Urban Area	>UAT	2	1	0	0	2	0	1
UK0014	The Potteries	>UAT	2	1	1	0	0	1	1
UK0015	Bournemouth Urban Area	>UAT	2	1	1	0	0	1	1
UK0016	Reading/Wokingham Urban Area	>UAT	2	1	1	0	0	1	1
UK0017	Coventry/Bedworth	>UAT	2	1	1	0	0	1	1
UK0018	Kingston upon Hull	>UAT	2	1	1	0	0	1	1
UK0019	Southampton Urban Area	>UAT	2	1	1	0	0	1	1
UK0020	Birkenhead Urban Area	>UAT	2	1	1	0	0	1	1
UK0021	Southend Urban Area	>UAT	1	0	1	0	0	0	0
UK0022	Blackpool Urban Area	>UAT	1	0	1	0	0	0	0
UK0023	Preston Urban Area	>UAT	1	0	1	0	0	0	0

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring			(+/-) to Meet Target	
					UB	UT	OTH	diffuse	traffic
UK0024	Glasgow Urban Area	>UAT	4	1	1	2	0	1	0
UK0025	Edinburgh Urban Area	>UAT	2	1	1	0	0	1	1
UK0026	Cardiff Urban Area	>UAT	2	1	1	0	0	1	1
UK0027	Swansea Urban Area	>UAT	1	0	0	1	1	-1	0
UK0028	Belfast Metropolitan Urban Area	>UAT	2	1	1	0	0	1	1
UK0029	Eastern	>UAT	9	1	2	3	2	2	0
UK0030	South West	>UAT	8	1	2	2	2	2	0
UK0031	South East	>UAT	10	1	3	3	4	0	0
UK0032	East Midlands	>UAT	7	1	2	2	2	1	0
UK0033	North West & Merseyside	>UAT	7	1	1	2	2	2	0
UK0034	Yorkshire & Humberside	>UAT	7	1	1	1	2	3	0
UK0035	West Midlands	>UAT	6	1	1	1	1	3	0
UK0036	North East	>UAT	4	1	1	1	0	2	0
UK0037	Central Scotland	>UAT	5	1	0	1	3	1	0
UK0038	North East Scotland	>UAT	4	1	1	1	0	2	0
UK0039	Highland	>UAT	2	1	0	1	1	0	0
UK0040	Scottish Borders	>UAT	2	1	1	1	1	-1	0
UK0041	South Wales	>UAT	5	1	2	1	1	1	0
UK0042	North Wales	>UAT	2	1	0	1	2	-1	0
UK0043	Northern Ireland	>UAT	4	1	1	1	0	2	0
Totals			153	39	51	35	32	35 ¹⁶	17

¹⁶ Sum of sites above and below target number. In zones with negative balance, sites will be reviewed for their value for supplementary assessment and research.

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring			(+/-) to Meet Target	
					UB	UT	OTH	diffuse	traffic
(balance)									
Total additional stations (i.e. stations proposed)								42	17

Implementation and phasing

Table 4 presents the proposed three phased approach for increasing NO₂ monitoring. It is not based on trying to satisfy each zone's requirements on a discrete basis but instead to ensure that at least one station will be established in each zone first, before subsequently 'back-filling' to meet the overall zone targets. Zones therefore appear more than once in the table.

Zones have been prioritised based on the maximum modelled roadside annual mean NO₂ concentration from the 2010 compliance assessment modelling, with higher concentrations being assigned a higher priority and phase. Traffic stations have been prioritised over background stations as these are likely to represent higher concentrations and these have been split into two phases for manageability. There are a few zones where either a traffic station or a background station would be acceptable and these have currently been placed in Phase 1 according to the maximum modelled roadside concentration and selected as urban traffic stations. Phase 3 consists of background stations proposed to make up the appropriate station numbers. The details of the changes in these phases may be altered as logistics and potential local authority site affiliations are reviewed together with modelling capability for the hourly mean.

The AQD specifies a network-wide ratio of urban background to urban traffic stations of no more than 2:1 – this is achieved by the proposals. In cases where more than one monitoring station is required but there is no-specific traffic requirement, a split of 1 UB to 1 UT or 2 UB and 1 UT is proposed. Therefore Phase 3 consists of urban background monitoring to 'backfill' the outstanding monitoring requirement in zones where multiple stations are proposed and urban traffic monitoring is already in place – this achieves the required ratio (1:1) and allows future network flexibility without risking non-compliance with this criteria.

A three phase approach is therefore proposed to allow prioritisation and a manageable approach to change. It is anticipated that a proportion of the proposed changes are accommodated through affiliating local authority monitoring stations. Belfast Stockman's Lane is proposed to be affiliated into the network for NO_x and NO₂, satisfying the planned new UT station in the Belfast Urban Area (Phase 1). The existing Mold NO₂ monitoring will be relocated as it is no longer required and is immediately available to use in Phase 1.

Table 4: Proposed Additional NO₂ Monitoring, Phased Approach

Zone code	Zone name	(+/-) to Meet Target	Traffic (+/-) to Meet Target	Maximum modelled roadside concentration, 2010 (µg m-3)	Proposed Action	Phase
UK0003	Greater Manchester Urban Area	1	0	95.0	1 UT	1
UK0029	Eastern	2	0	91.7	1 UT	1
UK0024	Glasgow Urban Area	1	0	89.8	1 UT	1
UK0002	West Midlands Urban Area	2	0	87.0	1 UT	1
UK0033	North West & Merseyside	2	0	86.7	1 UT	1
UK0014	The Potteries	1	1	85.8	1 UT	1
UK0035	West Midlands	3	0	84.5	1 UT	1
UK0036	North East	2	0	83.3	1 UT	1
UK0019	Southampton Urban Area	1	1	82.8	1 UT	1
UK0013	Teesside Urban Area	0	1	80.6	1 UT	1
UK0034	Yorkshire & Humberside	3	0	79.2	1 UT	1
UK0004	West Yorkshire Urban Area	2	0	78.9	1 UT	1
UK0018	Kingston upon Hull	1	1	77.5	1 UT	1
UK0011	Leicester Urban Area	1	1	76.6	1 UT	1
UK0028	Belfast Metropolitan Urban Area	1	1	75.9	1 UT	1
UK0041	South Wales	1	0	75.5	1 UT	1

Zone code	Zone name	(+/-) to Meet Target	Traffic (+/-) to Meet Target	Maximum modelled roadside concentration, 2010 ($\mu\text{g m}^{-3}$)	Proposed Action	Phase
UK0037	Central Scotland	1	0	75.3	1 UT	2
UK0017	Coventry/Bedworth	1	1	69.9	1 UT	2
UK0032	East Midlands	1	0	69.4	1 UT	2
UK0008	Nottingham Urban Area	1	1	68.7	1 UT	2
UK0012	Portsmouth Urban Area	1	1	68.4	1 UT	2
UK0007	Sheffield Urban Area	0	1	67.6	1 UT	2
UK0030	South West	2	0	66.8	1 UT	2
UK0009	Bristol Urban Area	1	1	64.5	1 UT	2
UK0038	North East Scotland	2	0	63.3	1 UT	2
UK0026	Cardiff Urban Area	1	1	62.9	1 UT	2
UK0015	Bournemouth Urban Area	1	1	59.0	1 UT	2
UK0016	Reading/Wokingham Urban Area	1	1	58.1	1 UT	2
UK0025	Edinburgh Urban Area	1	1	57.9	1 UT	2
UK0043	Northern Ireland	2	0	53.9	1 UT	2
UK0010	Brighton/Worthing/Littlehampton	1	1	53.3	1 UT	2
UK0020	Birkenhead Urban Area	1	1	52.1	1 UT	2
UK0029	Eastern	2	0	91.7	1 UB	3
UK0002	West Midlands Urban Area	2	0	87.0	1 UB	3

Zone code	Zone name	(+/-) to Meet Target	Traffic (+/-) to Meet Target	Maximum modelled roadside concentration, 2010 ($\mu\text{g m}^{-3}$)	Proposed Action	Phase
UK0033	North West & Merseyside	2	0	86.7	1 UB	3
UK0035	West Midlands	3	0	84.5	2 UB	3
UK0036	North East	2	0	83.3	1 UB	3
UK0034	Yorkshire & Humberside	3	0	79.2	2 UB	3
UK0004	West Yorkshire Urban Area	2	0	78.9	1 UB	3
UK0030	South West	2	0	66.8	1 UB	3
UK0038	North East Scotland	2	0	63.3	1 UB	3
UK0043	Northern Ireland	2	0	53.9	1 UB	3

Particulate Matter

Overview of Changes

The calculations set out the target number of particulate matter monitors and Table 5 shows that an additional eighteen new station locations are proposed to meet the requirements for diffuse monitoring. This total is increased to nineteen with the proposal to include Ealing, Horn Lane. Eighteen traffic stations are proposed and in two zones, these would also count towards the diffuse requirement (Brighton/Worthing/Littlehampton and Bournemouth Urban Area). There are eleven instruments which could be relocated to accommodate this, leaving a balance of eight instruments to be comprised of new instruments or affiliations. This includes the relocation of Haringey Roadside PM monitoring in London.

Currently many PM₁₀ and PM_{2.5} stations are collocated at background locations. This has additional scientific merit and is also important for the modelling used for supplementary assessment. Therefore collocation of PM size fraction monitoring has been preserved as far as practical to ensure robust supplementary assessment techniques. However, splitting of the existing collocation may be unavoidable in some zones above the UAT, when bearing in mind the cost burden of accommodating additional monitors. The plan to relocate some of this monitoring from UB to UT locations has been formed with due consideration to the impact on the model performance. Further scientific and logistical review may be given to these proposals before commencing with the phased approach.

The target number of PM monitors is proposed to be met with a combination of new monitoring stations and relocation of existing monitoring (from background to roadside locations). The proposed changes to the network are shown in Table 5 which shows the impact on the balance of background and traffic monitoring for each size fraction in each zone. Note that the assessment doesn't take into account differences between PM₁₀ and PM_{2.5} instruments on the premise that they are interchangeable (the AQD specifies number of PM stations as opposed to specific size fractions). Table 6 provides further detail on particulate matter monitoring which is required to support the calculation of the Average Exposure Indicator and the modelling.

The tables show that there are 26 stations which are not needed to satisfy the diffuse criteria, of which 23 are needed for either AEI monitoring or for modelling. No PM_{2.5} urban background AEI stations are proposed to be removed or relocated and the proposals also ensure that the modelling remains fully supported.

The only zone with any remaining monitoring flexibility is London, where two stations could be removed from the network; Southwark A2 and Haringey Roadside PM_{2.5}.Haringey

Roadside PM₁₀ is relocated in Phase 1 to Horn Lane, Ealing. Southwark A2 is proposed to be retained as it monitors relatively high concentrations compared to other traffic stations in London. Haringey Roadside PM_{2.5} is proposed to be removed in Phase 2, following a checkpoint review.

The details of the phasing and equipment location may be subject to change as the potential for local authority site affiliations and logistics are reviewed. The urban background to urban traffic monitoring ratio resulting from these changes is 1.15 and therefore meets the AQD criteria.

Table 5: Existing PM₁₀ and PM_{2.5} monitoring network and Monitoring Targets

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring						(+/-) to Meet Target ¹⁷	
					UB (PM ₁₀)	UT (PM ₁₀)	OTH (PM ₁₀)	UB (PM _{2.5})	UT (PM _{2.5})	OTH (PM _{2.5})	diffuse	traffic
UK0001	Greater London Urban Area	>UAT	8	1	2	4	1	5	3	3	-10	0
UK0002	West Midlands Urban Area	>UAT	4	1	1	1	0	2	1	0	-1	0
UK0003	Greater Manchester Urban Area	>UAT	4	1	0	1	1	1	1	1	-1	0
UK0004	West Yorkshire Urban Area	>UAT	3	1	1	1	0	1	1	0	-1	0
UK0005	Tyneside	>UAT	2	1	1	0	0	1	0	0	0	1
UK0006	Liverpool Urban Area	>UAT	2	1	0	0	1	0	0	1	0	1
UK0007	Sheffield Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0008	Nottingham Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0009	Bristol Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0010	Brighton/Worthing/Littlehampton	>UAT	2	1	0	0	0	1	0	0	1	1
UK0011	Leicester Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0012	Portsmouth Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0013	Teesside Urban Area	>UAT	2	1	0	0	1	0	0	1	0	1
UK0014	The Potteries	>UAT	2	1	1	0	0	1	0	0	0	1
UK0015	Bournemouth Urban Area	>UAT	2	1	0	0	0	1	0	0	1	1
UK0016	Reading/Wokingham Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0017	Coventry/Bedworth	>UAT	2	1	1	0	0	1	0	0	0	1
UK0018	Kingston upon Hull	>UAT	2	1	1	0	0	1	0	0	0	1

¹⁷ Note that negatives in '(+/- to Meet Target)' do not denote comprehensive monitoring flexibility – some stations are required to support measurement of the Average Exposure Indicator and for supplementary assessment using models. Further detail on this is provided in Table 6. The final column in Table 6 shows the flexibility after these requirements have been taken into account.

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring						(+/-) to Meet Target ¹⁷	
					UB (PM ₁₀)	UT (PM ₁₀)	OTH (PM ₁₀)	UB (PM _{2.5})	UT (PM _{2.5})	OTH (PM _{2.5})	diffuse	traffic
UK0019	Southampton Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0020	Birkenhead Urban Area	LAT-UAT	1	0	0	0	0	1	0	0	0	0
UK0021	Southend Urban Area	>UAT	1	0	0	0	0	1	0	0	0	0
UK0022	Blackpool Urban Area	LAT-UAT	1	0	0	0	0	1	0	0	0	0
UK0023	Preston Urban Area	LAT-UAT	1	0	0	0	0	1	0	0	0	0
UK0024	Glasgow Urban Area	>UAT	3	1	1	1	0	1	1	0	-1	0
UK0025	Edinburgh Urban Area	LAT-UAT	1	0	1	0	0	1	0	0	-1	0
UK0026	Cardiff Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0027	Swansea Urban Area	>UAT	1	0	0	1	1	0	1	1	-3	0
UK0028	Belfast Metropolitan Urban Area	>UAT	2	1	1	0	0	1	0	0	0	1
UK0029	Eastern	>UAT	7	1	2	2	0	1	2	0	0	0
UK0030	South West	>UAT	6	1	1	2	0	1	2	0	0	0
UK0031	South East	>UAT	8	1	2	2	2	2	2	2	-4	0
UK0032	East Midlands	>UAT	5	1	1	1	0	2	1	0	0	0
UK0033	North West & Merseyside	>UAT	5	1	0	1	1	1	1	1	0	0
UK0034	Yorkshire & Humberside	>UAT	5	1	1	1	1	1	1	0	0	0
UK0035	West Midlands	>UAT	4	1	1	1	0	1	1	0	0	0
UK0036	North East	>UAT	3	1	0	1	0	1	1	0	0	0
UK0037	Central Scotland	>UAT	4	1	0	0	2	0	0	2	0	1
UK0038	North East Scotland	LAT-UAT	2	0	1	0	0	1	0	0	0	0
UK0039	Highland	<LAT	0	0	0	1	0	0	1	0	-2	0
UK0040	Scottish Borders	<LAT	0	0	0	0	0	0	0	0	0	0
UK0041	South Wales	>UAT	4	1	1	1	1	1	1	0	-1	0
UK0042	North Wales	>UAT	2	1	0	1	0	0	1	0	0	0
UK0043	Northern Ireland	>UAT	3	1	1	1	1	1	0	0	-1	0

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring						(+/-) to Meet Target ¹⁷	
					UB (PM ₁₀)	UT (PM ₁₀)	OTH (PM ₁₀)	UB (PM _{2.5})	UT (PM _{2.5})	OTH (PM _{2.5})	diffuse	traffic
Totals (balance)			120	34	30	24	13	43	22	12	-24	18
					67			77				
Total additional stations (i.e. stations proposed)											2	18

Table 6: Further Analysis of Particulate Matter Monitoring Requirements

Zone code	Zone name	Sites not needed for diffuse criteria	Additional Requirements for Particulate Matter Monitoring Average Exposure Indicator and Modelling	Sites for further rationalisation
UK0001	Greater London Urban Area	-10	Needs 8 measurements for diffuse criteria but has 18 measurements in total prior to the review. This includes 5 collocated PM ₁₀ /PM _{2.5} sites which are needed for compliance monitoring and modelling: Camden Kerbside, London Bloomsbury, London Marylebone Road, London N. Kensington, London Harlington and 5 additional AEI sites London Bexley, London Eltham, London Harrow Stanmore, London Teddington and London Westminster. London Haringey PM ₁₀ will be moved to Ealing, Horn Lane. The two sites which are not included in this core are therefore: Old Kent Road, Haringey Roadside PM _{2.5} which could be further rationalised. No changes to these two sites are proposed in Phase 1.	-2
UK0002	West Midlands Urban Area	-1	Needs 4 measurements for diffuse criteria and has five measurements in total. This includes 2 collocated PM ₁₀ /PM _{2.5} sites at Birmingham Tyburn and Birmingham Tyburn RS. Birmingham Tyburn is also a PM _{2.5} AEI site. The fifth measurement and additional PM _{2.5} station at Birmingham Acocks Green is required as an AEI site.	0
UK0003	Greater Manchester Urban Area	-1	Needs four measurements in the zone, and has 5 measurements in total prior to the review. One PM _{2.5} measurement is proposed to be rationalised from this zone and the remaining measurements are collocated PM ₁₀ /PM _{2.5} measurements at Salford Eccles, a PM ₁₀ measurement station proposed at a new station, and PM _{2.5} at Manchester Piccadilly which is also an AEI station.	0
UK0004	West Yorkshire Urban Area	-1	Needs 3 PM measurements for diffuse criteria and has four measurements. Leeds Centre and Leeds Headingley Kerbside are both PM _{2.5} /PM ₁₀ collocated sites and the additional collocated measurement is needed for modelling support.	0
UK0024	Glasgow Urban Area	-1	Needs 3 PM measurements for diffuse criteria and has four measurements. The new Glasgow Centre and new Glasgow Kerbside have collocated PM ₁₀ /PM _{2.5} and are used for compliance and modelling support. Glasgow Centre is also a PM _{2.5} AEI station.	0
UK0025	Edinburgh Urban Area	-1	Needs 1 measurement to meet diffuse criteria but has two collocated PM ₁₀ /PM _{2.5} measurements. The PM _{2.5} measurements is also an AEI measurement and the collocated PM ₁₀ measurement supports the modelling.	0
UK0027	Swansea Urban Area	-3	Needs 1 measurement to meet diffuse criteria but has four measurements in total with collocated PM ₁₀ /PM _{2.5} at Port Talbot Margam and Swansea Roadside. The additional collocated measurements are required to monitor the industrial sources and to support the modelling.	0

Zone code	Zone name	Sites not needed for diffuse criteria	Additional Requirements for Particulate Matter Monitoring Average Exposure Indicator and Modelling	Sites for further rationalisation
UK0031	South East	-4	Needs 8 measurements to meet diffuse criteria and prior to this review has twelve. Three measurements are proposed to be rationalised from Eastbourne (PM ₁₀) and in Phase 2, Storrington (PM ₁₀ /PM _{2.5}) and leaving nine measurements. These measurements are proposed to be made at collocated PM ₁₀ /PM _{2.5} at Chatham Roadside, Harwell, Oxford St Ebbs and Rochester Stoke. These collocations also support the modelling. The ninth measurement is the PM _{2.5} AEI site located at Eastbourne.	0
UK0039	Highland	-2	No monitoring required but collocated measurements retained at Inverness to support modelling and research.	0
UK0041	South Wales	-1	4 measurements are needed to meet diffuse criteria for the zone, and it has five measurements in total. Chepstow A48 and Newport have collocated PM ₁₀ /PM _{2.5} and are used for compliance and modelling. The PM ₁₀ measurement at Narberth is needed for modelling of rural PM.	0
UK0043	Northern Ireland	-1	3 measurements are needed to meet diffuse criteria for the zone and it has four in total. Derry has collocated PM ₁₀ /PM _{2.5} and is used for compliance monitoring and modelling. Armagh Roadside is needed to fulfil the monitoring requirements. Lough Navar PM ₁₀ is needed for modelling of rural PM.	0

Implementation and phasing

In order to phase the necessary changes, the zones have been prioritised based on the maximum modelled roadside concentrations (i.e. worst case from a compliance perspective). Table 7 shows for each zone the proposed changes, the priority of the zone and the phase under which the actions are proposed to be taken. The details of the phasing and equipment location may be subject to change as the potential for site affiliations and logistics are reviewed.

Phase 1 also includes the affiliation of the London Ealing Horn Lane PM₁₀ monitoring station (urban industrial) and deaffiliation of the Haringey Roadside PM₁₀ instrument. Phase 1 also includes the affiliation of Belfast Stockman's Lane for PM₁₀ (also affiliated for NO_x and NO₂) and the redeployment of instruments from Bury Roadside (PM_{2.5}) and Coventry Memorial Park (PM₁₀) which are currently in storage following legacy network changes. As a result existing monitoring is retained as long as possible before being redeployed to other locations. A detailed review of available equipment and its suitability for the network, the progress of the new CEN standard reference methods for PM and any changes in the requirements of the AQD will be undertaken between phases. The suggested phasing has been designed to address the highest priority zones (based on maximum modelled annual mean concentration) most immediately.

Table 7: Proposed Phased Changes for Particulate Matter Monitoring

Zone code	Zone name	Proposed action	PM ₁₀ UB	PM ₁₀ UT	PM _{2.5} UB	PM _{2.5} UT	Maximum modelled PM ₁₀ roadside concentration, 2010 (µg m ⁻³)	Phase
UK0001	Greater London Urban Area	New urban industrial PM ₁₀ (affiliation of London Ealing Horn Lane) (Phase 1) Remove Haringey Roadside PM ₁₀ (Phase 1) Remove Haringey Roadside PM _{2.5} (Phase 2)		1 -1		-1	34.2	1 & 2
UK0002	West Midlands Urban Area	no change					30.3	
UK0003	Greater Manchester Urban Area	Spare PM _{2.5} station from former affiliate station Bury Roadside				-1	26.5	1
UK0004	West Yorkshire Urban Area	no change					26.1	
UK0005	Tyneside	New roadside PM ₁₀		1			24.4	3
UK0006	Liverpool Urban Area	New roadside PM ₁₀		1			24.8	2
UK0007	Sheffield Urban Area	New roadside PM _{2.5}				1	24.6	3
UK0008	Nottingham Urban Area	New roadside PM ₁₀		1			27.5	1
UK0009	Bristol Urban Area	New roadside PM ₁₀		1			24.9	2
UK0010	Brighton/Worthing/Littlehampton	New roadside PM _{2.5}				1	20.6	3
UK0011	Leicester Urban Area	New roadside PM ₁₀ Remove Leicester Centre PM ₁₀	-1	1			27.5	1
UK0012	Portsmouth Urban Area	New roadside PM ₁₀		1			24.9	2
UK0013	Teesside Urban Area	New roadside PM _{2.5}				1	25.1	2
UK0014	The Potteries	New roadside PM ₁₀ Remove Stoke-on-Trent Centre PM ₁₀	-1	1			27.8	1
UK0015	Bournemouth Urban Area	New roadside PM _{2.5}				1	23.5	3
UK0016	Reading/Wokingham Urban Area	New roadside PM ₁₀		1			24.3	3

Zone code	Zone name	Proposed action	PM ₁₀ UB	PM ₁₀ UT	PM _{2.5} UB	PM _{2.5} UT	Maximum modelled PM ₁₀ roadside concentration, 2010 (µg m ⁻³)	Phase
UK0017	Coventry/Bedworth	New roadside PM ₁₀ (Phase 2) Spare PM ₁₀ instrument (from Coventry Memorial Park site) (Phase 1)	-1	1			25.5	1 & 2
UK0018	Kingston upon Hull	New roadside PM ₁₀ Remove Hull Freetown PM ₁₀	-1	1			28.5	1
UK0019	Southampton Urban Area	New roadside PM ₁₀		1			29.2	1
UK0020	Birkenhead Urban Area	no change					19.4	
UK0021	Southend Urban Area	no change					25.1	
UK0022	Blackpool Urban Area	no change					16.5	
UK0023	Preston Urban Area	no change					20.4	
UK0024	Glasgow Urban Area	no change					24.9	
UK0025	Edinburgh Urban Area	no change					20.9	
UK0026	Cardiff Urban Area	New roadside PM ₁₀		1			24.5	3
UK0027	Swansea Urban Area	no change					18.2	
UK0028	Belfast Metropolitan Urban Area	New roadside PM ₁₀ , Stockman's Lane proposed candidate.		1			27.4	1
UK0029	Eastern	no change					29.7	
UK0030	South West	no change					25.1	
UK0031	South East	Remove Storrington Roadside PM _{2.5} Remove Storrington Roadside PM ₁₀ Remove Eastbourne PM ₁₀	-1	-1		-1	26.5	2
UK0032	East Midlands	no change					26.2	
UK0033	North West & Merseyside	no change					26.9	
UK0034	Yorkshire & Humberside	no change					25.8	

Zone code	Zone name	Proposed action	PM ₁₀ UB	PM ₁₀ UT	PM _{2.5} UB	PM _{2.5} UT	Maximum modelled PM ₁₀ roadside concentration, 2010 (µg m ⁻³)	Phase
UK0035	West Midlands	no change					27.6	
UK0036	North East	no change					25.6	
UK0037	Central Scotland	New roadside PM _{2.5} (Phase 3) Remove Grangemouth PM _{2.5} (Phase 2)			-1	1	23.7	2 & 3
UK0038	North East Scotland	no change					19.6	
UK0039	Highland	no change					12.8	
UK0040	Scottish Borders	no change					15.4	
UK0041	South Wales	no change					24.1	
UK0042	North Wales	no change					24.3	
UK0043	Northern Ireland	no change					18.6	

Carbon Monoxide

Overview of Changes

All zones have been classified as lower than the Lower Assessment Threshold for CO indicating, as set out in Article 6 of the Directive that there is no requirement for fixed measurements. From 2012, CO will be assessed using objective estimation (based on historical trends, current concentrations and emissions projections). A core network of seven CO monitoring stations will remain to provide a geographically representative snapshot of the CO pollution climate. This will be used to undertake the monitoring regime assessment exercise in future years and to reconcile the objective estimation used for future reporting.

Table 8 lists the existing (pre 2012) CO monitoring stations in the AURN by zone and the maximum daily 8-hr mean in 2011 to represent the highest concentrations. This allows a selection of the highest priority stations to retain based on geographic coverage and by concentration.

The seven stations which have been retained ensure a representative cross section across the UK of background and roadside stations. These include the highest concentrations and so provide a conservative selection that can be used to justify the objective estimation (<LV in the annual compliance assessment) as well as informing future monitoring regime assessments.

Implementation

The changes outlined in Table 8 were implemented in 2012 to leave a network of seven stations. Defra owned CO monitors ceased operation during 2012 and affiliated local authority stations operated until the end of the calendar year 2012. For monitors that were removed as a result of those decisions, the end date is provided in Table 8.

Table 8: Changes to CO Monitoring

Zone code	Zone name	Station	Station Classification	Max daily 8-hr (mg m ⁻³)	Keep	Monitoring End Date
UK0001	Greater London Urban Area	London Marylebone Road	Urban Traffic	1.9	✓	
		London N. Kensington	Urban Background	1.5	✓	
		Tower Hamlets Roadside	Urban Traffic	1.5		31/12/2012
		London Cromwell Road 2	Urban Traffic	1.4		03/10/2012
		London Bloomsbury	Urban Background	1.3		16/07/2012
		London Bexley	Suburban Background	1.2		31/12/2012
		London Westminster	Urban Background	1		19/07/2012
UK0003	Greater Manchester Urban Area	Bury Roadside	Urban Traffic	2		06/09/2012
		Salford Eccles	Urban Industrial	1.8		31/12/2012
UK0004	West Yorkshire Urban Area	Leeds Centre	Urban Background	2	✓	
UK0005	Tyneside	Newcastle Centre	Urban Background	0.9		15/08/2012
UK0006	Liverpool Urban Area	Liverpool Speke	Urban Industrial	1.2		21/08/2012
UK0007	Sheffield Urban Area	Sheffield Centre	Urban Background	1.2		10/07/2012
UK0009	Bristol Urban Area	Bristol St Paul's	Urban Background	1.7		23/07/2012
		Bristol Old Market	Urban Traffic	1.5		31/12/2012
UK0011	Leicester Urban Area	Leicester Centre	Urban Background	0.9		01/08/2012
UK0013	Teesside Urban Area	Middlesbrough	Urban Industrial	1.3		31/12/2012
UK0018	Kingston upon Hull	Hull Freetown	Urban Background	1.4		17/09/2012
UK0019	Southampton Urban Area	Southampton Centre	Urban Background	1.5		28/08/2012
UK0024	Glasgow Urban Area	Glasgow Centre	Urban Background	1.1		15/08/2012
UK0025	Edinburgh Urban Area	Edinburgh St Leonards	Urban Background	0.8	✓	
UK0026	Cardiff Urban Area	Cardiff Centre	Urban Background	1	✓	
UK0027	Swansea Urban Area	Port Talbot Margam	Urban Industrial	3.4	✓	
UK0028	Belfast Metropolitan Urban Area	Belfast Centre	Urban Background	1.2	✓	

Sulphur Dioxide

Overview of Changes

The review concluded that there is scope to reduce the amount of SO₂ monitoring in the national network as shown in Table 9, without compromising the quality of the modelling. The final number of stations to be retained is above the targets shown, because some additional stations are needed to support the modelling that provides the supplementary assessment through model verification. This ensures that model performance is evaluated through comparison to measurements. Sixteen SO₂ monitors were therefore removed in 2012.

Table 10 lists all the SO₂ stations in the network prior to 2012. To determine which stations to keep expert judgement has been used and the following retained:

- important stations close to known sources (e.g. Southampton Centre to inform on shipping emissions and Fawley refinery, Thurrock to inform on power station emissions in the Thames Estuary);
- stations with high measured concentrations (i.e. preserving the representation of hotspots within the national air quality assessments);
- stations that provide reasonable dynamic range in measured and modelled concentrations to ensure that a representative calibration can be made; and
- stations that provide a reasonable geographical coverage (i.e. not weighted in favour of one zone, Devolved Administration or geographical region).

There are two stations which are not used in the modelling. These are London Marylebone Road and Grangemouth. Despite the lack of application for modelling it is important to retain these stations in the network. Grangemouth often measures the highest concentrations in the UK and Marylebone Road, London is scientifically important with a full suite of pollutants for research and policy support purposes.

Table 9: Existing SO₂ monitoring network and Monitoring Targets

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Existing monitoring			(+/-) to Meet Target
				UB	UT	OTH	diffuse
UK0001	Greater London Urban Area	<LAT	0	4	1	0	-5
UK0002	West Midlands Urban Area	<LAT	0	2	0	0	-2
UK0003	Greater Manchester Urban Area	<LAT	0	2	0	0	-2
UK0004	West Yorkshire Urban Area	<LAT	0	1	0	0	-1
UK0005	Tyneside	<LAT	0	1	0	0	-1
UK0006	Liverpool Urban Area	<LAT	0	1	0	0	-1
UK0007	Sheffield Urban Area	<LAT	0	1	0	0	-1
UK0008	Nottingham Urban Area	<LAT	0	1	0	0	-1
UK0009	Bristol Urban Area	<LAT	0	1	0	0	-1
UK0010	Brighton/Worthing/Littlehampton	<LAT	0	0	0	0	0
UK0011	Leicester Urban Area	<LAT	0	1	0	0	-1
UK0012	Portsmouth Urban Area	<LAT	0	0	0	0	0
UK0013	Teesside Urban Area	<LAT	0	1	0	0	-1
UK0014	The Potteries	<LAT	0	0	0	0	0
UK0015	Bournemouth Urban Area	<LAT	0	0	0	0	0
UK0016	Reading/Wokingham Urban Area	<LAT	0	0	0	0	0
UK0017	Coventry/Bedworth	<LAT	0	0	0	0	0
UK0018	Kingston upon Hull	<LAT	0	1	0	0	-1
UK0019	Southampton Urban Area	LAT-UAT	1	1	0	0	0
UK0020	Birkenhead Urban Area	<LAT	0	0	0	0	0
UK0021	Southend Urban Area	<LAT	0	0	0	0	0
UK0022	Blackpool Urban Area	<LAT	0	0	0	0	0
UK0023	Preston Urban Area	<LAT	0	0	0	0	0

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Existing monitoring			(+/-) to Meet Target
				UB	UT	OTH	diffuse
UK0024	Glasgow Urban Area	<LAT	0	1	0	0	-1
UK0025	Edinburgh Urban Area	<LAT	0	1	0	0	-1
UK0026	Cardiff Urban Area	<LAT	0	1	0	0	-1
UK0027	Swansea Urban Area	<LAT	0	0	0	1	-1
UK0028	Belfast Metropolitan Urban Area	LAT-UAT	1	1	0	0	0
UK0029	Eastern	<LAT	0	2	1	1	-4
UK0030	South West	<LAT	0	0	0	0	0
UK0031	South East	<LAT	0	0	0	3	-3
UK0032	East Midlands	<LAT	0	0	0	1	-1
UK0033	North West & Merseyside	<LAT	0	0	0	0	0
UK0034	Yorkshire & Humberside	LAT-UAT	2	1	0	1	0
UK0035	West Midlands	<LAT	0	2	0	0	-2
UK0036	North East	<LAT	0	1	0	0	-1
UK0037	Central Scotland	LAT-UAT	1	0	0	1	0
UK0038	North East Scotland	<LAT	0	0	0	0	0
UK0039	Highland	<LAT	0	0	0	0	0
UK0040	Scottish Borders	<LAT	0	0	0	0	0
UK0041	South Wales	LAT-UAT	1	0	0	1	0
UK0042	North Wales	LAT-UAT	1	0	1	0	0
UK0043	Northern Ireland	LAT-UAT	1	2	0	0	-1
Totals			8	30	3	9	-34

Implementation

Defra owned SO₂ monitors ceased operation during 2012 and affiliated local authority stations operated until the end of the calendar year 2012. For monitors that have been removed as a result of those decisions, the end date is provided in Table 10.

Table 10: SO₂ monitoring changes

Zone code	Zone name	Station	Station Classification	Keep	Action (justification)	Closed station (date)
UK0001	Greater London Urban Area	London Bexley	Suburban Background	✓	keep (model)	
		London Bloomsbury	Urban Background	✓	keep (model)	
		London Cromwell Road 2 ¹⁸	Urban Traffic		closed (non-compliant)	03/10/2012
		London Marylebone Road	Urban Traffic	✓	keep (high profile full suite station)	
		London N. Kensington	Urban Background	✓	keep (model)	
		London Westminster	Urban Background		remove	19/07/2012
UK0002	West Midlands Urban Area	Birmingham Acocks Green	Urban Background		remove	13/08/2012
		Birmingham Tyburn	Urban Background	✓	keep (model)	
UK0003	Greater Manchester Urban Area	Manchester Piccadilly	Urban Background	✓	keep (model)	
		Salford Eccles	Urban Industrial		remove	31/12/2012
UK0004	West Yorkshire Urban Area	Leeds Centre	Urban Background	✓	keep (model)	
UK0005	Tyneside	Newcastle Centre	Urban Background		remove	15/08/2012
UK0006	Liverpool Urban Area	Liverpool Speke	Urban Industrial	✓	keep (model)	
UK0007	Sheffield Urban Area	Sheffield Centre	Urban Background		remove	10/07/2012
UK0008	Nottingham Urban Area	Nottingham Centre	Urban Background	✓	keep (model)	
UK0009	Bristol Urban Area	Bristol St Paul's	Urban Background		remove	23/07/2012
UK0011	Leicester Urban Area	Leicester Centre ¹⁹	Urban Background		non-compliant (no replacement required in zone)	01/08/2012
UK0013	Teesside Urban Area	Middlesbrough	Urban Industrial	✓	keep (model)	
UK0018	Kingston upon Hull	Hull Freetown	Urban Background	✓	keep (model)	
UK0019	Southampton Urban Area	Southampton Centre	Urban Background	✓	keep (model)	

¹⁸ London Cromwell Road 2 is non-compliant, replacement does not require SO₂ monitoring

¹⁹ Leicester Centre is non-compliant, replacement at Leicester University does not require SO₂ monitoring

Zone code	Zone name	Station	Station Classification	Keep	Action (justification)	Closed station (date)
UK0024	Glasgow Urban Area	Glasgow Centre ²⁰	Urban Background		Planned closure (no replacement required in zone)	15/08/2012
UK0025	Edinburgh Urban Area	Edinburgh St Leonards	Urban Background	✓	keep (model)	
UK0026	Cardiff Urban Area	Cardiff Centre	Urban Background	✓	keep (informs on local sources)	
UK0027	Swansea Urban Area	Port Talbot Margam	Urban Industrial	✓	keep (model)	
UK0028	Belfast Metropolitan Urban Area	Belfast Centre	Urban Background	✓	keep	
UK0029	Eastern	Norwich Lakenfields	Urban Background		remove	15/08/2012
		Stanford-le-Hope Roadside	Urban Traffic		remove	31/12/2012
		Thurrock	Urban Background	✓	keep (model)	
		Wicken Fen	Rural Background	✓	keep (ecosystem station)	
UK0031	South East	Harwell	Rural Background	✓	keep (ecosystem station and model)	
		Lullington Heath	Rural Background	✓	keep (ecosystem station and model)	
		Rochester Stoke	Rural Background	✓	keep(informs on power station impacts)	
UK0032	East Midlands	Ladybower	Rural Background	✓	keep (ecosystem station and model)	
		Northampton Kingsthorpe	Urban Background		remove	02/08/2012
UK0034	Yorkshire & Humberside	Barnsley 12	Urban Background		to close (building due to be demolished)	17/07/2012
		Barnsley Gawber	Urban Background	✓	keep	
		Scunthorpe Town	Urban Industrial	✓	keep	
UK0035	West Midlands	Leamington Spa	Urban Background		remove	31/12/2012
		Leominster	Suburban Background		remove	07/08/2012
UK0036	North East	Sunderland Silksworth	Urban Background		remove	31/12/2012

²⁰ Glasgow Centre is to be closed, replacement does not require SO₂ monitoring

Zone code	Zone name	Station	Station Classification	Keep	Action (justification)	Closed station (date)
UK0037	Central Scotland	Grangemouth	Urban Industrial	✓	keep (high concentration station in network)	
UK0041	South Wales	Narberth	Rural Background	✓	keep	
UK0042	North Wales	Wrexham	Urban Traffic	✓	keep	
UK0043	Northern Ireland	Ballymena Ballykeel	Urban Background	✓	keep (model)	
		Derry	Urban Background	✓	keep	

Ozone

Overview of Changes

Article 10, paragraph 3 clearly specifies a minimum monitoring requirement where supplementary assessment is applied (Article 10, paragraph 3c.) as long other preconditions listed in Article 10, paragraph 3 are achieved. Therefore, the siting of monitoring locations within each zone/agglomeration is flexible since the criteria on suburban locations listed as a footnote within the table in Annex IX Section A is not required, because the model represents all environment types (urban, rural, suburban). Table 11 shows the existing monitoring network compared with the calculated monitoring targets.

Table 12 lists all the ozone stations in the network. Each station has been reviewed in terms of how it fulfils the monitoring targets and its value for modelling, whilst ensuring adequate geographical coverage across the UK.

Further consideration was given to the stations shortlisted for closure in Table 12 based on the risk of exceeding the Information Threshold specified in the AQD. Therefore, in zones where there are more stations than required to meet the targets, stations have been retained where they recorded concentrations over 80% (i.e. at risk of exceedance) of the Information Threshold in the last 5 years. This ensures that stations that may impact public information notifications remain operational.

Table 11: Existing ozone monitoring network compared with AQD requirements

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Existing monitoring				(+/-) to Meet Target
				UB	SB	RB	OTH	diffuse
UK0001	Greater London Urban Area	>LTO	4	5	2	0	2	-5
UK0002	West Midlands Urban Area	>LTO	2	3	0	0	1	-2
UK0003	Greater Manchester Urban Area	>LTO	1	2	1	0	0	-2
UK0004	West Yorkshire Urban Area	>LTO	1	1	0	0	0	0
UK0005	Tyneside	>LTO	1	1	0	0	0	0
UK0006	Liverpool Urban Area	>LTO	1	1	0	0	0	0
UK0007	Sheffield Urban Area	>LTO	1	1	0	0	0	0
UK0008	Nottingham Urban Area	>LTO	1	1	0	0	0	0
UK0009	Bristol Urban Area	>LTO	1	1	0	0	0	0
UK0010	Brighton/Worthing/Littlehampton	>LTO	1	1	0	0	0	0
UK0011	Leicester Urban Area	>LTO	1	1	0	0	0	0
UK0012	Portsmouth Urban Area	>LTO	1	1	0	0	0	0
UK0013	Teesside Urban Area	>LTO	1	1	0	0	0	0
UK0014	The Potteries	>LTO	1	1	0	0	0	0
UK0015	Bournemouth Urban Area	>LTO	1	1	0	0	0	0
UK0016	Reading/Wokingham Urban Area	>LTO	1	1	0	0	0	0
UK0017	Coventry/Bedworth	>LTO	1	1	0	0	0	0
UK0018	Kingston upon Hull	>LTO	1	1	0	0	0	0
UK0019	Southampton Urban Area	>LTO	1	1	0	0	0	0
UK0020	Birkenhead Urban Area	>LTO	1	1	0	0	0	0
UK0021	Southend Urban Area	>LTO	1	1	0	0	0	0
UK0022	Blackpool Urban Area	>LTO	1	1	0	0	0	0
UK0023	Preston Urban Area	>LTO	1	1	0	0	0	0

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Existing monitoring				(+/-) to Meet Target
				UB	SB	RB	OTH	diffuse
UK0024	Glasgow Urban Area	>LTO	1	1	0	0	0	0
UK0025	Edinburgh Urban Area	>LTO	1	1	0	0	0	0
UK0026	Cardiff Urban Area	>LTO	1	1	0	0	0	0
UK0027	Swansea Urban Area	>LTO	1	0	0	0	1	0
UK0028	Belfast Metropolitan Urban Area	>LTO	1	1	0	0	0	0
UK0029	Eastern	>LTO	3	2	0	4	0	-3
UK0030	South West	>LTO	3	1	0	2	0	0
UK0031	South East	>LTO	4	1	0	3	0	0
UK0032	East Midlands	>LTO	2	1	1	2	0	-2
UK0033	North West & Merseyside	>LTO	2	1	1	1	0	-1
UK0034	Yorkshire & Humberside	>LTO	2	1	0	1	0	0
UK0035	West Midlands	>LTO	2	1	1	0	0	0
UK0036	North East	>LTO	1	1	0	0	0	0
UK0037	Central Scotland	>LTO	1	0	0	1	0	0
UK0038	North East Scotland	>LTO	1	1	0	0	0	0
UK0039	Highland	>LTO	1	0	1	2	0	-2
UK0040	Scottish Borders	>LTO	1	0	1	1	0	-1
UK0041	South Wales	>LTO	1	1	0	1	0	-1
UK0042	North Wales	>LTO	1	0	1	1	0	-1
UK0043	Northern Ireland	>LTO	1	1	0	1	0	-1
Totals			58	46	9	20	4	-21

Implementation

The following changes in Table 12 are proposed to be implemented in 2013.

Table 12: Proposed Ozone Monitoring Changes

Zone code	Zone name	Station	Station classification	Keep	Action (justification)
UK0001	Greater London Urban Area	London Bloomsbury	Urban Background	✓	keep
		London Eltham	Suburban Background	✓	keep
		London Haringey	Urban Background	✓	keep (new station: London Haringey Priory Park South)
		London Harlington	Urban Industrial	✓	keep
		London Hillingdon	Urban Background	✓	keep (research)
		London Marylebone Road	Urban Traffic	✓	keep (research)
		London N. Kensington	Urban Background	✓	keep
		London Teddington	Urban Background	✓	keep
		London Westminster	Urban Background		remove
UK0002	West Midlands Urban Area	Birmingham Acocks Green	Urban Background	✓	keep
		Birmingham Tyburn	Urban Background	✓	keep
		Birmingham Tyburn Roadside	Urban Traffic	✓	keep (research)
		Walsall Woodlands	Urban Background	✓	keep
UK0003	Greater Manchester Urban Area	Manchester Piccadilly	Urban Background	✓	keep
		Manchester South	Suburban Industrial	✓	keep (model)
		Salford Eccles	Urban Industrial		remove
UK0004	West Yorkshire Urban Area	Leeds Centre	Urban Background	✓	keep
UK0005	Tyneside	Newcastle Centre	Urban Background	✓	keep

Zone code	Zone name	Station	Station classification	Keep	Action (justification)
UK0006	Liverpool Urban Area	Liverpool Speke	Urban Industrial	✓	keep
UK0007	Sheffield Urban Area	Sheffield Centre	Urban Background	✓	keep
UK0008	Nottingham Urban Area	Nottingham Centre	Urban Background	✓	keep
UK0009	Bristol Urban Area	Bristol St Paul's	Urban Background	✓	keep
UK0010	Brighton/Worthing/Littlehampton	Brighton Preston Park	Urban Background	✓	keep
UK0011	Leicester Urban Area	Leicester Centre	Urban Background		to close (replacement needed in zone)
UK0012	Portsmouth Urban Area	Portsmouth	Urban Background	✓	keep
UK0013	Teesside Urban Area	Middlesbrough	Urban Industrial	✓	keep
UK0014	The Potteries	Stoke-on-Trent Centre	Urban Background	✓	keep
UK0015	Bournemouth Urban Area	Bournemouth	Urban Background	✓	keep
UK0016	Reading/Wokingham Urban Area	Reading New Town	Urban Background	✓	keep
UK0017	Coventry/Bedworth	Coventry Memorial Park	Urban Background	✓	keep
UK0018	Kingston upon Hull	Hull Freetown	Urban Background	✓	keep
UK0019	Southampton Urban Area	Southampton Centre	Urban Background	✓	keep
UK0020	Birkenhead Urban Area	Wirral Tranmere	Urban Background	✓	keep
UK0021	Southend Urban Area	Southend-on-Sea	Urban Background	✓	keep
UK0022	Blackpool Urban Area	Blackpool Marton	Urban Background	✓	keep
UK0023	Preston Urban Area	Preston	Urban Background	✓	keep
UK0024	Glasgow Urban Area	Glasgow Centre	Urban Background		to close (replacement needed in zone)
UK0025	Edinburgh Urban Area	Edinburgh St Leonards	Urban Background	✓	keep
UK0026	Cardiff Urban Area	Cardiff Centre	Urban Background	✓	keep
UK0027	Swansea Urban Area	Port Talbot Margam	Urban Industrial	✓	keep
UK0028	Belfast Metropolitan Urban Area	Belfast Centre	Urban Background	✓	keep
UK0029	Eastern	Norwich Lakenfields	Urban Background	✓	keep - exceeded 80% of Information Threshold in 2010
		Sibton	Rural Background	✓	keep
		St Osyth	Rural Background	✓	keep

Zone code	Zone name	Station	Station classification	Keep	Action (justification)
		Thurrock	Urban Background	✓	keep - exceeded 80% of Information Threshold in 2008, 2009 and 2011
		Weybourne	Rural Background	✓	keep (model)
		Wicken Fen	Rural Background	✓	keep
UK0030	South West	Charlton Mackrell	Rural Background	✓	keep
		Exeter Roadside	Urban Traffic	✓	keep (research)
		Plymouth Centre	Urban Background	✓	keep
		Yarner Wood	Rural Background	✓	keep
UK0031	South East	Harwell	Rural Background	✓	keep
		Lullington Heath	Rural Background	✓	keep
		Rochester Stoke	Rural Background	✓	keep
		Canterbury	Urban Background	✓	keep
UK0032	East Midlands	Bottesford	Rural Background	✓	keep (model)
		Ladybower	Rural Background	✓	keep
		Market Harborough	Rural Background	✓	keep
		Northampton Kingsthorpe	Urban Background	✓	Keep (model)
UK0033	North West & Merseyside	Glazebury	Rural Background	✓	keep (long-running station)
		Great Dun Fell	Rural Background	✓	keep
		Wigan Centre	Urban Background	✓	keep
UK0034	Yorkshire & Humberside	Barnsley Gawber	Urban Background	✓	keep
		High Muffles	Rural Background	✓	keep
UK0035	West Midlands	Leamington Spa	Urban Background	✓	keep
		Leominster	Suburban Background	✓	keep - exceeded 80% of Information Threshold in last 4 years
UK0036	North East	Sunderland Silksworth	Urban Background	✓	keep
UK0037	Central Scotland	Auchencorth Moss	Rural Background	✓	keep
		Bush Estate	Rural Background	✓	keep (research)
UK0038	North East Scotland	Aberdeen	Urban Background	✓	keep

Zone code	Zone name	Station	Station classification	Keep	Action (justification)
UK0039	Highland	Fort William	Suburban Background	✓	keep (model)
		Lerwick	Suburban Background	✓	keep
		Strath Vaich	Rural Background	✓	keep
UK0040	Scottish Borders	Eskdalemuir	Rural Background	✓	keep
		Peebles	Urban Background	✓	keep (research/geographical spread)
UK0041	South Wales	Cwmbran	Urban Background	✓	keep (model)
		Narberth	Rural Background	✓	keep
UK0042	North Wales	Aston Hill	Rural Background	✓	keep
		Mold	Suburban Background		remove
UK0043	Northern Ireland	Derry	Urban Background	✓	keep (model)
		Lough Navar	Rural Background	✓	keep

Benzene

Overview of Changes

The review recommended three additional stations to meet the monitoring targets: two in the Yorkshire and Humberside zone and one in the South Wales zone. For background benzene at least 15 of the existing 21 stations are recommended for a robust model calibration. For traffic benzene all of the existing traffic stations were recommended for model calibration. Additional traffic benzene monitoring would improve the robustness of the model, particularly additional monitoring in inner or central London, where the monitoring data for London Marylebone Road show a different behaviour from other traffic stations. An additional station was therefore proposed for London.

The review concluded that six monitoring stations were recommended to be closed and four stations proposed to be opened, by relocating four of these six from other zones.

The urban background to urban traffic monitoring ratio resulting from these changes is 1.07 and therefore meets the AQD criteria.

Table 13: Existing benzene monitoring network compared with AQD requirements

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring			(+/-) to Meet Target ²¹	
					UB	UT	OTH	diffuse	traffic
UK0001	Greater London Urban Area	LAT-UAT	2	0	2	3	0	-3	0
UK0002	West Midlands Urban Area	<LAT	0	0	1	1	0	-2	0
UK0003	Greater Manchester Urban Area	<LAT	0	0	1	1	0	-2	0
UK0004	West Yorkshire Urban Area	<LAT	0	0	1	0	0	-1	0
UK0005	Tyneside	<LAT	0	0	1	0	0	-1	0
UK0006	Liverpool Urban Area	<LAT	0	0	1	0	0	-1	0
UK0007	Sheffield Urban Area	<LAT	0	0	1	0	0	-1	0
UK0008	Nottingham Urban Area	<LAT	0	0	1	0	0	-1	0
UK0009	Bristol Urban Area	<LAT	0	0	0	0	0	0	0
UK0010	Brighton/Worthing/Littlehampton	<LAT	0	0	0	0	0	0	0
UK0011	Leicester Urban Area	<LAT	0	0	1	0	0	-1	0
UK0012	Portsmouth Urban Area	<LAT	0	0	0	0	0	0	0
UK0013	Teesside Urban Area	<LAT	0	0	1	0	0	-1	0
UK0014	The Potteries	<LAT	0	0	1	0	0	-1	0
UK0015	Bournemouth Urban Area	<LAT	0	0	0	0	0	0	0
UK0016	Reading/Wokingham Urban Area	<LAT	0	0	0	0	0	0	0
UK0017	Coventry/Bedworth	<LAT	0	0	1	0	0	-1	0

²¹ Note that negatives in '(+/- to Meet Target)' do not denote comprehensive monitoring flexibility – some stations are required to support supplementary assessment and research.

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring			(+/-) to Meet Target ²¹	
					UB	UT	OTH	diffuse	traffic
UK0018	Kingston upon Hull	<LAT	0	0	0	0	0	0	0
UK0019	Southampton Urban Area	<LAT	0	0	1	0	0	-1	0
UK0020	Birkenhead Urban Area	<LAT	0	0	0	0	0	0	0
UK0021	Southend Urban Area	<LAT	0	0	0	0	0	0	0
UK0022	Blackpool Urban Area	<LAT	0	0	0	0	0	0	0
UK0023	Preston Urban Area	<LAT	0	0	0	0	0	0	0
UK0024	Glasgow Urban Area	<LAT	0	0	0	1	0	-1	0
UK0025	Edinburgh Urban Area	<LAT	0	0	0	0	0	0	0
UK0026	Cardiff Urban Area	<LAT	0	0	0	0	0	0	0
UK0027	Swansea Urban Area	<LAT	0	0	0	0	0	0	0
UK0028	Belfast Metropolitan Urban Area	<LAT	0	0	1	0	0	-1	0
UK0029	Eastern	<LAT	0	0	1	1	0	-2	0
UK0030	South West	<LAT	0	0	1	1	0	-2	0
UK0031	South East	<LAT	0	0	1	2	1	-4	0
UK0032	East Midlands	<LAT	0	0	1	1	0	-2	0
UK0033	North West & Merseyside	<LAT	0	0	1	1	0	-2	0
UK0034	Yorkshire & Humberside	>UAT	4	1	1	1	0	2	0
UK0035	West Midlands	<LAT	0	0	1	0	0	-1	0
UK0036	North East	LAT-UAT	1	0	0	1	0	0	0
UK0037	Central Scotland	LAT-UAT	1	0	0	0	1	0	0
UK0038	North East Scotland	<LAT	0	0	0	0	0	0	0
UK0039	Highland	<LAT	0	0	0	0	0	0	0
UK0040	Scottish Borders	<LAT	0	0	0	0	0	0	0
UK0041	South Wales	LAT-UAT	1	0	0	0	0	1	0
UK0042	North Wales	<LAT	0	0	0	0	0	0	0

Zone code	Zone name	Assessment Threshold classification	Calculated Target (diffuse)	Calculated Target (traffic)	Existing monitoring			(+/-) to Meet Target ²¹	
					UB	UT	OTH	diffuse	traffic
UK0043	Northern Ireland	<LAT	0	0	0	0	0	0	0
Totals			9	1	22	14	2	-29	0

Implementation

The following changes were implemented in 2012:

1. The Wigan and the Northampton monitors were moved to York Bootham and Scunthorpe Town to meet the targets in Yorkshire & Humberside zone.
2. The Plymouth Centre monitor was moved to Newport to meet the South Wales zone target.
3. The Leicester Centre and Coventry Memorial Park monitors were closed.
4. Bristol Old Market was identified as a non-compliant station and was closed as a result – a replacement is not required in this zone. This monitor was moved to Tower Hamlets in London to improve the modelling.

The following changes are proposed to occur during 2014:

1. The monitor at the non-compliant Bury roadside station will be replaced within the Greater Manchester zone.
2. The monitor at the Glasgow kerbside station will be relocated to a site with safer and improved site access.

Annex 1

Proposed UK Compliance Monitoring Stations from 2013

Summary of proposed phasing and station numbers for each pollutant

Zone code	Zone name	Phase 1							Phase 2			Phase 3		
		NO ₂	PM ₁₀	PM _{2.5}	CO	Benzene	O ₃	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
UK0001	Greater London Urban Area	14	7	11	2	6	8	4	14	7	10	14	7	10
UK0002	West Midlands Urban Area	5	2	3	0	2	4	1	5	2	3	6	2	3
UK0003	Greater Manchester Urban Area	5	2	2	0	2	2	1	5	2	2	5	2	2
UK0004	West Yorkshire Urban Area	3	2	2	1	1	1	1	3	2	2	4	2	2
UK0005	Tyneside	2	1	1	0	1	1	0	2	1	1	2	2	1
UK0006	Liverpool Urban Area	2	1	1	0	1	1	1	2	2	1	2	2	1
UK0007	Sheffield Urban Area	2	1	1	0	1	1	0	3	1	1	3	1	2
UK0008	Nottingham Urban Area	1	2	1	0	1	1	1	2	2	1	2	2	1
UK0009	Bristol Urban Area	1	1	1	0	0	1	0	2	2	1	2	2	1
UK0010	Brighton/Worthing/Littlehampton	1	0	1	0	0	1	0	2	0	1	2	0	2
UK0011	Leicester Urban Area	2	1	1	0	0	1	0	2	1	1	2	1	1
UK0012	Portsmouth Urban Area	1	1	1	0	0	1	0	2	2	1	2	2	1
UK0013	Teesside Urban Area	3	1	1	0	1	1	1	3	1	2	3	1	2
UK0014	The Potteries	2	1	1	0	1	1	0	2	1	1	2	1	1
UK0015	Bournemouth Urban Area	1	0	1	0	0	1	0	2	0	1	2	0	2
UK0016	Reading/Wokingham Urban Area	1	1	1	0	0	1	0	2	1	1	2	2	1
UK0017	Coventry/Bedworth	1	0	1	0	0	1	0	2	1	1	2	1	1
UK0018	Kingston upon Hull	2	1	1	0	0	1	1	2	1	1	2	1	1

Zone code	Zone name	Phase 1							Phase 2			Phase 3		
		NO ₂	PM ₁₀	PM _{2.5}	CO	Benzene	O ₃	SO ₂	NO ₂	PM ₁₀	PM _{2.5}	NO ₂	PM ₁₀	PM _{2.5}
UK0019	Southampton Urban Area	2	2	1	0	1	1	1	2	2	1	2	2	1
UK0020	Birkenhead Urban Area	1	0	1	0	0	1	0	2	0	1	2	0	1
UK0021	Southend Urban Area	1	0	1	0	0	1	0	1	0	1	1	0	1
UK0022	Blackpool Urban Area	1	0	1	0	0	1	0	1	0	1	1	0	1
UK0023	Preston Urban Area	1	0	1	0	0	1	0	1	0	1	1	0	1
UK0024	Glasgow Urban Area	4	2	2	0	1	1	0	4	2	2	4	2	2
UK0025	Edinburgh Urban Area	1	1	1	1	0	1	1	2	1	1	2	1	1
UK0026	Cardiff Urban Area	1	1	1	1	0	1	1	2	1	1	2	2	1
UK0027	Swansea Urban Area	2	2	2	1	0	1	1	2	2	2	2	2	2
UK0028	Belfast Metropolitan Urban Area	2	2	1	1	1	1	1	2	2	1	2	2	1
UK0029	Eastern	8	4	3	0	2	6	2	8	4	3	9	4	3
UK0030	South West	6	3	3	0	1	4	0	7	3	3	8	3	3
UK0031	South East	10	6	6	0	4	4	3	10	4	5	10	4	5
UK0032	East Midlands	6	2	3	0	1	4	1	7	2	3	7	2	3
UK0033	North West & Merseyside	6	2	3	0	1	3	0	6	2	3	7	2	3
UK0034	Yorkshire & Humberside	5	3	2	0	4	2	2	5	3	2	7	3	2
UK0035	West Midlands	4	2	2	0	1	2	0	4	2	2	6	2	2
UK0036	North East	3	1	2	0	1	1	0	3	1	2	4	1	2
UK0037	Central Scotland	4	2	2	0	2	2	1	5	2	1	5	2	2
UK0038	North East Scotland	2	1	1	0	0	1	0	3	1	1	4	1	1
UK0039	Highland	2	1	1	0	0	3	0	2	1	1	2	1	1
UK0040	Scottish Borders	3	0	0	0	0	2	0	3	0	0	3	0	0
UK0041	South Wales	5	3	2	0	1	2	1	5	3	2	5	3	2
UK0042	North Wales	2	1	1	0	0	1	1	2	1	1	2	1	1
UK0043	Northern Ireland	2	3	1	0	0	2	2	3	3	1	4	3	1

Proposed Composition of future monitoring network for AQD pollutants

Zone code	Zone name	Station name	Station classification	Pollutants measured							Phase and action additions as (+) removals as (-)			
				NO ₂	PM ₁₀	PM _{2.5}	CO	SO ₂	O ₃	Benzene	NO ₂	PM ₁₀	PM _{2.5}	Benzene
UK0001	Greater London Urban Area	London Ealing Horn Lane	Urban Industrial	0	1	0	0	0	0	0				
UK0001	Greater London Urban Area	Camden Kerbside	Urban Traffic	1	1	1	0	0	0	1				
UK0001	Greater London Urban Area	London Bexley	Suburban Background	1	0	1	0	1	0	0				
UK0001	Greater London Urban Area	London Bloomsbury	Urban Background	1	1	1	0	1	1	1				
UK0001	Greater London Urban Area	London Eltham	Suburban Background	1	0	1	0	0	1	1				
UK0001	Greater London Urban Area	London Haringey Priory Park South	Urban Background	1	0	0	0	0	1	0				
UK0001	Greater London Urban Area	London Harlington	Urban Industrial	1	1	1	0	0	1	0				
UK0001	Greater London Urban Area	London Harrow Stanmore	Urban Background	0	0	1	0	0	0	0				
UK0001	Greater London Urban Area	London Hillingdon	Urban Background	1	0	0	0	0	1	0				
UK0001	Greater London Urban Area	London Marylebone Road	Urban Traffic	1	1	1	1	1	1	1				
UK0001	Greater London Urban Area	London N. Kensington	Urban Background	1	1	1	1	1	1	0				
UK0001	Greater London Urban Area	London Teddington	Urban Background	1	0	1	0	0	1	0				
UK0001	Greater London Urban Area	London Westminster	Urban Background	1	0	1	0	0	0	0				
UK0001	Greater London Urban Area	Southwark A2 Old Kent Road	Urban Traffic	1	1	0	0	0	0	0				
UK0001	Greater London Urban Area	Tower Hamlets Roadside	Urban Traffic	1	0	0	0	0	0	1				1 (+)
UK0001	Greater London Urban Area	Haringey Roadside	Urban Traffic	1	0	0	0	0	0	1			1 (-)	2 (-)
UK0002	West Midlands Urban Area	Birmingham Acocks Green	Urban Background	1	0	1	0	0	1	1				
UK0002	West Midlands Urban Area	Birmingham Tyburn	Urban Background	1	1	1	0	1	1	0				
UK0002	West Midlands Urban Area	Birmingham Tyburn Roadside	Urban Traffic	1	1	1	0	0	1	1				
UK0002	West Midlands Urban Area	Walsall Woodlands	Urban Background	1	0	0	0	0	1	0				
UK0002	West Midlands Urban Area	UK0002_1	Urban Traffic	1	0	0	0	0	0	0			1 (+)	
UK0002	West Midlands Urban Area	UK0002_2	Urban Background	1	0	0	0	0	0	0			3 (+)	

Zone code	Zone name	Station name	Station classification	Pollutants measured						
				NO ₂	PM ₁₀	PM _{2.5}	CO	SO ₂	O ₃	Benzene
UK0003	Greater Manchester Urban Area	Manchester Piccadilly	Urban Background	1	0	1	0	1	1	1
UK0003	Greater Manchester Urban Area	Manchester South	Suburban Industrial	1	0	0	0	0	1	0
UK0003	Greater Manchester Urban Area	Salford Eccles	Urban Industrial	1	1	1	0	0	0	0
UK0003	Greater Manchester Urban Area	Bury Roadside - replacement	Urban Traffic	1	1	0	0	0	0	1
UK0003	Greater Manchester Urban Area	UK0003_1	Urban Traffic	1	0	0	0	0	0	0
UK0004	West Yorkshire Urban Area	Leeds Centre	Urban Background	1	1	1	1	1	1	1
UK0004	West Yorkshire Urban Area	Leeds Headingley Kerbside	Urban Traffic	1	1	1	0	0	0	0
UK0004	West Yorkshire Urban Area	UK0004_1	Urban Traffic	1	0	0	0	0	0	0
UK0004	West Yorkshire Urban Area	UK0004_2	Urban Background	1	0	0	0	0	0	0
UK0005	Tyneside	Newcastle Centre	Urban Background	1	1	1	0	0	1	1
UK0005	Tyneside	Newcastle Cradlewell Roadside	Urban Traffic	1	1	0	0	0	0	0
UK0006	Liverpool Urban Area	Liverpool Queen's Drive Roadside	Urban Traffic	1	1	0	0	0	0	0
UK0006	Liverpool Urban Area	Liverpool Speke	Urban Industrial	1	1	1	0	1	1	1
UK0007	Sheffield Urban Area	Sheffield Centre	Urban Background	1	1	1	0	0	1	1
UK0007	Sheffield Urban Area	Sheffield Tinsley	Urban Background	1	0	0	0	0	0	0
UK0007	Sheffield Urban Area	UK0007_1	Urban Traffic	1	0	1	0	0	0	0
UK0008	Nottingham Urban Area	Nottingham Centre	Urban Background	1	1	1	0	1	1	1
UK0008	Nottingham Urban Area	UK0008_1	Urban Traffic	1	1	0	0	0	0	0
UK0009	Bristol Urban Area	Bristol St Paul's	Urban Background	1	1	1	0	0	1	0
UK0009	Bristol Urban Area	UK0009_1	Urban Traffic	1	1	0	0	0	0	0
UK0010	Brighton/Worthing/Littlehampton	Brighton Preston Park	Urban Background	1	0	1	0	0	1	0
UK0010	Brighton/Worthing/Littlehampton	UK0010_1	Urban Traffic	1	0	1	0	0	0	0
UK0011	Leicester Urban Area	Leicester Centre - replacement	Urban Background	1	0	1	0	0	1	0
UK0011	Leicester Urban Area	UK0011_1	Urban Traffic	1	1	0	0	0	0	0
UK0012	Portsmouth Urban Area	Portsmouth	Urban Background	1	1	1	0	0	1	0
UK0012	Portsmouth Urban Area	UK0012_1	Urban Traffic	1	1	0	0	0	0	0

Phase and action additions as (+) removals as (-)			
NO ₂	PM ₁₀	PM _{2.5}	Benzene
		0 (-)‡	1 (+)
1 (+)			
1 (+)			
3 (+)			
	3 (+)		
	2 (+)		
2 (+)		3 (+)	
2 (+)	1 (+)		
2 (+)	2 (+)		
2 (+)		3 (+)	
	0 (-)‡		1 (-)
1 (+)	1 (+)		
2 (+)	2 (+)		

Zone code	Zone name	Station name	Station classification	Pollutants measured							Phase and action additions as (+) removals as (-)			
				NO ₂	PM ₁₀	PM _{2.5}	CO	SO ₂	O ₃	Benzene	NO ₂	PM ₁₀	PM _{2.5}	Benzene
UK0013	Teesside Urban Area	Billingham	Urban Industrial	1	0	0	0	0	0	0				
UK0013	Teesside Urban Area	Middlesbrough	Urban Industrial	1	1	1	0	1	1	1				
UK0013	Teesside Urban Area	UK0013_1	Urban Traffic	1	0	1	0	0	0	0	1 (+)		2 (+)	
UK0014	The Potteries	Stoke-on-Trent Centre	Urban Background	1	0	1	0	0	1	1		1 (-)		
UK0014	The Potteries	UK0014_1	Urban Traffic	1	1	0	0	0	0	0	1 (+)	1 (+)		
UK0015	Bournemouth Urban Area	Bournemouth	Urban Background	1	0	1	0	0	1	0				
UK0015	Bournemouth Urban Area	UK0015_1	Urban Traffic	1	0	1	0	0	0	0	2 (+)		3 (+)	
UK0016	Reading/Wokingham Urban Area	Reading New Town	Urban Background	1	1	1	0	0	1	0				
UK0016	Reading/Wokingham Urban Area	UK0016_1	Urban Traffic	1	1	0	0	0	0	0	2 (+)	3 (+)		
UK0017	Coventry/Bedworth	Coventry Memorial Park - replacement	Urban Background	1	0	1	0	0	1	0		0 (-)‡		1 (-)
UK0017	Coventry/Bedworth	UK0017_2	Urban Traffic	1	1	0	0	0	0	0	2 (+)	2 (+)		
UK0018	Kingston upon Hull	Hull Freetown	Urban Background	1	0	1	0	1	1	0		1 (-)		
UK0018	Kingston upon Hull	UK0018_1	Urban Traffic	1	1	0	0	0	0	0	1 (+)	1 (+)		
UK0019	Southampton Urban Area	Southampton Centre	Urban Background	1	1	1	0	1	1	1				
UK0019	Southampton Urban Area	UK0019_1	Urban Traffic	1	1	0	0	0	0	0	1 (+)	1 (+)		
UK0020	Birkenhead Urban Area	Wirral Tranmere	Urban Background	1	0	1	0	0	1	0				
UK0020	Birkenhead Urban Area	UK0020_1	Urban Traffic	1	0	0	0	0	0	0	2 (+)			
UK0021	Southend Urban Area	Southend-on-Sea	Urban Background	1	0	1	0	0	1	0				
UK0022	Blackpool Urban Area	Blackpool Marton	Urban Background	1	0	1	0	0	1	0				
UK0023	Preston Urban Area	Preston	Urban Background	1	0	1	0	0	1	0				
UK0024	Glasgow Urban Area	GLA_tbd	Urban Background	1	1	1	0	0	1	0				
UK0024	Glasgow Urban Area	Glasgow Kerbside	Urban Traffic	1	0	0	0	0	0	0				
UK0024	Glasgow Urban Area	GLA_tbd2 (kerbside)	Urban Traffic	1	1	1	0	0	0	1				1 (+)
UK0024	Glasgow Urban Area	UK0024_1	Urban Traffic	1	0	0	0	0	0	0	1 (+)			
UK0025	Edinburgh Urban Area	Edinburgh St Leonards	Urban Background	1	1	1	1	1	1	0				

Zone code	Zone name	Station name	Station classification	Pollutants measured							Phase and action additions as (+) removals as (-)				
				NO ₂	PM ₁₀	PM _{2.5}	CO	SO ₂	O ₃	Benzene	NO ₂	PM ₁₀	PM _{2.5}	Benzene	
UK0030	South West	UK0030_1	Urban Background	1	0	0	0	0	0	0	0	3 (+)			
UK0031	South East	Canterbury	Urban Background	1	0	0	0	0	1	0					
UK0031	South East	Chatham Roadside	Urban Traffic	1	1	1	0	0	0	1					
UK0031	South East	Eastbourne	Urban Background	1	0	1	0	0	0	0		2 (-)			
UK0031	South East	Harwell	Rural Background	1	1	1	0	1	1	1					
UK0031	South East	Horley	Suburban Industrial	1	0	0	0	0	0	0					
UK0031	South East	Lullington Heath	Rural Background	1	0	0	0	1	1	0					
UK0031	South East	Oxford St Ebbes	Urban Background	1	1	1	0	0	0	1					
UK0031	South East	Rochester Stoke	Rural Background	1	1	1	0	1	1	0					
UK0031	South East	Storrington Roadside	Urban Traffic	1	0	0	0	0	0	0		2 (-)	2 (-)		
UK0031	South East	Oxford Centre Roadside	Urban Traffic	1	0	0	0	0	0	1					
UK0032	East Midlands	Bottesford	Rural Background	0	0	0	0	0	1	0					
UK0032	East Midlands	Chesterfield	Urban Background	1	1	1	0	0	0	0					
UK0032	East Midlands	Chesterfield Roadside	Urban Traffic	1	1	1	0	0	0	1					
UK0032	East Midlands	Ladybower	Rural Background	1	0	0	0	1	1	0					
UK0032	East Midlands	Market Harborough	Rural Background	1	0	0	0	0	1	0					
UK0032	East Midlands	Northampton Kingsthorpe	Urban Background	1	0	1	0	0	1	0					1 (-)
UK0032	East Midlands	Lincoln Canwick Road	Urban Traffic	1	0	0	0	0	0	0					
UK0032	East Midlands	UK0032_1	Urban Traffic	1	0	0	0	0	0	0		2 (+)			
UK0033	North West & Merseyside	Blackburn Darwen Roadside	Urban Traffic	1	0	0	0	0	0	0					
UK0033	North West & Merseyside	Carlisle Roadside	Urban Traffic	1	1	1	0	0	0	1					
UK0033	North West & Merseyside	Glazebury	Rural Background	1	0	0	0	0	1	0					
UK0033	North West & Merseyside	Great Dun Fell	Rural Background	0	0	0	0	0	1	0					
UK0033	North West & Merseyside	Warrington	Urban Industrial	1	1	1	0	0	0	0					
UK0033	North West & Merseyside	Wigan Centre	Urban Background	1	0	1	0	0	1	0					1 (-)
UK0033	North West & Merseyside	UK0033_1	Urban Traffic	1	0	0	0	0	0	0		1 (+)			

Zone code	Zone name	Station name	Station classification	Pollutants measured						
				NO ₂	PM ₁₀	PM _{2.5}	CO	SO ₂	O ₃	Benzene
UK0033	North West & Merseyside	UK0033_2	Urban Background	1	0	0	0	0	0	0
UK0034	Yorkshire & Humberside	Barnsley Gawber	Urban Background	1	0	0	0	1	1	1
UK0034	Yorkshire & Humberside	High Muffles	Rural Background	1	0	0	0	0	1	0
UK0034	Yorkshire & Humberside	Scunthorpe Town	Urban Industrial	1	1	0	0	1	0	1
UK0034	Yorkshire & Humberside	York Bootham	Urban Background	1	1	1	0	0	0	1
UK0034	Yorkshire & Humberside	York Fishergate	Urban Traffic	1	1	1	0	0	0	1
UK0034	Yorkshire & Humberside	UK0034_1	Urban Traffic	1	0	0	0	0	0	0
UK0034	Yorkshire & Humberside	UK0034_2	Urban Background	1	0	0	0	0	0	0
UK0035	West Midlands	Leamington Spa	Urban Background	1	1	1	0	0	1	1
UK0035	West Midlands	Leominster	Suburban Background	1	0	0	0	0	1	0
UK0035	West Midlands	Leamington Roadside	Urban Traffic	1	1	1	0	0	0	0
UK0035	West Midlands	UK0035_1	Urban Traffic	1	0	0	0	0	0	0
UK0035	West Midlands	UK0035_2	Urban Background	1	0	0	0	0	0	0
UK0035	West Midlands	UK0035_3	Urban Background	1	0	0	0	0	0	0
UK0036	North East	Stockton-on-Tees Eaglescliffe	Urban Traffic	1	1	1	0	0	0	1
UK0036	North East	Sunderland Silksworth	Urban Background	1	0	1	0	0	1	0
UK0036	North East	UK0036_1	Urban Traffic	1	0	0	0	0	0	0
UK0036	North East	UK0036_2	Urban Background	1	0	0	0	0	0	0
UK0037	Central Scotland	Auchencorth Moss	Rural Background	0	1	1	0	0	1	1
UK0037	Central Scotland	Bush Estate	Rural Background	1	0	0	0	0	1	0
UK0037	Central Scotland	Dumbarton Roadside	Urban Traffic	1	0	1	0	0	0	0
UK0037	Central Scotland	Grangemouth	Urban Industrial	1	1	0	0	1	0	1
UK0037	Central Scotland	Grangemouth Moray	Urban Industrial	1	0	0	0	0	0	0
UK0037	Central Scotland	UK0037_1	Urban Traffic	1	0	0	0	0	0	0
UK0038	North East Scotland	Aberdeen	Urban Background	1	1	1	0	0	1	0
UK0038	North East Scotland	Aberdeen Union Street Roadside	Urban Traffic	1	0	0	0	0	0	0

Phase and action additions as (+) removals as (-)			
NO ₂	PM ₁₀	PM _{2.5}	Benzene
3 (+)			
			1 (+)
3 (+)			1 (+)
1 (+)			
3 (+)			
1 (+)			
3 (+)			
3 (+)			
1 (+)			
3 (+)			
		3 (+)	
		2 (-)	
2 (+)			

Zone code	Zone name	Station name	Station classification	Pollutants measured							Phase and action additions as (+) removals as (-)				
				NO ₂	PM ₁₀	PM _{2.5}	CO	SO ₂	O ₃	Benzene	NO ₂	PM ₁₀	PM _{2.5}	Benzene	
UK0038	North East Scotland	UK0038_1	Urban Traffic	1	0	0	0	0	0	0	0	2 (+)			
UK0038	North East Scotland	UK0038_2	Urban Background	1	0	0	0	0	0	0	0	3 (+)			
UK0039	Highland	Fort William	Suburban Background	1	0	0	0	0	1	0					
UK0039	Highland	Inverness	Urban Traffic	1	1	1	0	0	0	0					
UK0039	Highland	Lerwick	Rural Background	0	0	0	0	0	1	0					
UK0039	Highland	Strath Vaich	Rural Background	0	0	0	0	0	1	0					
UK0040	Scottish Borders	Dumfries	Urban Traffic	1	0	0	0	0	0	0					
UK0040	Scottish Borders	Eskdalemuir	Rural Background	1	0	0	0	0	1	0					
UK0040	Scottish Borders	Peebles	Urban Background	1	0	0	0	0	1	0					
UK0041	South Wales	Chepstow A48	Urban Traffic	1	1	1	0	0	0	0					
UK0041	South Wales	Cwmbran	Urban Background	1	0	0	0	0	1	0					
UK0041	South Wales	Narberth	Rural Background	1	1	0	0	1	1	0					
UK0041	South Wales	Newport	Urban Background	1	1	1	0	0	0	1					1 (+)
UK0041	South Wales	UK0041_1	Urban Traffic	1	0	0	0	0	0	0	1 (+)				
UK0042	North Wales	Aston Hill	Rural Background	1	0	0	0	0	1	0					
UK0042	North Wales	Mold	Suburban Background	0	0	0	0	0	0	0	1 (-)				
UK0042	North Wales	Wrexham	Urban Traffic	1	1	1	0	1	0	0					
UK0043	Northern Ireland	Armagh Roadside	Urban Traffic	1	1	0	0	0	0	0					
UK0043	Northern Ireland	Ballymena Ballykeel	Urban Background	1	0	0	0	1	0	0	3 (+)				
UK0043	Northern Ireland	Derry	Urban Background	1	1	1	0	1	1	0					
UK0043	Northern Ireland	Lough Navar	Rural Background	0	1	0	0	0	1	0					
UK0043	Northern Ireland	UK0043_1	Urban Traffic	1	0	0	0	0	0	0	2 (+)				

‡ Denotes that instrument has been removed from station prior to Phase 1 (i.e. in storage) and is therefore ready for redeployment in Phase 1.

Changes to Network between 2010 and 2012

Stations closed (or closing in 2013)

Zone name	EOI code	Station name	Pollutants	Reason for Closure	End Date
West Midlands Urban Area	GB0698A	Sandwell West Bromwich	CO, NO ₂ , SO ₂	Closed, planning issues and non compliant site	31/12/2011
South West	GB0955A	Saltash Roadside	PM ₁₀ , PM _{2.5}	Relocated- land ownership issues	31/08/2010
East Midlands	GB0738A	Northampton	NO ₂ , PM ₁₀ , PM _{2.5} , CO, SO ₂	Relocated – planning issues	09/07/2012
Leicester Urban Area	GB0597A	Leicester Centre	NO ₂ , PM ₁₀ , PM _{2.5} , CO, SO ₂ , O ₃	Closed –planning issues and non compliant, relocated	Closure in 2013
Glasgow Urban Area	GB0641A	Glasgow centre	NO ₂ , CO, O ₃	Closed – planning issues	16/08/2012
Glasgow Urban Area	GB0452A	Glasgow City Chambers	NO ₂ , CO	Closed – planning issues	16/03/2011
Greater Manchester Urban Area	GB0652A	Bury Roadside	NO ₂ , PM ₁₀ , PM _{2.5} , CO, SO ₂ , O ₃	Deaffiliated, non compliant.	06/09/2012
Brighton/Worthing/Littlehampton	GB0860A	Brighton Roadside	NO ₂	Closed – non-compliant	March 2012
Greater London Urban Area	GB0695A	London Cromwell Road 2	NO ₂ , CO, SO ₂	De affiliated, non compliant	03/10/2012
West Midlands Urban Area	GB0674A	Walsall Willenhall	NO ₂	Arson destroyed site, forced closure. Site relocated.	03/02/2010
Greater London Urban Area	GB0638A	London Haringey	NO ₂ , O ₃	Closed – planning issues forced relocation.	09/11/2012

New stations

Zone name	EOI code	Station name	Pollutants	Reason for opening	Start Date
West Midlands Urban Area	GB1013A	Birmingham Acocks Green	NO ₂ , PM _{2.5} , O ₃ , benzene	New station to replace Sandwell West Bromwich	18/03/2011
West Midlands	GB1018A	Leamington Spa Rugby Road	NO ₂ , PM ₁₀ , PM _{2.5}	New station required in zone.	10/04/2012
East Midlands	GB1014A	Lincoln Canwick Rd.	NO ₂	New station required in zone.	27/07/2011
South West	GB1017A	Honiton	NO ₂	New station required in zone.	27/05/2012
South West	-----	Barnstaple roadside	PM ₁₀ , PM _{2.5}	New station required in zone.	-----
West Midlands Urban Area	GB1020A	Walsall Woodlands	NO ₂ , O ₃	Replaced Walsall Willenhall which was destroyed by fire.	01/05/2012
South West	GB0955A	Saltash Carrington Road	PM ₁₀ , PM _{2.5}	Planning forced relocation	30/07/2008
East Midlands	GB1019A	Northampton Kingsthorpe	NO ₂ , PM _{2.5} , O ₃	Planning forced relocation within same grounds.	09/07/2012
Greater London Urban Area	GB1024A	London Haringey Priory Park South	NO ₂	Relocation of London Haringey within the park.	26/10/2012

Sites with planned changes in 2013

Zone name	EOI code	Station name	Pollutants	Reason for Change
Northern Ireland	GB0673A	Derry	NO ₂ , PM ₁₀ , PM _{2.5} , CO, SO ₂ , O ₃	Redevelopment work scheduled for end 2013/ mid 2014.
North West & Merseyside	GB0961A	Blackburn Darwen Roadside	NO ₂	Site proposed to be relocated for planning reasons.
Coventry/Bedworth	GB0739A	Coventry Memorial Park	NO ₂ , PM _{2.5} , O ₃	Health and safety issues with site access, site to be relocated.
Glasgow Urban Area	GB0657A (Glasgow Kerbside)	Glasgow kerbside/Glasgow new – traffic station	NO ₂ , PM ₁₀ , PM _{2.5} , benzene	New traffic station is required to rehouse instruments from Glasgow kerbside which has health and safety issues with access to PM cages. NO _x will continue to be monitored at Glasgow kerbside.
Leicester Urban Area	GB0597A	Leicester - University	NO ₂ , PM _{2.5} , O ₃	New site in University of Leicester grounds.
Glasgow Urban Area	-----	Glasgow – new background station	NO ₂ , PM ₁₀ , PM _{2.5} , O ₃	Planning forced relocation for Glasgow centre. New site proposed at Kennedy Path.
Greater Manchester Urban Area	-----	Manchester Urban Area – new traffic station	NO ₂ , PM ₁₀ , Benzene	To replace non compliant Bury a new site is being progressed at St Bernadette's School.

Annex 3

List of PM_{2.5} urban background AEI stations

EOI code	Station name	Zone name
GB0729A	Aberdeen	North East Scotland
GB0567A	Belfast Centre	Belfast Metropolitan Urban Area
GB1013A	Birmingham Acocks Green	West Midlands Urban Area
GB0851A	Birmingham Tyburn	West Midlands Urban Area
GB0882A	Blackpool Marton	Blackpool Urban Area
GB0741A	Bournemouth	Bournemouth Urban Area
GB0860A	Brighton Preston Park	Brighton/Worthing/Littlehampton
GB0884A	Bristol St Paul's	Bristol Urban Area
GB0580A	Cardiff Centre	Cardiff Urban Area
GB0929A	Chesterfield	East Midlands
GB0739A	Coventry Memorial Park	Coventry/Bedworth
GB1005A	Eastbourne	South East
GB0839A	Edinburgh St Leonards	Edinburgh Urban Area
GB0641A	Glasgow Centre	Glasgow Urban Area
GB0776A	Hull Freetown	Kingston upon Hull
GB0643A	Leamington Spa	West Midlands
GB0584A	Leeds Centre	West Yorkshire Urban Area
GB0777A	Liverpool Speke	Liverpool Urban Area
GB0608A	London Bexley	Greater London Urban Area
GB0566A	London Bloomsbury	Greater London Urban Area
GB0586A	London Eltham	Greater London Urban Area
GB0959A	London Harrow Stanmore	Greater London Urban Area
GB0620A	London N. Kensington	Greater London Urban Area
GB0644A	London Teddington	Greater London Urban Area
GB0743A	London Westminster	Greater London Urban Area
GB0613A	Manchester Piccadilly	Greater Manchester Urban Area
GB0583A	Middlesbrough	Teesside Urban Area
GB0568A	Newcastle Centre	Tyneside
GB0962A	Newport	South Wales
GB0738A	Northampton	East Midlands
GB1019A	Northampton Kingsthorpe	East Midlands
GB0995A	Norwich Lakenfields	Eastern
GB0646A	Nottingham Centre	Nottingham Urban Area

EOI code	Station name	Zone name
GB0920A	Oxford St Ebbes	South East
GB0687A	Plymouth Centre	South West
GB0733A	Portsmouth	Portsmouth Urban Area
GB0731A	Preston	Preston Urban Area
GB0840A	Reading New Town	Reading/Wokingham Urban Area
GB0615A	Sheffield Centre	Sheffield Urban Area
GB0598A	Southampton Centre	Southampton Urban Area
GB0728A	Southend-on-Sea	Southend Urban Area
GB0658A	Stoke-on-Trent Centre	The Potteries
GB0863A	Sunderland Silksworth	North East
GB0958A	Warrington	North West & Merseyside
GB0864A	Wigan Centre	North West & Merseyside
GB0730A	Wirral Tranmere	Birkenhead Urban Area
GB0918A	York Bootham	Yorkshire & Humberside