



2016 Air Quality Annual Status Report (ASR)

In fulfilment of Part IV of the Environment Act 1995
Local Air Quality Management

June 2016

Richmondshire District Council

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Executive Summary: Air Quality in Our Area

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³.

Air Quality in Richmondshire

Richmondshire District Council (RDC) is principally a rural district. Very few areas within the district are of concern in relation to air quality. Nitrogen dioxide levels are the principal focus of monitoring in RDC. Concentrations of nitrogen dioxide tend to reflect local road traffic conditions and are affected by the layout of the roads in combination with the surrounding buildings. An area of narrow congested streets, road junctions and properties close to the kerb in Richmond (around the main approaches to the town centre from the north east) has been identified as a particular area of concern in relation to air quality and is being monitored. The results of monitoring in 2015 for this area, together with all of the other sites in Richmondshire, indicate that the concentrations of nitrogen dioxide measured lie below the objective set by legislation (see Appendix E).

There are currently no Air Quality Management Areas (AQMAs) in the district. If an AQMA were to be declared in the future RDC and North Yorkshire County Council would work together to develop an Air Quality Action Plan which would include measures to address air pollution.

Locations of AQMAs in other parts of the country can be found at <https://uk-air.defra.gov.uk/aqma/list> .

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

² Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

Previous reports submitted by Richmondshire District Council can be found at <http://www.richmondshire.gov.uk/environment/174-environmental-health/pollution/645-air-quality> .

Actions to Improve Air Quality

In light of the air quality in Richmondshire being generally good, air quality has not been considered to require particular attention with regard to council policies or actions. Monitoring will continue at the same sites as monitored in 2015 and if the results of that monitoring indicate an upward trend and exceedance(s) of the air-quality objective then Richmondshire District Council will take the steps required by the Local Air Quality Management (LAQM) Policy Guidance.⁴

Local Priorities and Challenges

In Richmondshire the priorities with regard to air quality are to focus on continued monitoring.

It is not anticipated that there will be any significant developments in or around Richmond which would have a negative impact on the air quality in the area. RDC will continue to consider how planned developments might have an impact on increased traffic volumes (and hence nitrogen dioxide levels) in Richmond.

How to Get Involved

Richmondshire District Council currently has no schemes to help improve air quality however members of the public can help by reducing the number of car-driver trips, car sharing, increasing use of public transport and increasing active travel (cycling and walking).

⁴ Defra Local Air Quality Management Policy Guidance (PG16), April 2016

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1 Local Air Quality Management

This report provides an overview of air quality in Richmondshire during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy⁵ and Technical Guidance⁶ documents.

LAQM process places an obligation on all local authorities to review and assess air quality in their areas regularly, and to determine whether or not the air quality objectives are likely to be achieved. Where it is considered that air quality standards are likely to be exceeded the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. As a two-tier authority Richmondshire District Council and North Yorkshire County Council would work together to develop an AQAP (which would include measures to address air pollution).

The production of this Annual Status Report (ASR) is an annual requirement; it describes any strategies employed by Richmondshire District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

⁵ Defra Local Air Quality Management Policy Guidance (PG16), April 2016

⁶ Defra Local Air Quality Management Technical Guidance (TG16), April 2016

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when air-quality objectives are exceeded or it is anticipated that a breach of the objectives is likely. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months, setting out measures it intends to put in place in pursuit of the objectives.

Richmondshire District Council currently does not have any AQMAs.

2.2 Progress and Impact of Measures to address Air Quality in Richmondshire

Richmondshire District Council has not taken specific measures during the current reporting year of 2016 in pursuit of improving local air quality however relevant plans are set out in Table 2.1.

Richmondshire District Council's priorities for the coming year are to continue monitoring in the areas which were monitored during 2015.

Table 2.1 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Comments
1	Local Plan 2012 – 2028 Core Strategy ⁷ (including Core Policy CP3 Achieving Sustainable Development)	Policy Guidance and Development Control	Other policy	Richmondshire District Council	The strategy seeks to align development and provision of services so as to minimise the need for travel.
2	Local Transport Plan 4 ⁸ (LTP4)	Policy Guidance and Development Control	Other policy	North Yorkshire County Council	One objective of the plan is: 'Environment and Climate Change – managing the adverse impact of transport on the environment'
3	Removal of small waste oil burners from the Part B permitting regime of the Environmental Permitting (England and Wales) Regulations 2010 (as amended)	Environmental Permits	Other measure through permit systems and economic instruments	Richmondshire District Council	Permits either revoked or surrendered by 6 April 2016

⁷ Richmondshire District Council, Richmondshire Local Plan 2012-2028 Core Strategy, adopted 9 December 2014 <http://www.richmondshire.gov.uk/planning/local-plan>

⁸ North Yorkshire County Council, Local Transport Plan 4, March 2016 <http://www.northyorks.gov.uk/article/30583/Local-transport-plan-four-LTP4>

2.3 PM_{2.5} – Local Authority Approach to Reducing Emissions and or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7)⁹, local authorities are expected to work towards reducing emissions and/or concentrations of PM_{2.5} (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that PM_{2.5} has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

Local Authorities in England have been requested to ‘work towards reducing emissions/concentrations of fine particulate matter (PM_{2.5})’¹⁰. No specific targets have been issued and no monitoring is currently undertaken by Richmondshire District Council. Defra has produced national PM_{2.5} modelling maps which can be accessed via <http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps> . These models indicate that levels of PM_{2.5} are generally low in Richmondshire but with higher levels along the major A1 / A1(M) route (reflecting one of the primary sources of PM_{2.5}, i.e. combustion from road traffic exhausts)¹¹.

The Public Health Outcomes summary¹² for Richmondshire (found at <http://www.apho.org.uk/resource/view.aspx?RID=50215&SEARCH=richmondshire&SPEAR>) summarises that the health of people in Richmondshire is generally better than the England average. In addition, Public Health England produce figures, as part of a Public Health Outcomes Framework (PHOF), in relation to certain health indicators (found at <https://www.gov.uk/government/publications/estimating-local-mortality-burdens-associated-with-particulate-air-pollution>). The indicator of relevance (within the context of this Annual Status Report report) is: ‘Fraction of all-cause adult mortality attributable to anthropogenic (human-made) particulate air pollution (measured as fine particulate matter, PM_{2.5})’.

The values currently available are for the period 2013. The value for the above indicator for Richmondshire is 3.7%, which is the second lowest within the Yorkshire and Humber region. The value for Yorkshire and Humber as a whole is given as 5.1% with the value for England given as 5.3%.

⁹ Defra, Local Air Quality Management Policy Guidance (PG16) April 2016

¹⁰ Defra, Local Air Quality Management Technical Guidance (TG16) April 2016, Table 1.1

¹¹ Defra, Local Air Quality Management Technical Guidance (TG16) April 2016, Section 2.67

¹² Public Health England, Health Profile 2015 Richmondshire District, June 2015

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Local authorities are expected to review any existing measures already being implemented to determine whether they are already taking positive action to reduce PM_{2.5} emissions. Measures would be developed in an Action Plan to tackle a problem with any Air Quality Management Area (AQMA). Richmondshire District Council does not currently have an AQMA (or associated Air Quality Action Plan).

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

Richmondshire District Council does not undertake automatic (continuous) monitoring.

NB. Local authorities do not have to report annually on the following pollutants: 1,3 butadiene, benzene, carbon monoxide and lead, unless local circumstances indicate there is a problem.

National monitoring results are available at <https://uk-air.defra.gov.uk/>.

3.1.2 Non-Automatic Monitoring Sites

Richmondshire District Council undertook non-automatic (passive) monitoring of NO₂ at 15 sites during 2015. Table A. in Appendix A shows the details of these sites. Maps showing the locations of the monitoring sites are provided in Figures D.1 and D.2 in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for “annualisation” and bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO₂)

Table A.2 in Appendix A describes the ratified and adjusted monitored NO₂ annual mean concentrations for the past five years. Any concentrations above the air-quality objective of 40µg/m³ are shown in bold. Graph A.3 shows the change in those concentrations over that period (excluding location **R19** for which only one year’s worth of data is currently available – data for this site is given in Table A.1).

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Table B.1 in Appendix B.

Monitoring Results Summary

The air-quality objective of $40\mu\text{g}/\text{m}^3$ was not exceeded in 2015. Additionally as there were no annual mean values greater than $60\mu\text{g}/\text{m}^3$, this indicates that the 1-hour mean objective (of $200\mu\text{g}/\text{m}^3$, not to be exceeded more than 18 times per year) is unlikely to be exceeded at these sites.

Trends

The majority of the concentrations of nitrogen dioxide measured for 2015 are lower than those recorded in 2014. However, it cannot be concluded that the 2015 figures indicate a downward trend as the figures for 2013 were also generally lower than those for 2014. Trends are better assessed where more data is available as discussed below.

Over the last five years:

- Sites **R3** (Darlington Road), **R4** (White Rose Crescent - urban background), and **R7** (Scotch Corner) seem to indicate a slight overall downward trend from 2011 to 2015.
- Site **R2** (Queens Road roundabout) seems to indicate a slight overall upward trend from 2011 to 2015.
- Site **R6** (Gatherley Moor Farm on the A66) had a significant increase from 2011 to 2013, with the figure for 2015 being similar to that recorded in 2013.

Principal focus of Monitoring

An area of narrow congested streets, road junctions and properties close to the kerb in Richmond (around the main approaches to the town centre from the north east) has been identified as a particular area of focus in relation to air quality and is therefore being monitored. The site identified with the highest reading was site **R16** (74 Frenchgate) which was reported as $40.2\mu\text{g}/\text{m}^3$ for 2014 (just above the Annual Mean Air Quality Objective of $40\mu\text{g}/\text{m}^3$) but for 2015 lies at $38.9\mu\text{g}/\text{m}^3$ and is below the objective.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
R2	Queens Road	Roadside	417180	501125	NO ₂	N	8	2	N	3
R3	Darlington Road	Roadside	418066	501490	NO ₂	N	22	1	N	3
R4	White Rose Crescent	Urban Background	418504	501455	NO ₂	N	11	2	N	3
R6	Gatherley Moor Farm	Roadside	419207	506509	NO ₂	N	0	8	N	2
R7	Scotch Corner Hotel	Roadside ⁽³⁾	421366	505261	NO ₂	N	0	22	N	3
R8	15 Queens Road	Roadside	417179	501127	NO ₂	N	7	2.5	N	3

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Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
R10	Oglethorpe	Roadside	417381	501281	NO ₂	N	1.7	1.7	N	3
R11	7 Gallowgate	Roadside	417377	501317	NO ₂	N	0	3.3	N	3
R12	1 Anchorage Hill	Roadside	417542	501275	NO ₂	N	3.5	1.8	N	3
R13	3 Maison Dieu	Roadside	417536	501258	NO ₂	N	0	1.4	N	3
R15	2 Maison Dieu	Roadside	417500	501263	NO ₂	N	0	1.7	N	3
R16	74 Frenchgate	Roadside	417451	501269	NO ₂	N	0	1.5	N	3
R17	95 Frenchgate	Roadside	417661	501297	NO ₂	N	2	1.5	N	3

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) ⁽¹⁾	Distance to kerb of nearest road (m) ⁽²⁾	Tube collocated with a Continuous Analyser?	Height (m)
R18	26 Darlington Road	Roadside	417661	501297	NO ₂	N	3.5	1.7	N	3
R19	43 Frenchgate	Roadside	417312	501037	NO ₂	N	0	2	N	3

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

(3) NB This site is too far away from the kerb to be classed officially as a 'roadside' location according to Local Air Quality Management Technical Guidance LAQM.TG(16)¹³

¹³ Defra Local Air Quality Management Technical Guidance (TG16), April 2016, Section 7.127 Table 7.7

Table A.2 – Annual Mean NO₂ Monitoring Results, 2011 - 2015

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) ⁽¹⁾	Valid Data Capture 2015 (%) ⁽²⁾	NO ₂ Annual Mean Concentration (µg/m ³) ⁽³⁾				
					2011	2012	2013	2014	2015
R2	Roadside	Diffusion Tube	100	100	25.0	26.3	25.0	30.1	26.1
R3	Roadside	Diffusion Tube	100	100	19.0	17.2	17.3	19.3	17.9
R4	Urban Background	Diffusion Tube	100	100	9	9.4	9.1	9.4	7.8
R6	Roadside	Diffusion Tube	100	100	14.0	18.3	24.5	26.5	23.8
R7	Roadside	Diffusion Tube	100	100	19.0	19.1	19.7	20.3	18.1
R8	Roadside	Diffusion Tube	100	100	-	-	-	33.4	32.7
R10	Roadside	Diffusion Tube	100	100	-	-	-	37.2	35.7
R11	Roadside	Diffusion Tube	92	92	-	-	-	38.1	37.1
R12	Roadside	Diffusion Tube	100	100	-	-	-	27.1	26.9
R13	Roadside	Diffusion Tube	100	100	-	-	-	28.2	25.9
R15	Roadside	Diffusion Tube	100	100	-	-	-	28.7	28.6
R16	Roadside	Diffusion Tube	100	100	-	-	-	40.2	38.9
R17	Roadside	Diffusion Tube	92	92	-	-	-	32.8	28.1
R18	Roadside	Diffusion Tube	100	100	-	-	-	27.5	28.8
R19	Roadside	Diffusion Tube	92	92	-	-	-	-	25.9

Notes: Exceedances of the NO₂ annual mean objective of 40µg/m³ are shown in **bold**.

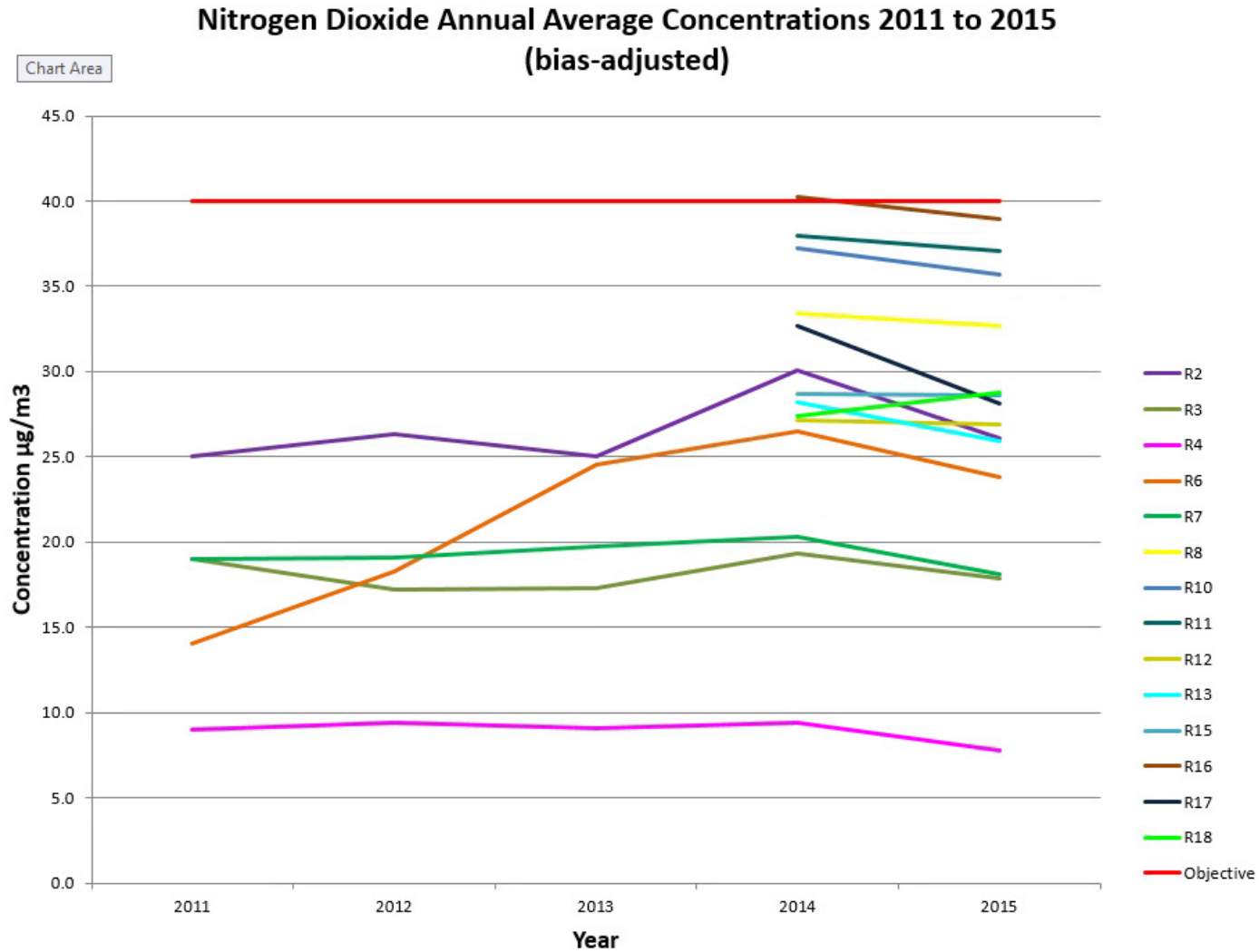
NO₂ annual means exceeding 60µg/m³, indicating a potential exceedance of the NO₂ 1-hour mean objective are shown in **bold and underlined**.

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been “annualised” as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Graph A.3 – Annual Mean NO₂ Monitoring Results



Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO₂ Monthly Diffusion Tube Results - 2015

Site ID	NO ₂ Mean Concentrations (µg/m ³)												Annual Mean	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Raw Data	Bias Adjusted ⁽¹⁾
	R2	25.4	28.4	36.7	28.9	29.4	30.5	29.2	33.4	36.3	40.6	37.9	30.6	32.3
R3	19.6	29.0	21.4	19.0	18.9	16.7	17.3	13.4	24.3	32.9	24.5	27.6	22.1	17.9
R4	8.5	9.9	14.9	8.4	6.9	5.2	6.2	4.9	7.6	15.6	12.5	15.0	9.6	7.8
R6	27.0	28.7	37.7	29.0	28.8	24.5	24.1	23.8	31.7	41	26.7	29.6	29.4	23.8
R7	19.1	24.1	32.1	23.9	18.8	15.7	19.8	18.1	21.6	31.9	21.4	21.3	22.3	18.1
R8	43.0	43.7	46.3	39.0	35.2	32	37.6	34.5	39.7	47.1	44.2	42.8	40.4	32.7
R10	49.8	52.7	50.4	43.0	41.1	34.6	40.9	38.5	43.9	50.6	42.4	41.2	44.1	35.7
R11	49.8	-	49.3	43.7	42.9	40.2	39.2	45.3	49.5	53.4	47.7	42.8	45.8	37.1
R12	35.0	35.9	38.9	26.3	22.1	23.9	26.9	28.9	33.7	49.4	38.2	39.1	33.2	26.9
R13	30.2	27.1	35.7	31.0	24.3	24.1	31.0	23.8	33.1	45.9	39.3	38.3	32.0	25.9
R15	34.9	29.2	38.4	37.1	27.5	25.8	31.0	32.9	31.9	41.4	46.0	47.6	35.3	28.6
R16	44.1	53.0	52.2	47.6	43.3	34.2	42.2	44.4	46.7	59.0	55.5	54.4	48.1	38.9
R17	29.5	30.6	38.3	29.1	30.1	30.2	37.9	35.2	37.7	-	41.5	40.9	34.6	28.1
R18	33.7	39.2	38.0	33.0	27.3	24.1	30.2	31.5	35.7	49.6	42.8	42.1	35.6	28.8
R19	-	36.0	38.6	26.7	24.5	20.6	26.4	28.9	29.9	38.6	44.5	36.9	32.0	25.9

(1) See Appendix C for details on bias adjustment

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

Diffusion Tube Bias Adjustment Factor

Before April 2015, Richmondshire District Council provided Environmental Services to Hambleton District Council. The Richmondshire and Hambleton diffusion tubes were collected and submitted together, with triplicate tubes being located at the Automatic Monitoring Site situated in Northallerton (in Hambleton District). After April 2015 this arrangement changed and the Richmondshire diffusion tubes were no longer co-located with that Automatic Monitoring Site.

Richmondshire has made use of the National bias adjustment figures. The figure used takes into account the following factors:

(i) Supplier

The diffusion tubes used in Richmondshire are supplied and analysed by Environmental Scientifics Group (ESG), Didcot, Oxfordshire.

(ii) Tube Type

The tubes used contain a mesh which is doped with 50% v/v triethanolamine (TEA) and acetone.

(iii) Results from other local authorities using the same supplier and tube type

There are systematic differences in the performance of different laboratories and preparation methods of diffusion tubes. A spreadsheet (Version Number 03/16) provided by the LAQM Helpdesk (which can be viewed at <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>) shows those figures for different local authorities using the same supplier and tube type and where diffusion tubes are co-located with automatic (continuous) monitors (where data has been collected for nine months or more).

A copy of the relevant section of the table provided by the LAQM Helpdesk is shown in Table C.1 below.

Table C.1 National Diffusion Tube Bias Adjustment Factor Spreadsheet Version 03/16

National Diffusion Tube Bias Adjustment Factor Spreadsheet				Spreadsheet Version Number: 03/16						
Follow the steps below in the correct order to show the results of relevant co-location studies Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet This spreadsheet will be updated every few months; the factors may therefore be subject to change. This should not discourage their immediate use.								This spreadsheet will be updated at the end of June 2016 LAQM Helpdesk Website		
The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.				Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.						
Step 1:	Step 2:	Step 3:	Step 4:							
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor ² shown in blue at the foot of the final column. If you have your own co-location study then see footnote ¹ . If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953							
If a laboratory is not chosen, we have no data for this laboratory.	If a preparation method is not chosen, we have no data for this method at this laboratory.	If a year is not chosen, we have no data.								
Analysed By ¹	Method ²	Year ²	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m ³)	Automatic Monitor Mean Conc. (Cm) (µg/m ³)	Bias (B)	Tube Precision ³	Bias Adjustment Factor (A) (Cm/Dm)
ESG Didcot	50% TEA in acetone	2015	R	Dumfries and Galloway Council	12	35	30	14.6%	G	0.87
ESG Didcot	50% TEA in acetone	2015	B	Gravesham Borough Council	12	40	30	34.1%	G	0.75
ESG Didcot	50% TEA in acetone	2015	B	Gravesham Borough Council	12	30	23	29.8%	P	0.77
ESG Didcot	50% TEA in acetone	2015	UI	North Lincolnshire	11	24	18	36.5%	P	0.73
ESG Didcot	50% TEA in acetone	2015	R	Swale BC	11	38	32	19.3%	P	0.84
ESG Didcot	50% TEA in acetone	2015	R	Swale BC	10	48	39	21.0%	G	0.83
ESG Didcot	50% TEA in acetone	2015	R	Swale Borough Council	11	40	34	19.7%	P	0.84
ESG Didcot	50% TEA in acetone	2015	R	Wrexham County Borough Council	12	19	19	0.6%	G	0.99
ESG Didcot	50% TEA in acetone	2015	UC	Cardiff Council	10	26	26	1.6%	G	0.98
ESG Didcot	50% TEA in acetone	2015	KS	Marblebone Road Intercomparison	12	104	81	27.9%	G	0.78
ESG Didcot	50% TEA in acetone	2015	R	Vale of White Horse District Council	11	34	29	15.7%	G	0.86
ESG Didcot	50% TEA in acetone	2015	UI	Stockton on Tees	12	24	18	29.4%	G	0.77
ESG Didcot	50% TEA in acetone	2015	R	Stockton on Tees	12	17	14	21.5%	G	0.82
ESG Didcot	50% TEA in acetone	2015	KS	Suffolk Coastal DC	12	44	35	26.0%	P	0.79
ESG Didcot	50% TEA in acetone	2015	SU	Thanet District Council	9	17	15	10.6%	G	0.90
ESG Didcot	50% TEA in acetone	2015	R	Thanet District Council	12	27	23	17.8%	G	0.85
ESG Didcot	50% TEA in acetone	2015	B	Medway Council	12	21	12	77.3%	G	0.56
ESG Didcot	50% TEA in acetone	2015	R	Medway Council	11	32	23	42.6%	G	0.70
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	10	34	28	21.2%	P	0.83
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	11	39	28	38.6%	G	0.72
ESG Didcot	50% TEA in acetone	2015	R	North East Lincolnshire Council	11	55	47	16.2%	G	0.86
ESG Didcot	50% TEA in acetone	2015		Overall Factor² (21 studies)					Use	0.81

Summary

For supplier ‘ESG Didcot’ and for tube type ‘50% TEA in acetone’ (ie the same lab and tube type as used in Richmondshire) there were 21 co-location studies submitted by other local authorities for 2015 (at the time the spreadsheet was accessed).

For this group an overall bias adjustment factor of **0.81** was reported.

This figure has been used to adjust the figures obtained from the tubes in Richmondshire in 2015.

QA/QC of Diffusion Tube Monitoring

Tubes are exposed according to the monthly schedule supplied available on the LAQM Helpdesk (<http://laqm.defra.gov.uk/diffusion-tubes/data-entry.html>).

Tube precision

The LAQM Helpdesk indicates that *'Diffusion tube precision can be described as the ability of a measurement to be consistently reproduced, i.e. how similar the results of duplicate or triplicate tubes are to each other.'* A spreadsheet of diffusion tube co-location results, published by the Helpdesk, *'contains information on the precision of diffusion tubes'*. The tubes are classified as having either 'good' or 'poor' precision. The helpdesk states *'The distinction between "good" and "poor" precision is an indicator of how well the same measurement can be reproduced. This precision will reflect the laboratory's performance/consistency in preparing and analysing the tubes, as well as the subsequent handling of the tubes in the field. Any laboratory can show "poor" precision for a particular period/co-location study, if this is due to poor handling of the tubes in the field.'*

The tube precision results for the same laboratory and tube type as used by Richmondshire are shown in a column of the spreadsheet (Version Number 03/16) provided by the LAQM Helpdesk and replicated in Table C.1 above. Around three quarters of the results are shown as 'good'.

A summary of the current QA/QC arrangements applied to the diffusion tube supplier is provided in Table C.2.

Table C.2 Summary of Nitrogen Dioxide Diffusion Tube Monitoring QA/QC relating to Richmondshire

Supplier and analyst	Environmental Scientifics Group (ESG)
Tube precision	Majority classed as 'Good'
AIR NO₂ PT Scheme	Yes ESG participates
Current Rating:	'Satisfactory'
Method accreditation:	UKAS
Conforms to harmonisation Practical Guidance*:	Yes

* Harmonisation Practical Guidance 'Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users'¹⁴.

AIR NO₂ PT Scheme

Environmental Scientifics Group (ESG), Didcot, Oxfordshire is a participant of AIR NO₂ PT Scheme.

AIR is an independent analytical proficiency-testing (PT) scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014 and incorporates the previous proficiency testing scheme 'WASP' (Workplace Analysis Scheme for Proficiency).

The laboratory is rated the top rating of 'Satisfactory' under the AIR NO₂ PT Scheme for the most recent rounds of testing (AIR PT Rounds 1-12 (Apr 2014 – Feb 2016)). A copy of the summary table is replicated in Table C.3 with further information available at <http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html>)

¹⁴ AEA Energy and Environment, Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users, February 2008

Table C.3 Summary of Laboratory performance in AIR NO₂ Proficiency Testing Scheme (April 2014 – February 2016)

Table 1: Laboratory summary performance for AIR NO₂ PT rounds AR001, 3, 4, 6, 7, 9, 10 and 12

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO₂ PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of $\leq \pm 2$ as defined above.

AIR PT Round	AR001	AR003	AR004	AR006	AR007	AR009	AR010	AR012
Round conducted in the period	April – May 2014	July – August 2014	October – November 2014	January – February 2015	April – May 2015	July – August 2015	October – November 2015	January – February 2016
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	100 %	75 %	100 %	100 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	100 %	100 %	75 %	100 %	100 %	100 %	100 %
Environmental Services Group, Didcot [1]	100 %	100 %	100 %	87.5 %	100 %	100 %	100 %	100 %
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	75 %
Gradko International [1]	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	100 %	100 %	100 %	75 %	100 %	100 %	100 %	100 %
Lambeth Scientific Services	50 %	100 %	100 %	25 %	100 %	100 %	100 %	100 %
Milton Keynes Council	100 %	100 %	75 %	100 %	100 %	100 %	100 %	50 %
Northampton Borough Council	100 %	0 %	0 %	100 %	100 %	100 %	100 %	50 %
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	100 %	100 %	100 %	75 %	100 %
Staffordshire County Council	100 %	25 %	100 %	100 %	100 %	75 %	75 %	75 %
Tayside Scientific Services (formerly Dundee CC)	NR [2]	100 %	100 %	100 %	NR [2]	NR [2]	NR [2]	100 %
West Yorkshire Analytical Services	75 %	100 %	75 %	100 %	75 %	75 %	75 %	75 %

[1] Participant subscribed to two sets of test samples (2 x 4 test samples) in each AIR PT round.

[2] NR No results reported

[3] Kent Scientific Services, Cardiff Scientific Services and Exova (formerly Clyde Analytical) no longer carry out NO₂ diffusion tube monitoring and therefore did not submit results.

Appendix D: Maps of Monitoring Locations

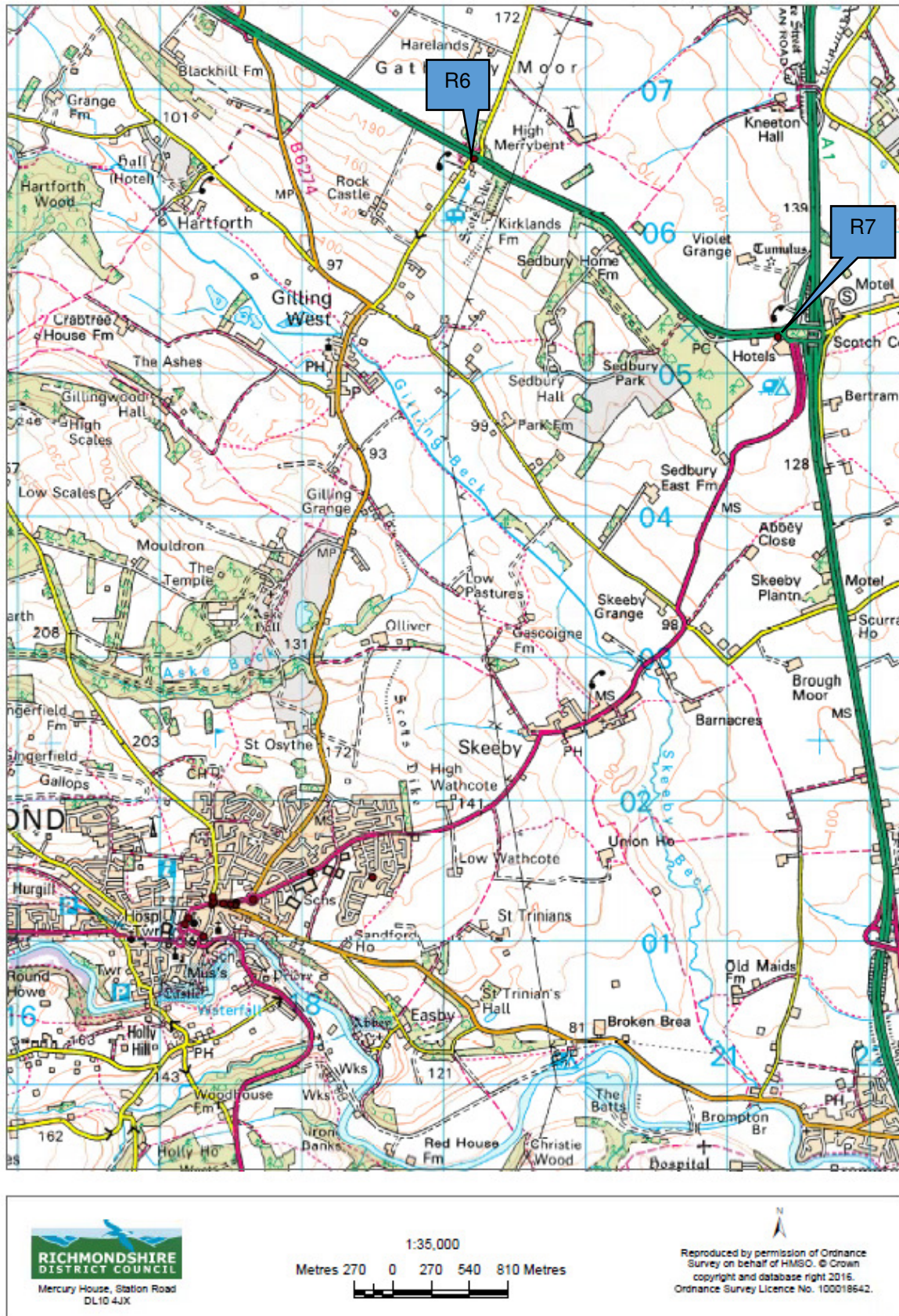


Figure D.1 Location of Diffusion Tubes along the A66 Trunk Road

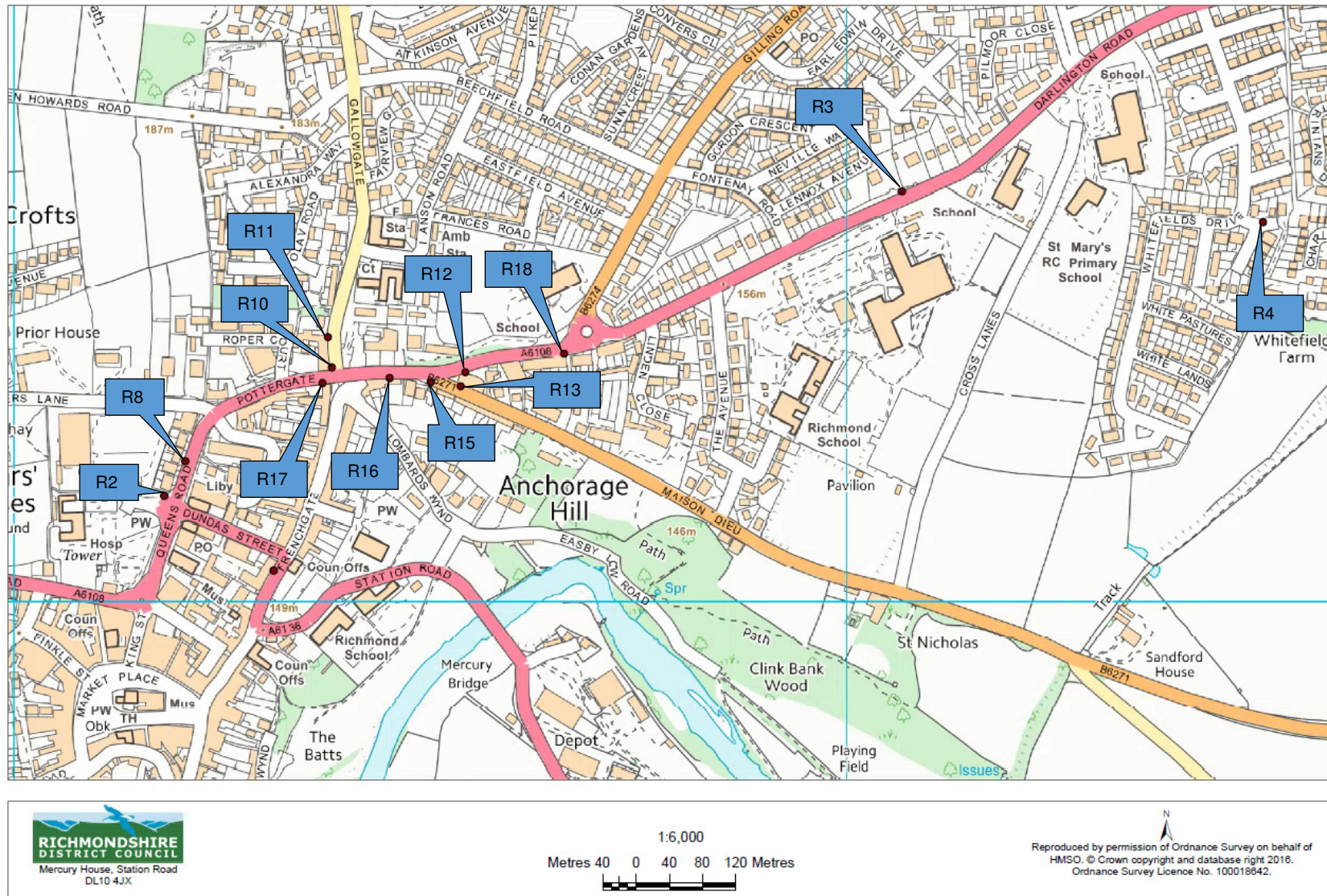


Figure D.2 Location of Diffusion Tubes in Richmond

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective ⁽¹⁾	
	Concentration	Measured as
Nitrogen Dioxide (NO ₂)	200 µg/m ³ not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m ³	Annual mean
Particulate Matter (PM ₁₀)	50 µg/m ³ , not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m ³	Annual mean
Sulphur Dioxide (SO ₂)	350 µg/m ³ , not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m ³ , not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m ³ , not to be exceeded more than 35 times a year	15-minute mean

(1) The units are in microgrammes of pollutant per cubic metre of air (µg/m³).

Glossary of Terms

Abbreviation	Description
AEI	Average Exposure Indicator
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
ESG	Environmental Scientifics Group
EU	European Union
HSL	Health and Safety Laboratory
LAQM	Local Air Quality Management
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
PHOF	Public Health Outcomes Framework
PM ₁₀	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
PM _{2.5}	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
PT	Proficiency Testing
QA/QC	Quality Assurance and Quality Control
RDC	Richmondshire District Council
SO ₂	Sulphur Dioxide
TEA	Triethanolamine
WASP	Workplace Analysis Scheme for Proficiency

References

- AEA Energy and Environment, Diffusion Tubes for Ambient NO₂ Monitoring: Practical Guidance for Laboratories and Users, February 2008
- Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
- Environmental equity, air quality, socioeconomic status and respiratory health, 2010
- Defra. Abatement cost guidance for valuing changes in air quality, May 2013
- Defra Local Air Quality Management Policy Guidance (PG16), April 2016
- Defra Local Air Quality Management Technical Guidance (TG16), April 2016
- Public Health England, Health Profile 2015 Richmondshire District, June 2015
- Richmondshire District Council, Richmondshire Local Plan 2012-2028 Core Strategy, adopted 9 December