



London Air Quality Network Summary Report 2017

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King's College London

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1 Introduction

This report details the results of air pollution measurements made on the London Air Quality Network during 2017. Measurements have been presented with specific reference to the UK Air Quality Strategy (AQS) Objectives and the EU Limit Values.

The London Air Quality Network (LAQN) is a unique resource, providing robust air pollution measurements that are essential to underpin air quality management and health studies. The public face of the network, the LondonAir web site (www.londonair.org.uk), is visited by thousands of Londoners seeking hourly updated air pollution information.

The LAQN was formed in 1993 to coordinate and improve air pollution monitoring in London. The majority of London's 33 boroughs supply measurements to the network with additional measurements from local authorities surrounding London, thereby providing an overall perspective of air pollution in London and the Home Counties.

The LAQN is operated and managed by the Environmental Research Group (ERG) at King's College London. QA/QC audits are carried out by the National Physical Laboratory (NPL). Each borough funds air quality monitoring in its own area. The Department of Environment, Food and Rural Affairs (Defra) funds King's to operate the Marylebone Road site and to maintain several of the LAQN sites as affiliate sites to the UK Automatic Urban and Rural Network (AURN). This Defra support assists the operation of the overall LAQN. Analysis of LAQN measurements has been augmented by measurements from directly-funded Defra sites in London. Measurements from Defra sites were provided by Ricardo Energy and Environment from the National Air Quality Archive and were included within the LAQN database. Transport for London has also funded monitoring to help assess the air pollution impacts of the Congestion Charging Scheme and Low Emission Zone and some sites have been funded by Business Improvement Districts (BIDs) in London .

2 Air quality Strategy Objectives and EU Limit Values

There is ample evidence of the adverse health effects caused by air pollution (WHO, 2006). In response to these health impacts, the Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland (Defra, 2008) sets out the UK’s way forward on air quality issues, details objectives to be achieved, and proposes measures to help reach them. These UK objectives largely reflect EU Limit Values (EC, 2008). The GLA and the London boroughs and district councils outside the capital have responsibilities for the management of air quality and must work towards the attainment of AQS objectives. The AQS Objectives and EU Limit Values are detailed in Table 1. Monitoring progress towards the attainment of these Objectives and Limit Values forms a core activity for the LAQN.

Pollutant	Concentration	Measured as	To be achieved by (UK)	To be achieved by (EU)
Carbon Monoxide (CO)	10.0 mg m ⁻³	Maximum daily running 8-hour mean	31 December 2003	1 January 2005
Nitrogen Dioxide (NO ₂)	200 µg m ⁻³ not to be exceeded more than 18 times a year	1-hour mean	31 December 2005	1 January 2010
Sulphur dioxide (SO ₂)	40 µg m ⁻³	Annual mean	31 December 2005	1 January 2010
	350 µg m ⁻³ , not to be exceeded more than 24 times a year	1-hour mean	31 December 2005	n/a
	125 µg m ⁻³ , not to be exceeded more than 3 times a year	24-hour mean	31 December 2004	1 January 2005
Ozone (O ₃)	266 µg m ⁻³ , not to be exceeded more than 35 times a year	15-minute mean	31 December 2005	1 January 2005
	100 µg m ⁻³ not to be exceeded more than 10 times a year	8 hourly running or hourly mean	31 December 2005	n/a
	Target of 120 µg/m ³ not to be exceeded more than 25 times a year averaged over 3 years		n/a	31 December 2010
Particles (PM ₁₀) (gravimetric)	50 µg m ⁻³ , not to be exceeded more than 35 times a year	Daily mean	31 December 2004	1 January 2005
Particles (PM _{2.5}) (gravimetric)	40 µg m ⁻³	Annual mean	31 December 2004	1 January 2005
	25 µg m ⁻³	Annual mean	2020	1 January 2015
	20% cut in urban background exposure	Annual mean	2010 - 2020	2010 - 2020

Table 1: AQS Objectives and EU Limit Values.

3 Results

The AQS Objective results measured at LAQN sites during 2017 are detailed in Tables 2 to 8.

Key to site types:

RU	=	Rural
S	=	Suburban
U	=	Urban background
R	=	Roadside
K	=	Kerbside
I	=	Industrial

Key to network and funding status

AA	=	Affiliated to UK AURN. Final data set published by DEFRA
A	=	AURN DEFRA funded. Final data set published by DEFRA
T	=	TfL funded
O	=	Other non local authority funding (annotated in brackets after site name)

All other instruments are funded by the respective local authorities

3.1 Carbon Monoxide

Site Name	Type	Capture Rate (%)	No occurrences of rolling 8hr mean $\geq 10\text{mgm}^{-3}$ (8.6ppm)	Achieved?
Kensington and Chelsea - North Ken ^{AA}	U	99	0	yes
Westminster - Marylebone Road ^{AA}	K	72	0	n/a

Table 2: AQS Objective results for CO

Summary

- All sites achieved the CO rolling 8 hourly mean objective.
- Large reductions in CO over last 20 years with the introduction of catalytic converters on petrol vehicles.
- Small number of sites still measuring CO.

3.2 Nitrogen Dioxide

Site Name	Type	Capture Rate (%)	Annual Mean ≤ 40 ug ^m - ³	Annual Mean Achieved?	No more than 18 occurrences of hourly mean > 200ug ^m - ³ (104.7ppb)	Hourly Mean Achieved?
Barking and Dagenham - Rush Green	S	93	24	yes	0	yes
Barking and Dagenham - Scrattons Farm	S	93	29	yes	0	yes
Bexley - Belvedere	S	98	28	yes	0	yes
Bexley - Belvedere West	U	98	21	yes	0	yes
Bexley - Slade Green ^{AA}	S	95	25	yes	0	yes
Brent - ARK Franklin Primary Academy	R	14	54	n/a	0	n/a
Brent - Ikea	R	87	72	n/a	33	no
Brent - John Keble Primary School	R	100	45	no	0	yes
Brent - Neasden Lane	I	97	45	no	17	yes
Brentwood - Brentwood Town Hall	U	83	22	n/a	0	n/a
Camden – Bloomsbury ^A	U	99	38	yes	0	yes
Camden - Euston Road	R	99	83	no	25	no
Camden - Holborn (Bee Midtown BID) ^O	K	88	74	n/a	10	n/a
Camden - Swiss Cottage ^{AA}	K	91	53	no	1	yes
Castle Point - Hadleigh	R	99	26	yes	0	yes
City of London - Beech Street	R	99	80	no	67	no
City of London - Sir John Cass School	U	99	38	yes	0	yes
City of London - Walbrook Wharf	R	97	92	no	126	no
Croydon - Norbury	K	100	43	no	0	yes
Croydon - Park Lane	R	100	46	no	2	yes
Croydon - Purley Way A23	R	99	31	yes	0	yes
Ealing - Acton Vale	U	11	40	n/a	0	n/a
Ealing - Hanger Lane Gyrotory	R	97	72	no	8	yes
Ealing - Horn Lane	I	95	44	no	2	yes
Ealing - Western Avenue	R	79	51	n/a	0	n/a
Enfield - Bowes Primary School	R	87	44	n/a	3	n/a
Enfield - Bush Hill Park	S	99	26	yes	0	yes
Enfield - Derby Road	R	99	38	yes	0	yes
Enfield - Prince of Wales School	U	99	23	yes	0	yes
Greenwich - A206 Burrage Grove	R	100	35	yes	0	yes
Greenwich - Blackheath	R	100	38	yes	0	yes
Greenwich – Eltham ^{AA}	S	97	19	yes	0	yes
Greenwich - Falconwood	R	97	40	yes	1	yes
Greenwich - Fiveways Sidcup Rd A20	R	98	41	no	0	yes
Greenwich - Plumstead High Street	R	99	34	yes	0	yes
Greenwich - Trafalgar Road (Hoskins St)	R	21	51	n/a	0	n/a
Greenwich - Westthorne Avenue	R	97	39	yes	2	yes
Greenwich - Woolwich Flyover	R	92	65	no	7	yes
Hackney - Old Street	R	99	57	no	0	yes
Hammersmith and Fulham - Shepherds Bush	R	81	74	n/a	14	n/a

Site Name	Type	Capture Rate (%)	Annual Mean <= 40 ug ^m - ³	Annual Mean Achieved?	No more than 18 occurrences of hourly mean > 200ug ^m - ³ (104.7ppb)	Hourly Mean Achieved?
Haringey - Priory Park South ^{AA}	U	100	24	yes	0	yes
Haringey - Haringey Town Hall ^{AA}	R	99	40	yes	5	yes
Harrow - Pinner Road	R	97	41	no	5	yes
Harrow - Stanmore	U	32	33	n/a	0	n/a
Havering - Rainham	R	100	34	yes	0	yes
Havering - Romford	R	85	40	n/a	1	n/a
Islington - Arsenal	U	95	31	yes	1	yes
Islington - Holloway Road	R	91	49	no	0	yes
Kensington and Chelsea - Cromwell Road	R	80	50	n/a	0	n/a
Kensington and Chelsea - Earls Court Rd	K	82	77	n/a	17	n/a
Kensington and Chelsea - Kings Road	R	80	63	n/a	4	n/a
Kensington and Chelsea - Knightsbridge	R	79	66	n/a	80	no
Kensington and Chelsea - North Ken ^{AA}	U	100	33	yes	1	yes
Kingston Upon Thames - Tolworth Broadway	R	100	49	no	7	yes
Lambeth - Bondway Interchange	I	80	65	n/a	0	n/a
Lambeth - Brixton Road	K	98	95	no	75	no
Lambeth - Streatham Green	U	84	29	n/a	0	n/a
Lewisham - Catford	U	100	43	no	0	yes
Lewisham - Loampit Vale	R	100	54	no	4	yes
Lewisham - New Cross	R	87	49	n/a	0	n/a
Merton - Morden Civic Centre 2	R	26	47	n/a	0	n/a
Redbridge - Gardner Close	R	91	39	yes	0	yes
Redbridge - Ley Street	U	99	30	yes	0	yes
Reigate and Banstead - Horley	S	98	20	yes	0	yes
Reigate and Banstead - Horley South East	S	99	27	yes	0	yes
Reigate and Banstead - Poles Lane	RU	99	14	yes	0	yes
Richmond Upon Thames - Barnes Wetlands	S	100	21	yes	0	yes
Richmond Upon Thames - Castelnau	R	99	31	yes	0	yes
Richmond Upon Thames - Chertsey Road high level	R	84	37	n/a	0	n/a
Richmond Upon Thames - Chertsey Road low level	R	85	38	n/a	0	n/a
Sevenoaks - Bat and Ball	R	93	28	yes	0	yes
Sevenoaks - Greatness Park	U	73	16	n/a	0	n/a
Southwark - A2 Old Kent Road ^{AA}	R	97	42	no	0	yes
Southwark - Elephant and Castle	U	97	34	yes	0	yes
Sutton - Beddington Lane	I	95	25	yes	0	yes
Sutton - Beddington Lane north	I	98	32	yes	0	yes
Sutton - Wallington	K	94	53	no	1	yes
Sutton - Worcester Park	K	100	52	no	11	yes
Thurrock - Calcutta Road Tilbury	R	97	34	yes	0	yes
Thurrock - London Road (Grays) ^A	U	98	28	yes	0	yes

Site Name	Type	Capture Rate (%)	Annual Mean <= 40 $\mu\text{g}\text{m}^{-3}$	Annual Mean Achieved?	No more than 18 occurrences of hourly mean > 200 $\mu\text{g}\text{m}^{-3}$ (104.7ppb)	Hourly Mean Achieved?
Thurrock - London Road (Purfleet)	R	98	52	no	1	yes
Thurrock - Stanford-le-Hope ^{AA}	R	99	28	yes	0	yes
Tower Hamlets – Blackwall ^T	R	97	56	no	0	yes
Tower Hamlets - Mile End Road ^{AA}	R	99	48	no	2	yes
Wandsworth - Battersea	R	81	33	n/a	0	n/a
Wandsworth - Lavender Hill (Clapham Jct)	R	92	43	no	0	yes
Wandsworth - Putney	U	79	31	n/a	7	n/a
Wandsworth - Putney High Street	K	77	76	n/a	76	no
Wandsworth - Putney High Street Facade	R	98	60	no	9	yes
Wandsworth - Tooting High Street	R	86	55	n/a	0	n/a
Wandsworth - Wandsworth Town Hall	U	97	40	yes	0	yes
Westminster - Covent Garden	U	41	38	n/a	0	n/a
Westminster - Horseferry Road ^A	U	83	36	n/a	0	n/a
Westminster - Marylebone Road ^{AA}	K	99	84	no	38	no
Westminster - Oxford Street	K	98	72	no	1	yes
Westminster - Strand (Northbank BID) ^O	R	87	92	n/a	26	no
Westminster - Victoria (Victoria BID) ^O	R	64	65	n/a	2	n/a
Windsor and Maidenhead - Aldebury Road	U	98	18	yes	0	yes
Windsor and Maidenhead - Clarence Road	R	96	34	yes	3	yes
Windsor and Maidenhead - Frascati Way	R	99	38	yes	0	yes

Table 3: AQS Objective results for NO₂

NO₂ ppbV measurements have been converted to $\mu\text{g}\text{m}^{-3}$ by multiplying by 1.9125 as recommended in Defra’s Local Air Quality Management Technical Guidance (Defra, 2016).

Summary

- 70 sites achieved the 90% data capture requirement.
- 41 of these sites achieved the annual mean objective for nitrogen dioxide (NO₂) of 40 $\mu\text{g}\text{m}^{-3}$.
- 29 of the 70 sites did not achieve the annual mean objective.
- 5 sites recorded an annual mean of twice the legal limit or above.
- 65 sites achieved the hourly mean objective of no more than 18 occurrences of an hourly mean greater than 200 $\mu\text{g}\text{m}^{-3}$.
- 5 sites exceeded the hourly mean objective for NO₂.
- One site measured more than 100 hours with mean NO₂ greater than 200 $\mu\text{g}\text{m}^{-3}$.
- This is a significant improvement compared to 2016. A smaller proportion of sites exceeded the annual mean objective (less than half exceeded the objective in 2017 (41%) compared to 55% in 2016) and fewer sites exceeded the hourly mean objective (5 sites in 2017 compared to 24 sites in 2016). The number of hourly exceedences fell at many sites. However, both objectives were still exceeded in several locations, in some cases by a large margin, so further improvements are needed.
- The main source of NO₂ in London is diesel traffic emissions.

3.3 Nitrogen Oxides

Site Name	Type	Capture Rate (%)	Annual Mean NO _x as NO ₂ µg m ⁻³
Barking and Dagenham - Rush Green	S	93	41
Barking and Dagenham - Scrattons Farm	S	93	51
Bexley - Belvedere	S	98	42
Bexley - Belvedere West	U	98	33
Bexley - Slade Green ^A	S	95	40
Brent - ARK Franklin Primary Academy	R	14	135
Brent - Ikea	R	87	220
Brent - John Keble Primary School	R	100	90
Brent - Neasden Lane	I	97	104
Brentwood - Brentwood Town Hall	U	83	30
Camden - Bloomsbury ^A	U	99	61
Camden - Euston Road	R	99	263
Camden - Holborn (Bee Midtown)	K	88	190
Camden - Swiss Cottage ^{AA}	K	91	140
Castle Point - Hadleigh	R	99	42
City of London - Beech Street	R	99	283
City of London - Sir John Cass School	U	99	61
City of London - Walbrook Wharf	R	97	274
Croydon - Norbury	K	100	127
Croydon - Park Lane	R	100	125
Croydon - Purley Way A23	R	99	79
Ealing - Acton Vale	U	11	70
Ealing - Hanger Lane Gyratory	R	97	278
Ealing - Horn Lane	I	95	103
Ealing - Western Avenue	R	79	123
Enfield - Bowes Primary School	R	87	111
Enfield - Bush Hill Park	S	99	43
Enfield - Derby Road	R	99	91
Enfield - Prince of Wales School	U	99	48
Greenwich - A206 Burrage Grove	R	100	62
Greenwich - Blackheath	R	100	83
Greenwich - Eltham ^{AA}	S	97	30
Greenwich - Falconwood	R	97	85
Greenwich - Fiveways Sidcup Rd A20	R	98	108
Greenwich - Plumstead High Street	R	99	71
Greenwich - Trafalgar Road (Hoskins St)	R	21	134
Greenwich - Westthorne Avenue	R	97	87
Greenwich - Woolwich Flyover	R	92	215
Hackney - Old Street	R	99	137
Hammersmith and Fulham - Shepherds Bush	R	81	187
Haringey - Priory Park South ^{AA}	U	100	38
Haringey - Haringey Town Hall ^{AA}	R	99	84

Site Name	Type	Capture Rate (%)	Annual Mean NO _x as NO ₂ ugm ⁻³
Harrow - Pinner Road	R	97	99
Harrow - Stanmore	U	32	53
Havering - Rainham	R	100	71
Havering - Romford	R	85	90
Hillingdon - Harlington	U	100	58
Hillingdon - Keats Way	S	99	111
Islington - Arsenal	U	95	48
Islington - Holloway Road	R	91	128
Kensington and Chelsea - Cromwell Road	R	80	100
Kensington and Chelsea - Earls Court Rd	K	82	243
Kensington and Chelsea - Kings Road	R	80	151
Kensington and Chelsea - Knightsbridge	R	79	161
Kensington and Chelsea - North Ken ^{AA}	U	100	51
Kingston Upon Thames - Tolworth Broadway	R	100	120
Lambeth - Bondway Interchange	I	80	164
Lambeth - Brixton Road	K	98	291
Lambeth - Streatham Green	U	84	55
Lewisham - Catford	U	100	88
Lewisham - Loampit Vale	R	100	143
Lewisham - New Cross	R	87	133
Merton - Morden Civic Centre 2	R	26	130
Redbridge - Gardner Close	R	91	77
Redbridge - Ley Street	U	99	58
Reigate and Banstead - Horley ^{AA}	S	98	34
Reigate and Banstead - Horley South East	S	99	46
Reigate and Banstead - Poles Lane	RU	99	19
Richmond Upon Thames - Barnes Wetlands	S	100	34
Richmond Upon Thames - Castelnau	R	99	67
Richmond Upon Thames - Chertsey Road high level	R	84	90
Richmond Upon Thames - Chertsey Road low level	R	85	82
Sevenoaks - Bat and Ball	R	93	64
Sevenoaks - Greatness Park	U	73	25
Southwark - A2 Old Kent Road	R	97	94
Southwark - Elephant and Castle	U	97	52
Sutton - Beddington Lane	I	95	48
Sutton - Beddington Lane north	I	98	71
Sutton - Wallington	K	94	143
Sutton - Worcester Park	K	100	136
Thurrock - Calcutta Road Tilbury	R	97	66
Thurrock - London Road (Grays) ^A	U	98	50
Thurrock - London Road (Purfleet)	R	98	165
Thurrock - Stanford-le-Hope ^{AA}	R	99	57
Tower Hamlets – Blackwall ^T	R	97	140
Tower Hamlets - Mile End Road ^{AA}	R	99	107
Wandsworth - Battersea	R	81	71
Wandsworth - Lavender Hill (Clapham Jct)	R	92	102

Site Name	Type	Capture Rate (%)	Annual Mean NO _x as NO ₂ µg ^m ⁻³
Wandsworth - Putney	U	79	50
Wandsworth - Putney High Street	K	77	204
Wandsworth - Putney High Street Facade	R	98	164
Wandsworth - Tooting High Street	R	86	132
Wandsworth - Wandsworth Town Hall	U	97	80
Westminster - Covent Garden	U	41	59
Westminster - Horseferry Road ^A	U	83	53
Westminster - Marylebone Road ^{AA}	K	99	286
Westminster - Oxford Street	K	98	243
Westminster - Strand (Northbank BID)	R	87	268
Westminster - Victoria (Victoria BID)	R	64	146
Windsor and Maidenhead - Aldebury Road	U	98	32
Windsor and Maidenhead - Clarence Road	R	96	76
Windsor and Maidenhead - Frascati Way	R	99	90

Table 4: Annual Mean values for NO_x

NO_x ppbV measurements have been converted to µg^m⁻³ by multiplying by 1.9125 as recommended in Defra's Local Air Quality Management Technical Guidance (Defra, 2016).

3.4 Ozone

Site Name	Type	Capture Rate (%)	No more than 10 days where maximum rolling 8hr mean $\geq 100 \mu\text{g m}^{-3}$ (50ppb)	Achieved?
Bexley - Belvedere West	U	91	12	no
Bexley - Slade Green	S	82	10	n/a
Brent – Ikea ^T	R	98	0	yes
Camden - Bloomsbury ^A	U	99	4	yes
Greenwich - Eltham ^{AA}	S	99	7	yes
Greenwich - Falconwood	R	100	1	yes
Greenwich - Plumstead High Street	R	100	0	yes
Greenwich - Westhorpe Avenue ^T	R	97	0	yes
Greenwich - Woolwich Flyover ^T	R	94	0	yes
Hackney - Old Street ^T	R	60	3	n/a
Haringey - Priory Park South ^{AA}	U	100	11	no
Kensington and Chelsea - North Ken ^{AA}	U	99	8	yes
Redbridge - Ley Street	U	78	9	n/a
Reigate and Banstead - Poles Lane	RU	96	15	no
Richmond Upon Thames - Barnes Wetlands	S	100	13	no
Sevenoaks - Greatness Park	U	74	16	no
Southwark - Elephant and Castle	U	99	0	yes
Thurrock - London Road (Grays) ^A	U	93	2	yes
Tower Hamlets – Blackwall ^T	R	92	0	yes
Wandsworth - Wandsworth Town Hall	U	45	0	n/a
Westminster - Marylebone Road ^{AA}	K	98	0	yes

Table 5: AQS Objective results for O₃

O₃ ppbV measurements have been converted to $\mu\text{g m}^{-3}$ by multiplying by 1.9957.

Summary

- 12 sites out of 16 which achieved the 90% data capture requirement achieved the 8 hourly mean AQS objective for O₃ of no more than ten days measuring a daily mean greater than or equal to $100\mu\text{g m}^{-3}$.
- Four sites did not achieve the objective, including three in urban background or suburban locations in London and one rural site in Surrey. This is an increase in sites exceeding the objective compared to 2016, particularly in London. There were also more exceedance days at most sites which did achieve the objective compared to 2016.
- O₃ is a regional pollutant. It is greater away from busy roads as it is scavenged by NO_x from traffic. The higher number of exceedance days across London could be partly a result of the reduction in NO_x concentrations.

3.5 Sulphur Dioxide

Site Name	Type	Capture Rate (%)	No more than 35 occurrences of 15min mean $\geq 350 \mu\text{g m}^{-3}$ (100ppb)	Achieved?
Barking and Dagenham - Rush Green	S	91	0	yes
Bexley - Slade Green	S	75	0	n/a
Camden - Bloomsbury ^A	U	85	0	n/a
Enfield - Derby Road	R	99	0	yes
Greenwich - Eltham	S	23	0	n/a
Kensington and Chelsea - North Ken ^{AA}	U	90	0	yes
Lambeth - Bondway Interchange	I	94	0	yes
Thurrock - London Road (Grays) ^A	U	97	0	yes
Westminster - Marylebone Road ^{AA}	K	99	0	yes

Table 6: AQS Objective results for SO₂

SO₂ ppbV measurements have been converted to $\mu\text{g m}^{-3}$ by multiplying by 2.6609 as recommended in Defra's Local Air Quality Management Technical Guidance (Defra, 2016).

Summary

- All six sites that achieved the 90% data capture requirement achieved the AQS objective of no more than 35 occurrences of 15 minute mean greater than 350 $\mu\text{g m}^{-3}$ for SO₂.
- No 15 minute mean SO₂ measurements greater than 350 $\mu\text{g m}^{-3}$ were recorded at any LAQN site.
- The 15 minute mean objective is the most stringent of the current AQS objectives for SO₂.
- The WHO Guidelines (WHO, 2006) recommended a significant reduction in the maximum daily mean concentration from the current 125 $\mu\text{g m}^{-3}$ to an eventual 20 $\mu\text{g m}^{-3}$. Two sites exceeded this target in 2017.

3.6 Particulate Matter PM₁₀

Site Name	Type	Capture Rate (%)	Annual Mean <= 40 ug ^m - ³	Annual Mean Achieved?	No more than 35 occurrences of daily mean >= 50ug ^m - ³	Daily Mean Achieved?
Barking and Dagenham - Scrattons Farm	S	98	19	yes	4	yes
Bexley – Belvedere TEOM	S	97	14	yes	0	yes
Bexley - Belvedere FDMS	S	99	17	yes	7	yes
Bexley - Belvedere West	U	95	17	yes	2	yes
Bexley - Belvedere West FDMS	U	95	15	yes	3	yes
Bexley - Slade Green	S	99	17	yes	3	yes
Brent - ARK Franklin Primary Academy	R	12	19	n/a	0	n/a
Brent - Ikea	R	92	33	yes	41	no
Brent - John Keble Primary School	R	98	20	yes	5	yes
Brent - Neasden Lane	I	99	27	yes	18	yes
Camden - Bloomsbury ^A	U	95	19	yes	6	yes
Camden - Euston Road	R	89	20	n/a	3	n/a
Camden - Swiss Cottage ^{AA}	K	89	20	n/a	8	n/a
City of London - Beech Street	R	92	23	yes	8	yes
City of London - Sir John Cass School	U	99	23	yes	8	yes
City of London - Upper Thames Street	R	99	32	yes	30	yes
Croydon - Park Lane	R	89	20	n/a	4	n/a
Ealing - Hanger Lane Gyratory	R	97	26	yes	10	yes
Ealing - Horn Lane FDMS ^{AA}	I	96	27	yes	15	yes
Ealing - Horn Lane TEOM	I	97	26	yes	10	yes
Ealing - Western Avenue	R	91	26	yes	9	yes
Enfield - Bowes Primary School	R	97	19	yes	9	yes
Greenwich - A206 Burrage Grove	R	99	18	yes	8	yes
Greenwich - Blackheath	R	98	23	yes	15	yes
Greenwich - Eltham	S	90	19	n/a	4	n/a
Greenwich - Falconwood	R	98	20	yes	12	yes
Greenwich - Fiveways Sidcup Rd A20	R	54	21	n/a	1	n/a
Greenwich - Plumstead High Street	R	86	20	n/a	7	n/a
Greenwich - Trafalgar Road (Hoskins St)	R	22	23	n/a	0	n/a
Greenwich - Westthorne Avenue	R	97	21	yes	16	yes
Greenwich - Woolwich Flyover	R	94	25	yes	9	yes
Hackney - Old Street ^T	R	99	19	yes	1	yes
Hammersmith and Fulham - Shepherds Bush	R	81	27	n/a	10	n/a
Harrow - Pinner Road	R	87	20	n/a	6	n/a
Harrow - Stanmore	U	30	19	n/a	3	n/a
Havering - Rainham	R	85	18	n/a	4	n/a
Havering - Romford	R	73	20	n/a	5	n/a
Islington - Arsenal	U	99	18	yes	3	yes
Islington - Holloway Road	R	99	21	yes	6	yes
Kensington and Chelsea - Cromwell Road	R	79	21	n/a	6	n/a
Kensington and Chelsea - Earls Court Rd	K	74	27	n/a	18	n/a

Site Name	Type	Capture Rate (%)	Annual Mean <= 40 ug ^m - ³	Annual Mean Achieved?	No more than 35 occurrences of daily mean >= 50ug ^m - ³	Daily Mean Achieved?
Kensington and Chelsea - North Ken FDMS ^{AA}	U	86	17	n/a	1	n/a
Kensington and Chelsea - North Ken FIDAS	U	47	12	n/a	0	n/a
Kingston Upon Thames - Tolworth Broadway	R	97	23	yes	5	yes
Lambeth - Bondway Interchange	I	94	37	yes	64	no
Lambeth - Brixton Road	K	82	35	n/a	27	n/a
Lambeth - Streatham Green	U	48	26	n/a	10	n/a
Lewisham - Loampit Vale	R	86	21	n/a	6	n/a
Lewisham - New Cross	R	82	23	n/a	9	n/a
Merton - Merton Road	R	80	24	n/a	10	n/a
Redbridge - Gardner Close	R	90	17	n/a	2	n/a
Redbridge - Ley Street	U	97	16	yes	2	yes
Reigate and Banstead – Horley TEOM	S	99	16	yes	2	yes
Reigate and Banstead - Horley FDMS	S	95	15	yes	2	yes
Richmond Upon Thames - Barnes Wetlands	S	96	16	yes	4	yes
Richmond Upon Thames - Castelnau	R	99	18	yes	4	yes
Richmond Upon Thames - Chertsey Road	R	83	21	n/a	6	n/a
Sevenoaks - Bat and Ball	R	99	20	yes	5	yes
Sevenoaks - Greatness Park	U	97	18	yes	4	yes
Sevenoaks - Sevenoaks Quarry	I	85	23	n/a	5	n/a
Southwark - A2 Old Kent Road ^{AA}	R	91	22	yes	18	yes
Southwark - Elephant and Castle	U	99	19	yes	5	yes
Sutton - Beddington Lane	I	98	23	yes	5	yes
Sutton - Beddington Lane north	I	93	31	yes	21	yes
Sutton - Wallington	K	82	28	n/a	10	n/a
Sutton - Worcester Park	K	85	20	n/a	2	n/a
Thurrock - London Road (Grays) ^A	U	95	18	yes	5	yes
Thurrock - London Road (Purfleet)	R	99	25	yes	10	yes
Thurrock - Stanford-le-Hope ^{AA}	R	90	19	n/a	5	n/a
Tower Hamlets – Blackwall ^T	R	94	25	yes	10	yes
Wandsworth - Battersea	R	99	27	yes	16	yes
Wandsworth - Lavender Hill (Clapham Jct)	R	99	20	yes	4	yes
Wandsworth - Putney	U	98	17	yes	5	yes
Wandsworth - Putney High Street	K	88	25	n/a	6	n/a
Wandsworth - Tooting High Street	R	93	23	yes	11	yes
Westminster - Horseferry Road	U	93	17	yes	6	yes
Westminster - Marylebone Road TEOM	K	99	27	yes	12	yes
Westminster - Marylebone Road FDMS ^{AA}	K	97	24	yes	8	yes
Windsor and Maidenhead - Frascati Way	R	94	24	yes	12	yes

Table 7: AQS Objective results for PM₁₀.

All PM₁₀ measurements have been converted to reference equivalent by the methods recommended in Defra’s Local Air Quality Management Technical Guidance (Defra, 2016), i.e. TEOM measurements have been corrected using the Volatile Correction Model (VCM) and heated and unheated BAM measurements have been corrected using the divisors 1.2 and 1.035 respectively.

Summary

- All of the 53 sites that achieved the 90% data capture requirement, met the annual mean AQS objective of $40 \mu\text{g m}^{-3}$ for PM_{10} .
- Two sites did not meet the daily mean objective of no more than 35 days with a daily mean greater than $50 \mu\text{g m}^{-3}$. One site measured more than 50 days greater than $50 \mu\text{g m}^{-3}$.

3.7 Particulate Matter PM_{2.5}

Site Name	Type	Instrument	Capture Rate (%)	Annual Mean ug ^m - ³
Bexley - Belvedere	S	TEOM*	90	8
Bexley - Belvedere West	U	TEOM*	97	8
Bexley - Slade Green ^{AA}	S	FDMS	94	11
Bexley - Thamesmead	S	TEOM*	98	8
Brent - ARK Franklin Primary Academy	R	TEOM*	13	8
Brent – Ikea ^T	R	TEOM*	97	12
Camden - Bloomsbury ^A	U	FDMS	94	13
Camden - Euston Road	R	FDMS	89	14
Camden - Swiss Cottage ^{AA}	K	FDMS	97	16
City of London - Farringdon Street	K	BAMH	96	16
City of London - Sir John Cass School	U	BAMH	68	15
Croydon - Norbury Manor	U	BAMH	98	12
Greenwich - A206 Burrage Grove	R	FDMS	84	12
Greenwich - Eltham ^{AA}	S	FDMS	88	12
Greenwich - Falconwood FDMS	R	FDMS	89	13
Greenwich - Plumstead High Street	R	FDMS	98	12
Greenwich - Trafalgar Road (Hoskins St)	R	TEOM*	21	10
Greenwich - Westhorne Avenue	R	FDMS	99	11
Greenwich - Woolwich Flyover ^T	R	TEOM*	94	13
Hackney - Old Street ^T	R	TEOM*	97	12
Harrow - Stanmore ^{AA}	U	FDMS	28	16
Havering - Rainham	R	FDMS	85	12
Kensington and Chelsea - Cromwell Road	R	FDMS	72	17
Kensington and Chelsea - North Ken FDMS ^{AA}	U	FDMS	90	12
Kensington and Chelsea - North Ken FIDAS	U	FIDAS	47	7
Lewisham - New Cross	R	FDMS	81	15
Marylebone Rd - Partisol	K	GRAV	95	14
Redbridge - Gardner Close	R	BAM*	73	12
Redbridge - Ley Street	U	BAMH	95	14
Richmond Upon Thames - Bushy Park	S	FDMS	94	10
Sutton - Beddington Lane north	I	BAMH	71	16
Thurrock - Stanford-le-Hope ^{AA}	R	FDMS	90	11
Tower Hamlets – Blackwall ^T	R	FDMS	86	13
Westminster - Marylebone Road FDMS ^{AA}	K	FDMS	96	15

Table 8: Annual mean results for PM_{2.5}

FIDAS measurements have been corrected using the divisor 1.06, as recommended in in Defra’s Local Air Quality Management Technical Guidance (Defra, 2016). Instruments marked with a * are not considered a reference equivalent measurement method and do not currently have an agreed correction method.

Summary

- All 13 sites with data capture of 90% or more that used a reference equivalent measurement method achieved the EU limit value of $25 \mu\text{g m}^{-3}$ as an annual mean.
- One site with a data capture of 90% or more that used a reference equivalent measurement method achieved the WHO guideline value of $10 \mu\text{g m}^{-3}$ (WHO, 2006).

4 References

European Commission (EC) 2008. Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe. Commission of the European Community, Brussels.

Department of Environment Food and Rural Affairs (Defra), 2016. Local Air Quality Management, Technical Guidance LAQM.TG(16).

Department of Environment Food and Rural Affairs (Defra), 2008. The Air Quality Strategy for England, Scotland, Wales and Northern Ireland.

World Health Organisation (WHO), 2006. WHO air quality guidelines for nitrogen dioxide, ozone, sulphur dioxide and particulate matter. Global update 2005. Summary of risk assessment. WHO, Geneva.