

**Imperial College  
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Projects

**Environmental  
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# London Air Quality Network Summary Report 2019

Independent analysis provided by:




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<b>Title</b>	London Air Quality Network – Summary Report 2019
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<b>Customer</b>	London Air Quality Network
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## 1 Introduction

This report details the results of air pollution measurements made on the London Air Quality Network during 2019. 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](http://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 Imperial 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 ERG 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). 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 also funds monitoring to help assess the air pollution impacts of the Congestion Charging Scheme and Low Emission Zone and some sites are funded by Business Improvement Districts (BIDs).

## 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 <sup>-3</sup>	Maximum daily running 8-hour mean	31 December 2003	1 January 2005
Nitrogen Dioxide (NO <sub>2</sub> )	200 µg m <sup>-3</sup> not to be exceeded more than 18 times a year	1-hour mean	31 December 2005	1 January 2010
	40 µg m <sup>-3</sup>	Annual mean	31 December 2005	1 January 2010
Sulphur dioxide (SO <sub>2</sub> )	350 µg m <sup>-3</sup> , not to be exceeded more than 24 times a year	1-hour mean	31 December 2004	1 January 2005
	125 µg m <sup>-3</sup> , not to be exceeded more than 3 times a year	24-hour mean	31 December 2004	1 January 2005
	266 µg m <sup>-3</sup> , not to be exceeded more than 35 times a year	15-minute mean	31 December 2005	n/a
Ozone (O <sub>3</sub> )	100 µg m <sup>-3</sup> not to be exceeded more than 10 times a year	8 hourly running or hourly mean	31 December 2005	n/a
Ozone (O <sub>3</sub> )	Target of 120 µg/m <sup>3</sup> not to be exceeded more than 25 times a year averaged over 3 years		n/a	31 December 2010
Particles (PM <sub>10</sub> ) (gravimetric)	50 µg m <sup>-3</sup> , not to be exceeded more than 35 times a year	Daily mean	31 December 2004	1 January 2005
	40 µg m <sup>-3</sup>	Annual mean	31 December 2004	1 January 2005
Particles (PM <sub>2.5</sub> ) (gravimetric)	25 µg m <sup>-3</sup>	Annual mean	2020	2010
	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 2019 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 <sup>AA</sup>	U	84	0	n/a
Westminster - Marylebone Road <sup>AA</sup>	K	97	0	yes

Table 2: AQS Objective results for CO

#### Summary

- All sites with data capture of 90% or above 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.
- Only two LAQN sites now measure CO.

### 3.2 Nitrogen Dioxide

Site Name	Type	Capture Rate (%)	Annual Mean <= 40 ug <sup>m</sup> - <sup>3</sup>	Annual Mean Achieved?	No more than 18 occurrences of hourly mean > 200ug <sup>m</sup> - <sup>3</sup> (104.7ppb)	Hourly Mean Achieved?
Barking and Dagenham - Rush Green	S	40	16	n/a	0	n/a
Barking and Dagenham - Scrattons Farm	S	89	24	n/a	0	n/a
Bexley - Belvedere	S	87	23	n/a	0	n/a
Bexley - Belvedere West	U	98	21	yes	0	yes
Bexley - Slade Green <sup>AA</sup>	S	99	22	yes	0	yes
Brent - ARK Franklin Primary Academy	R	99	41	no	0	yes
Brent - Ikea	R	98	63	no	7	yes
Brent - John Keble Primary School	R	97	37	yes	0	yes
Brent - Neasden Lane	I	99	38	yes	2	yes
Bromley - Harwood Avenue	R	2	31	n/a	0	n/a
Camden - Bloomsbury <sup>A</sup>	U	98	32	yes	0	yes
Camden - Euston Road	R	78	70	n/a	7	n/a
Camden - Holborn (Bee Midtown) <sup>D</sup>	K	88	55	n/a	2	n/a
Camden - Swiss Cottage <sup>AA</sup>	K	99	43	no	1	yes
Castle Point - Hadleigh	R	99	27	yes	0	yes
City of London - Beech Street	R	99	62	no	7	yes
City of London - The Aldgate School	U	96	33	yes	0	yes
City of London - Walbrook Wharf	R	98	74	no	15	yes
Croydon - Norbury	K	95	44	no	0	yes
Croydon - Park Lane	R	92	44	no	0	yes
Croydon - Purley Way A23	R	99	29	yes	0	yes
Ealing - Acton Vale	U	100	27	yes	0	yes
Ealing - Hanger Lane Gyrotory	R	91	65	no	2	yes
Ealing - Horn Lane	I	98	42	no	2	yes
Ealing - Western Avenue	R	99	49	no	0	yes
Enfield - Bowes Primary School	R	97	41	no	0	yes
Enfield - Bush Hill Park	S	99	22	yes	0	yes
Enfield - Derby Road	R	99	37	yes	0	yes
Enfield - Prince of Wales School	U	99	23	yes	0	yes
Greenwich - A206 Burrage Grove	R	99	33	yes	0	yes
Greenwich - Blackheath	R	100	38	yes	0	yes
Greenwich - Eltham <sup>AA</sup>	S	97	17	yes	0	yes
Greenwich - Falconwood	R	100	36	yes	0	yes
Greenwich - Fiveways Sidcup Rd A20	R	94	37	yes	0	yes
Greenwich - John Harrison Way	R	100	33	yes	0	yes
Greenwich - Plumstead High Street	R	97	34	yes	0	yes
Greenwich - Trafalgar Road (Hoskins St)	R	100	41	no	0	yes
Greenwich - Westthorne Avenue	R	97	34	yes	0	yes
Greenwich - Woolwich Flyover	R	100	52	no	0	yes
Hackney - Old Street <sup>T</sup>	R	99	47	no	0	yes
Haringey - Priory Park South <sup>AA</sup>	U	99	22	yes	0	yes
Haringey - Haringey Town Hall <sup>AA</sup>	R	95	34	yes	0	yes
Harrow - Pinner Road	R	100	36	yes	0	yes

Site Name	Type	Capture Rate (%)	Annual Mean $\leq 40 \mu\text{g m}^{-3}$	Annual Mean Achieved?	No more than 18 occurrences of hourly mean $> 200 \mu\text{g m}^{-3}$ (104.7ppb)	Hourly Mean Achieved?
Harrow - Stanmore	U	100	20	yes	0	yes
Havering - Rainham	R	100	29	yes	0	yes
Havering - Romford	R	99	38	yes	0	yes
Hillingdon - Harlington <sup>A</sup>	U	99	31	yes	0	yes
Hillingdon - Keats Way <sup>A</sup>	S	91	45	no	0	yes
Islington - Arsenal	U	95	25	yes	0	yes
Islington - Holloway Road	R	98	40	yes	0	yes
Kensington and Chelsea - North Ken <sup>AA</sup>	U	99	27	yes	0	yes
Kings Cross - Tapestry Building	U	34	33	n/a	0	n/a
Kingston Upon Thames - Cromwell Road	R	99	57	no	5	yes
Kingston Upon Thames - Kingston Vale	R	99	33	yes	0	yes
Kingston Upon Thames - Tolworth Broadway	R	98	41	no	0	yes
Lambeth - Bondway Interchange	I	100	48	no	0	yes
Lambeth - Brixton Road	K	79	75	n/a	11	n/a
Lambeth - Streatham Green	U	99	32	yes	0	yes
Lewisham - Catford	U	100	33	yes	0	yes
Lewisham - Deptford	U	13	31	n/a	0	n/a
Lewisham - Honor Oak Park	U	97	23	yes	0	yes
Lewisham - Loampit Vale	R	100	43	no	0	yes
Lewisham - New Cross	R	95	38	yes	0	yes
Merton - Morden Civic Centre 2	R	97	51	no	1	yes
Newham - Cam Road	R	99	29	yes	0	yes
Newham - Wren Close	U	100	28	yes	0	yes
Redbridge - Gardner Close	R	99	37	yes	0	yes
Redbridge - Ley Street	U	99	30	yes	1	yes
Reigate and Banstead - A23 Hooley	R	63	46	n/a	0	n/a
Reigate and Banstead - Horley <sup>AA</sup>	S	99	20	yes	0	yes
Reigate and Banstead - Horley South East	S	99	24	yes	0	yes
Reigate and Banstead - Poles Lane	RU	98	15	yes	0	yes
Richmond Upon Thames - Barnes Wetlands	S	95	21	yes	0	yes
Richmond Upon Thames - Castelnuau	R	99	27	yes	0	yes
Richmond Upon Thames - Chertsey Road (high level)	R	97	36	yes	0	yes
Richmond Upon Thames - Chertsey Road (low level)	R	10	49	n/a	0	n/a
Sevenoaks - Bat and Ball	R	98	23	yes	0	yes
Sevenoaks - Greatness Park	U	99	14	yes	0	yes
Southwark - A2 Old Kent Road <sup>AA</sup>	R	98	38	yes	1	yes
Southwark - Elephant and Castle	U	99	30	yes	0	yes
Southwark - Tower Bridge Road	R	50	39	n/a	0	n/a
Sutton - Beddington Lane	I	96	25	yes	0	yes
Sutton - Beddington Lane north	I	97	29	yes	0	yes



Site Name	Type	Capture Rate (%)	Annual Mean $\leq 40 \mu\text{g}\text{m}^{-3}$	Annual Mean Achieved?	No more than 18 occurrences of hourly mean $> 200\mu\text{g}\text{m}^{-3}$ (104.7ppb)	Hourly Mean Achieved?
Sutton - Wallington	K	90	46	no	0	yes
Sutton - Worcester Park	K	99	51	no	9	yes
Thurrock - Calcutta Road Tilbury	R	80	32	n/a	0	n/a
Thurrock - London Road (Grays) <sup>A</sup>	U	98	23	yes	0	yes
Thurrock - London Road (Purfleet)	R	95	48	no	1	yes
Thurrock - Stanford-le-Hope <sup>AA</sup>	R	99	25	yes	0	yes
Tower Hamlets – Blackwall <sup>T</sup>	R	99	47	no	0	yes
Tower Hamlets - Mile End Road <sup>AA</sup>	R	100	35	yes	1	yes
Wandsworth - Battersea	R	91	31	yes	0	yes
Wandsworth - Lavender Hill (Clapham Jct)	R	57	38	n/a	0	n/a
Wandsworth - Putney	U	95	35	yes	0	yes
Wandsworth - Putney High Street	K	92	69	no	11	yes
Wandsworth - Putney High Street Facade	R	97	66	no	19	no
Wandsworth - Tooting High Street	R	89	50	n/a	3	n/a
Wandsworth - Wandsworth Town Hall	U	100	41	no	0	yes
Westminster - Buckingham Palace Road	R	99	51	no	0	yes
Westminster - Cavendish Square	R	99	50	no	0	yes
Westminster - Covent Garden	U	85	39	n/a	0	n/a
Westminster - Duke Street (Grosvenor) <sup>O</sup>	R	34	43	n/a	0	n/a
Westminster - Ebury Street (Grosvenor) <sup>O</sup>	R	98	35	yes	0	yes
Westminster - Horseferry Road <sup>A</sup>	U	76	34	n/a	0	n/a
Westminster - Marylebone Road <sup>AA</sup>	K	95	63	no	0	yes
Westminster - Oxford Street	K	97	55	no	0	yes
Westminster - Oxford Street East	R	98	51	no	5	yes
Westminster - Strand (Northbank BID) <sup>O</sup>	R	99	76	no	21	no
Windsor and Maidenhead - Aldebury Road	U	96	18	yes	0	yes
Windsor and Maidenhead - Clarence Road	R	97	32	yes	0	yes
Windsor and Maidenhead - Frascati Way	R	99	35	yes	0	yes

Table 3: AQS Objective results for NO<sub>2</sub>

NO<sub>2</sub> 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

- 93 (out of 111) sites achieved the 90% data capture requirement.
- 60 of these sites achieved the annual mean objective for nitrogen dioxide (NO<sub>2</sub>) of not exceeding 40  $\mu\text{g}\text{m}^{-3}$ .
- 33 of the 93 sites did not achieve the annual mean objective.
- A smaller proportion of sites (35%) failed to achieve the annual mean objective in 2019 compared to 37% in 2018 and 41% in 2017.
- 91 sites achieved the hourly mean objective of no more than 18 occurrences of an hourly mean greater than 200  $\mu\text{g}\text{m}^{-3}$ .

- 2 sites failed to achieve the hourly mean objective in 2019 compared to 6 sites in 2018 and 9 sites in 2017.
- The number of hourly exceedences fell at many sites, the highest being 21 exceedences. This is the continuation of a trend which has seen the maximum number of hourly exceedences fall dramatically over the past five years; over 1500 hourly exceedences were measured at three London sites in 2014.
- The main source of NO<sub>2</sub> in London is diesel traffic emissions.

### 3.3 Nitrogen Oxides

Site Name	Type	Capture Rate (%)	Annual Mean NO <sub>x</sub> as NO <sub>2</sub> ugm <sup>-3</sup>
Barking and Dagenham - Rush Green	S	40	20
Barking and Dagenham - Scrattons Farm	S	89	41
Bexley - Belvedere	S	87	34
Bexley - Belvedere West	U	98	31
Bexley - Slade Green <sup>AA</sup>	S	99	36
Brent - ARK Franklin Primary Academy	R	99	84
Brent - Ikea	R	98	179
Brent - John Keble Primary School	R	97	66
Brent - Neasden Lane	I	99	78
Bromley - Harwood Avenue	R	2	58
Camden - Bloomsbury <sup>A</sup>	U	98	46
Camden - Euston Road	R	78	184
Camden - Holborn (Bee Midtown) <sup>O</sup>	K	88	119
Camden - Swiss Cottage <sup>AA</sup>	K	99	97
Castle Point - Hadleigh	R	99	39
City of London - Beech Street	R	99	137
City of London - The Aldgate School	U	96	49
City of London - Walbrook Wharf	R	98	183
Croydon - Norbury	K	95	112
Croydon - Park Lane	R	92	94
Croydon - Purley Way A23	R	99	66
Ealing - Acton Vale	U	100	42
Ealing - Hanger Lane Gyratory	R	91	225
Ealing - Horn Lane	I	98	83
Ealing - Western Avenue	R	99	108
Enfield - Bowes Primary School	R	97	89
Enfield - Bush Hill Park	S	99	35
Enfield - Derby Road	R	99	75
Enfield - Prince of Wales School	U	99	43
Greenwich - A206 Burrage Grove	R	99	55
Greenwich - Blackheath	R	100	73
Greenwich - Eltham <sup>AA</sup>	S	97	26
Greenwich - Falconwood	R	100	71
Greenwich - Fiveways Sidcup Rd A20	R	94	91
Greenwich - John Harrison Way	R	100	57
Greenwich - Plumstead High Street	R	97	61
Greenwich - Trafalgar Road (Hoskins St)	R	100	88
Greenwich - Westthorne Avenue	R	97	68
Greenwich - Woolwich Flyover	R	100	150
Hackney - Old Street <sup>T</sup>	R	99	96
Haringey - Priory Park South <sup>AA</sup>	U	99	32
Haringey - Haringey Town Hall <sup>AA</sup>	R	95	70
Harrow - Pinner Road	R	100	83
Harrow - Stanmore	U	100	28
Havering - Rainham	R	100	56

Site Name	Type	Capture Rate (%)	Annual Mean NO <sub>x</sub> as NO <sub>2</sub> ug m <sup>-3</sup>
Havering - Romford	R	99	77
Hillingdon - Harlington <sup>A</sup>	U	99	51
Hillingdon - Keats Way <sup>A</sup>	S	91	87
Islington - Arsenal	U	95	37
Islington - Holloway Road	R	98	89
Kensington and Chelsea - North Ken <sup>AA</sup>	U	99	39
Kingston Upon Thames - Cromwell Road	R	99	143
Kingston Upon Thames - Kingston Vale	R	99	72
Kingston Upon Thames - Tolworth Broadway	R	98	94
Lambeth - Bondway Interchange	I	100	92
Lambeth - Brixton Road	K	79	181
Lambeth - Streatham Green	U	99	55
Lewisham - Catford	U	100	64
Lewisham - Deptford	U	13	54
Lewisham - Loampit Vale	R	100	90
Lewisham - New Cross	R	95	76
Merton - Morden Civic Centre 2	R	97	120
Newham - Cam Road	R	99	48
Newham - Wren Close	U	100	40
Redbridge - Gardner Close	R	99	69
Redbridge - Ley Street	U	99	51
Reigate and Banstead - A23 Hooley	R	63	121
Reigate and Banstead - Horley <sup>AA</sup>	S	99	31
Reigate and Banstead - Horley South East	S	99	39
Reigate and Banstead - Poles Lane	RU	98	21
Richmond Upon Thames - Barnes Wetlands	S	95	30
Richmond Upon Thames - Castelnau	R	99	47
Richmond Upon Thames - Chertsey Road (high level)	R	97	75
Richmond Upon Thames - Chertsey Road (low level)	R	10	107
Sevenoaks - Bat and Ball	R	98	50
Sevenoaks - Greatness Park	U	99	21
Southwark - A2 Old Kent Road <sup>AA</sup>	R	98	75
Southwark - Elephant and Castle	U	99	46
Southwark - Tower Bridge Road	R	50	88
Sutton - Beddington Lane	I	96	43
Sutton - Beddington Lane north	I	97	58
Sutton - Wallington	K	90	104
Sutton - Worcester Park	K	99	114
Thurrock - Calcutta Road Tilbury	R	80	59
Thurrock - London Road (Grays) <sup>A</sup>	U	98	36
Thurrock - London Road (Purfleet)	R	95	140
Thurrock - Stanford-le-Hope <sup>AA</sup>	R	99	50
Tower Hamlets – Blackwall <sup>T</sup>	R	99	107
Tower Hamlets - Mile End Road <sup>AA</sup>	R	100	68

Site Name	Type	Capture Rate (%)	Annual Mean NO <sub>x</sub> as NO <sub>2</sub> µgm <sup>-3</sup>
Wandsworth - Battersea	R	91	53
Wandsworth - Lavender Hill (Clapham Jct)	R	57	75
Wandsworth - Putney	U	95	54
Wandsworth - Putney High Street	K	92	171
Wandsworth - Putney High Street Facade	R	97	149
Wandsworth - Tooting High Street	R	89	105
Wandsworth - Wandsworth Town Hall	U	100	69
Westminster - Buckingham Palace Road	R	99	100
Westminster - Cavendish Square	R	99	100
Westminster - Covent Garden	U	85	56
Westminster - Duke Street (Grosvenor) <sup>0</sup>	R	34	87
Westminster - Ebury Street (Grosvenor) <sup>0</sup>	R	98	54
Westminster - Horseferry Road <sup>A</sup>	U	76	43
Westminster - Marylebone Road <sup>AA</sup>	K	95	176
Westminster - Oxford Street	K	97	136
Westminster - Oxford Street East	R	98	103
Westminster - Strand (Northbank BID) <sup>0</sup>	R	99	166
Windsor and Maidenhead - Aldebury Road	U	96	30
Windsor and Maidenhead - Clarence Road	R	97	67
Windsor and Maidenhead - Frascati Way	R	99	74

Table 4: Annual Mean values for NO<sub>x</sub>

NO<sub>x</sub> ppbV measurements have been converted to µgm<sup>-3</sup> by multiplying by 1.9125 as recommended in Defra’s Local Air Quality Management Technical Guidance (Defra, 2016). There are no AQS Objectives for NO<sub>x</sub>.

### 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	99	23	no
Bexley - Slade Green	S	99	18	no
Brent – Ikea <sup>T</sup>	R	87	0	n/a
Camden - Bloomsbury <sup>A</sup>	U	98	8	yes
Greenwich - Eltham <sup>AA</sup>	S	100	17	no
Greenwich - Falconwood	R	99	0	yes
Greenwich - Plumstead High Street	R	100	0	yes
Greenwich - Westthorne Avenue <sup>T</sup>	R	68	0	n/a
Greenwich - Woolwich Flyover <sup>T</sup>	R	90	1	yes
Hackney - Old Street <sup>T</sup>	R	97	6	yes
Haringey - Priory Park South <sup>AA</sup>	U	95	16	no
Hillingdon - Harlington <sup>A</sup>	U	98	13	no
Hillingdon - Keats Way <sup>A</sup>	S	99	2	yes
Kensington and Chelsea - North Ken <sup>AA</sup>	U	96	18	no
Lewisham - Honor Oak Park <sup>AA</sup>	U	87	16	no
Redbridge - Ley Street	U	91	15	no
Reigate and Banstead - Poles Lane	RU	97	22	no
Richmond Upon Thames - Barnes Wetlands	S	100	17	no
Sevenoaks - Greatness Park	U	99	21	no
Southwark - Elephant and Castle	U	99	7	yes
Thurrock - London Road (Grays) <sup>A</sup>	U	58	10	n/a
Tower Hamlets – Blackwall <sup>T</sup>	R	84	0	n/a
Wandsworth - Wandsworth Town Hall	U	100	16	no
Westminster - Marylebone Road <sup>AA</sup>	K	98	0	yes

Table 5: AQS Objective results for O<sub>3</sub>

O<sub>3</sub> ppbV measurements have been converted to  $\mu\text{g m}^{-3}$  by multiplying by 1.9957.

#### Summary

- 8 sites out of 19 which achieved the 90% data capture requirement achieved the 8 hourly mean AQS objective for O<sub>3</sub> of no more than ten days measuring a daily mean greater than or equal to  $100 \mu\text{g m}^{-3}$ .
- 11 sites exceeded the objective, including nine in urban background or suburban locations in London, one urban background site in Kent, and one rural site in Surrey. This is slightly fewer sites exceeding the objective compared to 2018 (13 sites). There were fewer exceedance days at most sites compared to 2018, the maximum number being 22, compared to a maximum of 52 exceedance days at one site in 2018.
- O<sub>3</sub> is a regional pollutant. It is greater away from busy roads as it is scavenged by NO<sub>x</sub> from traffic emissions. The lower number of exceedance days compared to 2018 across London and the south-east is likely to be due to the weather conditions - summer 2018 was declared to be the joint hottest on record by the Met Office. Mean summer temperatures for England were around 1°C lower in 2019. O<sub>3</sub> generation is higher in hot sunny conditions.

### 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	97	0	yes
Bexley - Slade Green	S	100	0	yes
Camden - Bloomsbury <sup>A</sup>	U	79	0	n/a
Greenwich - Eltham	S	72	0	n/a
Kensington and Chelsea - North Ken <sup>AA</sup>	U	93	0	yes
Lambeth - Bondway Interchange	I	100	0	yes
Thurrock - London Road (Grays) <sup>A</sup>	U	95	0	yes
Westminster - Marylebone Road <sup>AA</sup>	K	98	0	yes

Table 6: AQS Objective results for SO<sub>2</sub>

SO<sub>2</sub> 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 SO<sub>2</sub>.
- No 15 minute mean SO<sub>2</sub> 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 SO<sub>2</sub>.

### 3.6 Particulate Matter PM<sub>10</sub>

Site Name	Type	Capture Rate (%)	Annual Mean $\leq$ 40 $\mu\text{g m}^{-3}$	Annual Mean Achieved?	No more than 35 occurrences of daily mean $\geq$ 50 $\mu\text{g m}^{-3}$	Daily Mean Achieved?
Barking and Dagenham - Scrattons Farm	S	89	18	n/a	6	n/a
Bexley - Belvedere	S	100	19	yes	10	yes
Bexley - Belvedere FDMS	S	95	19	yes	11	yes
Bexley - Belvedere West	U	100	18	yes	7	yes
Bexley - Belvedere West FDMS	U	98	14	yes	4	yes
Bexley - Slade Green	S	99	17	yes	8	yes
Brent - ARK Franklin Primary Academy	R	98	18	yes	5	yes
Brent - Ikea	R	96	30	yes	29	yes
Brent - John Keble Primary School	R	83	19	n/a	4	n/a
Brent - Neasden Lane	I	100	26	yes	15	yes
Camden - Bloomsbury <sup>A</sup>	U	91	18	yes	9	yes
Camden - Coopers Lane	I	93	15	yes	5	yes
Camden - Euston Road	R	100	22	yes	8	yes
Camden - Swiss Cottage <sup>AA</sup>	K	95	19	yes	8	yes
City of London - Beech Street	R	97	22	yes	9	yes
City of London - The Aldgate School	U	98	19	yes	7	yes
City of London - Upper Thames Street	R	79	27	n/a	14	n/a
Croydon - Park Lane	R	86	22	n/a	8	n/a
Ealing - Acton Vale	U	92	18	yes	9	yes
Ealing - Hanger Lane Gyrotory	R	94	25	yes	13	yes
Ealing - Horn Lane <sup>AA</sup>	I	80	28	n/a	15	n/a
Ealing - Horn Lane TEOM	I	81	26	n/a	14	n/a
Ealing - Western Avenue	R	98	25	yes	19	yes
Enfield - Bowes Primary School	R	86	19	n/a	9	n/a
Greenwich - A206 Burrage Grove	R	97	17	yes	7	yes
Greenwich - Blackheath	R	95	20	yes	7	yes
Greenwich - Eltham	S	87	14	n/a	2	n/a
Greenwich - Falconwood	R	99	19	yes	8	yes
Greenwich - Fiveways Sidcup Rd A20	R	98	25	yes	17	yes
Greenwich - John Harrison Way	R	97	14	yes	6	yes
Greenwich - Plumstead High Street	R	47	19	n/a	5	n/a
Greenwich - Trafalgar Road (Hoskins St)	R	100	22	yes	12	yes
Greenwich - Westthorne Avenue	R	61	17	n/a	2	n/a
Greenwich - Woolwich Flyover	R	99	23	yes	10	yes
Hackney - Old Street <sup>T</sup>	R	91	22	yes	6	yes
Harrow - Pinner Road	R	75	18	n/a	2	n/a
Harrow - Stanmore	U	98	15	yes	1	yes
Havering - Rainham	R	95	17	yes	4	yes
Havering - Romford	R	99	21	yes	9	yes
Hillingdon - Harlington <sup>A</sup>	U	97	15	yes	6	yes
Islington - Arsenal	U	100	19	yes	9	yes
Islington - Holloway Road	R	95	20	yes	7	yes



Site Name	Type	Capture Rate (%)	Annual Mean <= 40 $\mu\text{g m}^{-3}$	Annual Mean Achieved?	No more than 35 occurrences of daily mean >= 50 $\mu\text{g m}^{-3}$	Daily Mean Achieved?
Kensington and Chelsea - North Ken FDMS <sup>AA</sup>	U	100	15	yes	5	yes
Kensington and Chelsea - North Ken FIDAS <sup>AA</sup>	U	100	15	yes	5	yes
Kingston Upon Thames - Cromwell Road	R	99	26	yes	15	yes
Kingston Upon Thames - Kingston Vale	R	99	20	yes	4	yes
Kingston Upon Thames - Tolworth Broadway	R	95	22	yes	4	yes
Lambeth - Bondway Interchange	I	100	38	yes	74	no
Lambeth - Brixton Road	K	76	25	n/a	10	n/a
Lambeth - Streatham Green	U	98	19	yes	5	yes
Lewisham - Honor Oak Park <sup>AA</sup>	U	100	15	yes	7	yes
Lewisham - Loampit Vale	R	97	20	yes	9	yes
Lewisham - New Cross	R	75	20	n/a	8	n/a
Merton - Merton Road	R	96	28	yes	20	yes
Newham - Cam Road	R	93	18	yes	3	yes
Newham - Wren Close	U	98	18	yes	4	yes
Redbridge - Gardner Close	R	92	19	yes	2	yes
Redbridge - Ley Street	U	89	16	n/a	2	n/a
Reigate and Banstead - Horley	S	98	16	yes	0	yes
Reigate and Banstead 1 co-location	S	98	13	yes	0	yes
Richmond Upon Thames - Barnes Wetlands	S	95	16	yes	3	yes
Richmond Upon Thames - Castelnau	R	89	15	n/a	3	n/a
Richmond Upon Thames - Chertsey Road	R	96	20	yes	8	yes
Sevenoaks - Bat and Ball	R	99	20	yes	8	yes
Sevenoaks - Greatness Park	U	100	20	yes	9	yes
Southwark - A2 Old Kent Road <sup>AA</sup>	R	89	24	n/a	15	n/a
Southwark - Elephant and Castle	U	90	17	yes	3	yes
Sutton - Beddington Lane	I	95	17	yes	4	yes
Sutton - Beddington Lane north	I	99	22	yes	13	yes
Sutton - Wallington	K	99	21	yes	6	yes
Sutton - Worcester Park	K	43	25	n/a	10	n/a
Thurrock - London Road (Grays) <sup>A</sup>	U	96	21	yes	13	yes
Thurrock - London Road (Purfleet)	R	97	23	yes	14	yes
Thurrock - Stanford-le-Hope <sup>AA</sup>	R	96	17	yes	7	yes
Tower Hamlets – Blackwall <sup>T</sup>	R	73	20	n/a	8	n/a
Wandsworth - Battersea	R	99	23	yes	16	yes
Wandsworth - Lavender Hill (Clapham Jct)	R	57	19	n/a	3	n/a
Wandsworth - Putney	U	92	19	yes	5	yes
Wandsworth - Putney High Street	K	85	22	n/a	9	n/a
Wandsworth - Tooting High Street	R	83	25	n/a	9	n/a
Westminster - Cavendish Square	R	97	25	yes	10	yes
Westminster - Horseferry Road <sup>A</sup>	U	82	17	n/a	7	n/a
Westminster - Marylebone Road FDMS <sup>AA</sup>	K	96	22	yes	10	yes
Westminster - Marylebone Road Fidas <sup>AA</sup>	K	99	21	yes	11	yes

Site Name	Type	Capture Rate (%)	Annual Mean $\leq$ $40 \mu\text{g m}^{-3}$	Annual Mean Achieved?	No more than 35 occurrences of daily mean $\geq 50 \mu\text{g m}^{-3}$	Daily Mean Achieved?
Westminster - Marylebone Road Partisol PM <sub>10</sub> <sup>AA</sup>	K	76	24	n/a	11	n/a
Westminster - Oxford Street	K	97	27	yes	17	yes
Westminster - Oxford Street East	R	39	22	n/a	0	n/a
Windsor and Maidenhead - Frascati Way	R	98	23	yes	8	yes

Table 7: AQS Objective results for PM<sub>10</sub>.

All PM<sub>10</sub> 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 59 sites that achieved the 90% data capture requirement met the annual mean AQS objective of less than  $40 \mu\text{g m}^{-3}$  for PM<sub>10</sub>.
- One site did not meet the daily mean objective of no more than 35 days with a daily mean greater than  $50 \mu\text{g m}^{-3}$ . This site is classified as 'industrial' as it is located close to a local source of PM<sub>10</sub> emissions.
- 28 of the sites that achieved the 90% data capture requirement achieved the WHO guideline value of  $20 \mu\text{g m}^{-3}$  as an annual mean (WHO, 2006). This is a similar proportion of sites that achieved this target in 2018 (47% in 2019 compared to 50% in 2018).
- Sites measuring PM<sub>10</sub> by more than one method have only been counted once in this summary.

### 3.7 Particulate Matter PM<sub>2.5</sub>

Site Name	Type	Instrument	Capture Rate (%)	Annual Mean ug <sup>m</sup> - <sup>3</sup>
Bexley - Belvedere	S	TEOM*	99	8
Bexley - Belvedere West	U	TEOM*	100	7
Bexley - Slade Green FDMS <sup>AA</sup>	S	FDMS	82	12
Brent - ARK Franklin Primary Academy	R	TEOM*	95	8
Brent – Ikea <sup>T</sup>	R	TEOM*	54	11
Camden - Bloomsbury <sup>A</sup>	U	FDMS	98	11
Camden - Euston Road	R	FDMS	100	14
Camden - Swiss Cottage <sup>AA</sup>	K	FDMS	98	11
City of London - Farringdon Street	K	BAMH	96	14
City of London - The Aldgate School	U	BAMH	86	12
Croydon - Norbury Manor	U	BAMH	99	10
Greenwich - A206 Burrage Grove	R	FDMS	36	11
Greenwich - Eltham <sup>AA</sup>	S	FDAS	97	11
Greenwich - Falconwood FDMS	R	FDMS	99	12
Greenwich - John Harrison Way	R	FDMS	94	11
Greenwich - Plumstead High Street	R	FDMS	95	13
Greenwich - Trafalgar Road (Hoskins St)	R	TEOM*	100	9
Greenwich - Westthorne Avenue	R	FDMS	99	10
Greenwich - Woolwich Flyover <sup>T</sup>	R	TEOM*	98	11
Hackney - Old Street <sup>T</sup>	R	TEOM*	91	9
Havering - Rainham	R	FDMS	96	11
Hillingdon - Harlington <sup>A</sup>	U	FDMS	97	10
Kensington and Chelsea - North Ken <sup>AA</sup>	U	FDMS	100	10
Kensington and Chelsea - North Ken FIDAS <sup>AA</sup>	U	FDAS	100	10
Lewisham - Honor Oak Park <sup>AA</sup>	U	FDAS	100	10
Lewisham - New Cross	R	FDMS	88	15
London Teddington Bushy Park <sup>A</sup>	S	FDMS	93	12
Redbridge - Gardner Close	R	BAM	93	11
Redbridge - Ley Street	U	BAMH	39	11
Sutton - Beddington Lane north	I	BAMH	99	12
Thurrock - Stanford-le-Hope <sup>AA</sup>	R	BAMH	91	12
Tower Hamlets – Blackwall <sup>T</sup>	R	FDMS	74	13
Westminster - Marylebone Road FDMS <sup>AA</sup>	K	FDMS	91	14
Westminster - Marylebone Road Partisol <sup>A</sup>	K	GRAV	97	12

Table 8: Annual mean results for PM<sub>2.5</sub>

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, so should be interpreted with caution.

## Summary

- All 25 sites with data capture of 90% or more that used a reference equivalent measurement method achieved the UK Objective of  $25 \mu\text{g m}^{-3}$  as an annual mean.
- No sites 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) in 2019, compared to four in 2018.

## 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.

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