

**Imperial College
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Projects

**Environmental
Research Group**

London Air Quality Network Summary Report 2022

Independent analysis provided by:

Louise Mittal and Timothy Baker

Environmental Research Group, Imperial College London

Title	London Air Quality Network – Summary Report 2022
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Customer	London Air Quality Network
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<p>Environmental Research Group School of Public Health Imperial College London Michael Uren Biomedical Engineering Hub White City Campus Wood Lane London W12 0BZ erg-enquiries@imperial.ac.uk</p>
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	Name	Signature	Date
Author	Louise Mittal	<i>L. Mittal</i>	March 2024
Reviewed by	Timothy Baker	<i>T. Baker.</i>	March 2024
Approved by	Timothy Baker	<i>T. Baker.</i>	March 2024

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1 Introduction

This report details the results of air pollution measurements made on the London Air Quality Network during 2022. 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 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. Analysis of LAQN measurements has been augmented by measurements from affiliated and 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) or other local organisations.

2 Air quality Strategy Objectives and EU Limit Values

There is ample evidence of the adverse health effects caused by air pollution (WHO, 2006 and 2021). 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
	40 µg m ⁻³	Annual mean	31 December 2005	1 January 2010
Sulphur dioxide (SO ₂)	350 µg m ⁻³ , not to be exceeded more than 24 times a year	1-hour mean	31 December 2004	1 January 2005
	125 µg m ⁻³ , not to be exceeded more than 3 times a year	24-hour mean	31 December 2004	1 January 2005
	266 µg m ⁻³ , not to be exceeded more than 35 times a year	15-minute mean	31 December 2005	n/a
Ozone (O ₃)	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
Ozone (O ₃)	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
	40 µg m ⁻³	Annual mean	31 December 2004	1 January 2005
Particles (PM _{2.5}) (gravimetric)	25 µg m ⁻³	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 2022 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	83	0	n/a
Westminster - Marylebone Road ^{AA}	K	72	0	n/a

Table 2: AQS Objective results for CO

Summary

- Large reductions in CO over last 30 years with the introduction of catalytic converters on petrol vehicles.
- Although neither site achieved the 90% data capture requirement, concentrations were well below the 10mgm^{-3} threshold. This objective has not been exceeded in London since 2000.
- Only two LAQN sites now measure CO.

3.2 Nitrogen Dioxide

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 $> 200 \mu\text{g m}^{-3}$	Hourly Mean Achieved?
Barking and Dagenham - Rush Green	S	92	17	yes	0	yes
Barking and Dagenham - Scrattons Farm	S	100	21	yes	0	yes
Bexley - Belvedere	S	100	16	yes	0	yes
Bexley - Belvedere West	U	93	16	yes	0	yes
Bexley - Slade Green ^{AA}	S	96	18	yes	0	yes
Brent - ARK Franklin Primary Academy	R	100	29	yes	0	yes
Brent - Ikea	R	99	43	no	0	yes
Brent - John Keble Primary School	R	100	28	yes	0	yes
Brent - Neasden Lane	I	100	28	yes	0	yes
Bromley - Harwood Avenue	R	99	20	yes	0	yes
Camden - Bloomsbury ^A	U	87	26	n/a	0	n/a
Camden - Holborn (Central District Alliance) ^O	K	68	38	n/a	0	n/a
City of London - Beech Street	R	98	41	no	0	yes
City of London - The Aldgate School	U	99	23	yes	0	yes
City of London - Walbrook Wharf	R	97	52	no	0	yes
Croydon - Norbury	K	100	37	yes	0	yes
Croydon - Purley Way A23	R	39	27	n/a	0	n/a
Ealing - Acton Vale	U	45	22	n/a	0	n/a
Ealing - Hanger Lane Gyrotory	R	99	52	no	0	yes
Ealing - Horn Lane	I	99	29	yes	0	yes
Ealing - Western Avenue	R	99	35	yes	0	yes
Enfield - Bowes Primary School	R	100	28	yes	0	yes
Enfield - Bush Hill Park	S	100	19	yes	0	yes
Enfield - Derby Road	R	96	26	yes	0	yes
Enfield - Prince of Wales School	U	100	18	yes	0	yes
Greenwich - A206 Burrage Grove	R	100	26	yes	0	yes
Greenwich - Blackheath	R	94	27	yes	0	yes
Greenwich - Eltham	S	54	9	n/a	0	n/a
Greenwich - Falconwood	R	100	22	yes	0	yes
Greenwich - Fiveways Sidcup Rd A20	R	100	27	yes	0	yes
Greenwich - John Harrison Way	R	91	23	yes	0	yes
Greenwich - Plumstead High Street	R	100	25	yes	0	yes
Greenwich - Trafalgar Road (Hoskins St)	R	91	32	yes	0	yes
Greenwich - Tunnel Avenue ^T	R	100	32	yes	0	yes
Greenwich - Westhorne Avenue	R	73	23	n/a	0	n/a
Greenwich - Woolwich Flyover	R	98	40	yes	0	yes
Hackney - Amhurst Road	R	22	15	n/a	0	n/a
Hackney - Homerton Library	R	28	26	n/a	0	n/a
Hackney - Old Street ^T	R	94	31	yes	0	yes
Haringey - Priory Park South ^{AA}	U	93	17	yes	0	yes
Haringey - Haringey Town Hall ^{AA}	R	94	30	yes	0	yes
Harrow - Stanmore	U	72	16	n/a	0	n/a
Havering - Rainham	R	99	23	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 $> 200 \mu\text{g m}^{-3}$	Hourly Mean Achieved?
Havering - Romford	R	99	30	yes	0	yes
Islington - Arsenal	U	100	20	yes	0	yes
Islington - Holloway Road	R	100	28	yes	0	yes
Kensington and Chelsea - North Ken ^{AA}	U	86	15	n/a	0	n/a
Kingston Upon Thames - Cromwell Road	R	100	43	no	0	yes
Kingston Upon Thames - Kingston Vale	R	97	25	yes	0	yes
Kingston Upon Thames - Tolworth Broadway	R	49	33	n/a	0	n/a
Lambeth - Bondway Interchange	I	99	29	yes	0	yes
Lambeth - Brixton Road	K	98	64	no	9	yes
Lambeth - Streatham Green	U	99	23	yes	0	yes
Lewisham - Deptford	U	99	19	yes	0	yes
Lewisham - Honor Oak Park	U	99	16	yes	0	yes
Lewisham - Loampit Vale	R	98	38	yes	0	yes
Lewisham - New Cross	R	78	27	n/a	0	n/a
Lewisham - Laurence House Catford	R	94	25	yes	0	yes
Merton - Morden Civic Centre 2	R	69	34	n/a	0	n/a
Newham - Britannia Gate ^T	R	99	25	yes	0	yes
Newham - Cam Road	R	98	24	yes	0	yes
Newham - Hoola Tower ^T	R	100	23	yes	0	yes
Newham - Wren Close	U	98	22	yes	0	yes
Redbridge - Gardner Close	R	100	26	yes	0	yes
Redbridge - Ley Street	U	22	30	n/a	1	n/a
Regent Street facade (The Crown Estate) ^O	R	98	39	yes	0	yes
Reigate and Banstead - A23 Hooley	R	99	35	yes	0	yes
Reigate and Banstead - Horley ^{AA}	S	83	15	n/a	0	n/a
Reigate and Banstead - Horley South East	S	98	17	yes	0	yes
Reigate and Banstead - Poles Lane	RU	96	12	yes	0	yes
Richmond Upon Thames - Barnes Wetlands	S	62	14	n/a	0	n/a
Richmond Upon Thames - Castelnau	R	80	23	n/a	0	n/a
Sevenoaks - Bat and Ball	R	77	20	n/a	0	n/a
Sevenoaks - Greatness Park	U	99	12	yes	0	yes
Southwark - A2 Old Kent Road ^{AA}	R	92	26	yes	0	yes
Southwark - Elephant and Castle	U	93	22	yes	0	yes
Southwark - Lower Road	R	73	27	n/a	0	n/a
Southwark - South Circular Road	R	94	26	yes	0	yes
Southwark - Tower Bridge Road	R	99	30	yes	0	yes
Southwark - Vicarage Grove	R	92	32	yes	0	yes
Sutton - Beddington Lane north	I	99	24	yes	0	yes
Sutton - Beddington Village	R	99	23	yes	0	yes
Sutton - Wallington	K	90	44	no	0	yes
Sutton - Worcester Park	K	96	40	yes	0	yes
Thurrock - Dock Road Tilbury	R	98	29	yes	1	yes
Thurrock - London Road (Grays) ^A	U	99	19	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?
Thurrock - London Road (Purfleet)	R	96	39	yes	0	yes
Thurrock - Stanford-le-Hope ^{AA}	R	94	22	yes	0	yes
Tower Hamlets - Blackwall ^T	R	62	37	n/a	0	n/a
Tower Hamlets - Jubilee Park	U	86	20	n/a	0	n/a
Tower Hamlets - Mile End Road ^{AA}	R	96	22	yes	0	yes
Wandsworth - Battersea	R	75	27	n/a	0	n/a
Wandsworth - Lavender Hill (Clapham Jct)	R	21	35	n/a	0	n/a
Wandsworth - Putney High Street Facade	R	67	47	n/a	0	n/a
Wandsworth - Tooting High Street	R	45	38	n/a	0	n/a
Wandsworth - Wandsworth Town Hall	U	93	28	yes	0	yes
Waterloo Place (The Crown Estate) ^O	R	99	38	yes	0	yes
Westminster - Cavendish Square	R	100	33	yes	0	yes
Westminster - Covent Garden	U	99	23	yes	0	yes
Westminster - Duke Street (Grosvenor) ^O	R	95	32	yes	0	yes
Westminster - Ebury Street (Grosvenor) ^O	R	91	25	yes	0	yes
Westminster - Elizabeth Bridge	R	99	34	yes	0	yes
Westminster - Horseferry Road ^A	U	88	23	n/a	0	n/a
Westminster - Marylebone Road ^{AA}	K	99	42	no	0	yes
Westminster - Oxford Street	K	100	37	yes	0	yes
Westminster - Oxford Street East	R	100	42	no	1	yes
Westminster - Strand (Northbank BID)	R	79	35	n/a	0	n/a
Windsor and Maidenhead - Aldebury Road	U	97	15	yes	0	yes
Windsor and Maidenhead - Clarence Road	R	99	27	yes	0	yes
Windsor and Maidenhead - Frascati Way	R	99	26	yes	0	yes

Table 3: AQS Objective results for NO₂

NO₂ ppbV measurements have been converted to $\mu\text{g m}^{-3}$ by multiplying by 1.9125 as recommended in Defra's Local Air Quality Management Technical Guidance (Defra, 2022).

Summary

- 74 sites out of 83 that achieved the 90% data capture requirement met the annual mean objective for nitrogen dioxide (NO₂) of not exceeding $40 \mu\text{g m}^{-3}$.
- All sites achieved the hourly mean objective of no more than 18 occurrences of an hourly mean greater than $200 \mu\text{g m}^{-3}$.
- A similar proportion of sites (13%) failed to achieve the annual mean objective in 2022 compared to 13% in 2021 and 12% in 2020. This is a continued improvement compared to 2019 when 35% of sites failed to meet the objective.
- No sites failed to achieve the hourly mean objective for NO₂ in 2022 which is the third year that this objective has been achieved at all LAQN sites.
- Only four sites measured any exceedences of the hourly mean threshold of $200 \mu\text{g m}^{-3}$. This again demonstrates a continued improvement following a sharp downward trend which has seen the number of hourly exceedences fall to a maximum of 9 hourly exceedences from over 1500 hourly exceedences at three London sites in 2014.

- In 2020, pollution concentrations were affected by restrictions introduced due to the Covid-19 pandemic which is likely to have reduced annual NO₂ concentrations. Some restrictions remained in place for parts of 2021 with a return to more expected levels of activity in 2022. It is encouraging that the number of exceedances of the annual and hourly mean objectives did not return to previous levels.
- New guidelines announced by the WHO in 2021 (WHO, 2021) suggest a reduction of the NO₂ annual mean limit to 10 µg m⁻³. No sites achieved this target in 2022.
- The largest source of NO₂ in London is diesel traffic emissions. However, the London Atmospheric Emissions Inventory forecasts that road transport will no longer be the dominant source of NO_x across London by 2025 and the largest contribution will be from commercial heat and power generation (GLA, 2022).

3.3 Nitrogen Oxides

Site Name	Type	Capture Rate (%)	Annual Mean NO _x as NO ₂ ug m ⁻³
Barking and Dagenham - Rush Green	S	92	23
Barking and Dagenham - Scrattons Farm	S	100	33
Bexley - Belvedere	S	100	23
Bexley - Belvedere West	U	93	23
Bexley - Slade Green ^{AA}	S	96	26
Brent - ARK Franklin Primary Academy	R	100	50
Brent - Ikea	R	99	93
Brent - John Keble Primary School	R	100	45
Brent - Neasden Lane	I	100	55
Bromley - Harwood Avenue	R	99	32
Camden - Bloomsbury ^A	U	87	35
Camden - Holborn (Central District Alliance) ^O	K	68	73
City of London - Beech Street	R	98	66
City of London - The Aldgate School	U	99	31
City of London - Walbrook Wharf	R	97	114
Croydon - Norbury	K	100	82
Croydon - Purley Way A23	R	39	53
Ealing - Acton Vale	U	45	33
Ealing - Hanger Lane Gyratory	R	99	140
Ealing - Horn Lane	I	99	55
Ealing - Western Avenue	R	99	70
Enfield - Bowes Primary School	R	100	55
Enfield - Bush Hill Park	S	100	27
Enfield - Derby Road	R	96	49
Enfield - Prince of Wales School	U	100	31
Greenwich - A206 Burrage Grove	R	100	41
Greenwich - Blackheath	R	94	47
Greenwich - Eltham	S	54	14
Greenwich - Falconwood	R	100	39
Greenwich - Fiveways Sidcup Rd A20	R	100	57
Greenwich - John Harrison Way	R	91	37
Greenwich - Plumstead High Street	R	100	41
Greenwich - Trafalgar Road (Hoskins St)	R	91	58
Greenwich - Tunnel Avenue	R	100	57
Greenwich - Westthorne Avenue	R	73	44
Greenwich - Woolwich Flyover	R	98	94
Hackney - Amhurst Road	R	22	24
Hackney - Homerton Library	R	28	45
Hackney - Old Street ^T	R	94	55
Haringey - Priory Park South ^{AA}	U	93	22
Haringey - Haringey Town Hall ^{AA}	R	94	51
Harrow - Stanmore	U	72	21
Havering - Rainham	R	99	40
Havering - Romford	R	99	57
Islington - Arsenal	U	100	28

Site Name	Type	Capture Rate (%)	Annual Mean NO _x as NO ₂ µg ⁻³
Islington - Holloway Road	R	100	51
Kensington and Chelsea - North Ken ^{AA}	U	86	20
Kingston Upon Thames - Cromwell Road	R	100	102
Kingston Upon Thames - Kingston Vale	R	97	51
Kingston Upon Thames - Tolworth Broadway	R	49	65
Lambeth - Bondway Interchange	I	99	52
Lambeth - Brixton Road	K	98	141
Lambeth - Streatham Green	U	99	36
Lewisham - Deptford	U	99	27
Lewisham - Loampit Vale	R	98	100
Lewisham - New Cross	R	78	49
Lewisham - Laurence House Catford	R	94	49
Merton - Morden Civic Centre 2	R	69	70
Newham - Britannia Gate	R	99	43
Newham - Cam Road	R	98	36
Newham - Hoola Tower	R	100	34
Newham - Wren Close	U	98	30
Redbridge - Gardner Close	R	100	42
Redbridge - Ley Street	U	22	66
Regent Street facade (The Crown Estate) ^O	R	98	71
Reigate and Banstead - A23 Hooley	R	99	80
Reigate and Banstead - Horley ^{AA}	S	83	23
Reigate and Banstead - Horley South East	S	98	29
Reigate and Banstead - Poles Lane	RU	96	16
Richmond Upon Thames - Barnes Wetlands	S	62	17
Richmond Upon Thames - Castelnau	R	80	36
Sevenoaks - Bat and Ball	R	77	43
Sevenoaks - Greatness Park	U	99	17
Southwark - A2 Old Kent Road ^{AA}	R	92	69
Southwark - Elephant and Castle	U	93	29
Southwark - Lower Road	R	73	42
Southwark - South Circular Road	R	94	44
Southwark - Tower Bridge Road	R	99	62
Southwark - Vicarage Grove	R	92	59
Sutton - Beddington Lane north	I	99	42
Sutton - Beddington Village	R	99	40
Sutton - Wallington	K	90	93
Sutton - Worcester Park	K	96	86
Thurrock - Dock Road Tilbury	R	98	53
Thurrock - London Road (Grays) ^A	U	99	10
Thurrock - London Road (Purfleet)	R	96	98
Thurrock - Stanford-le-Hope ^{AA}	R	94	41
Tower Hamlets - Blackwall ^T	R	62	75
Tower Hamlets - Jubilee Park	U	86	26

Site Name	Type	Capture Rate (%)	Annual Mean NO _x as NO ₂ µg ^m ⁻³
Tower Hamlets - Mile End Road ^{AA}	R	96	40
Wandsworth - Battersea	R	75	44
Wandsworth - Lavender Hill (Clapham Jct)	R	21	61
Wandsworth - Putney High Street Facade	R	67	91
Wandsworth - Tooting High Street	R	45	78
Wandsworth - Wandsworth Town Hall	U	93	42
Waterloo Place (The Crown Estate) ^O	R	99	65
Westminster - Cavendish Square	R	100	56
Westminster - Covent Garden	U	99	31
Westminster - Duke Street (Grosvenor) ^O	R	95	45
Westminster - Ebury Street (Grosvenor) ^O	R	91	36
Westminster - Elizabeth Bridge	R	99	62
Westminster - Horseferry Road ^A	U	88	32
Westminster - Marylebone Road ^{AA}	K	99	93
Westminster - Oxford Street	K	100	72
Westminster - Oxford Street East	R	100	81
Westminster - Strand (Northbank BID) ^O	R	79	49
Windsor and Maidenhead - Aldebury Road	U	97	25
Windsor and Maidenhead - Clarence Road	R	99	52
Windsor and Maidenhead - Frascati Way	R	99	54

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, 2022). There are no AQS Objectives for NO_x.

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	28	no
Bexley - Slade Green	S	99	33	no
Brent - Ikea ^T	R	75	7	n/a
Camden - Bloomsbury ^A	U	95	14	no
City of London - Guildhall	U	76	24	no
Greenwich - Eltham ^{AA}	S	44	16	no
Greenwich - Falconwood	R	87	2	n/a
Greenwich - Plumstead High Street	R	91	0	yes
Greenwich - Westthorne Avenue ^T	R	89	8	n/a
Greenwich - Woolwich Flyover ^T	R	74	1	n/a
Hackney - Old Street ^T	R	78	11	no
Haringey - Priory Park South ^{AA}	U	69	22	no
Kensington and Chelsea - North Ken ^{AA}	U	92	16	no
Lewisham - Honor Oak Park	U	96	21	no
Redbridge - Ley Street	U	91	19	no
Reigate and Banstead - Poles Lane	RU	95	32	no
Sevenoaks - Greatness Park	U	98	32	no
Southwark - Elephant and Castle	U	98	23	no
Thurrock - London Road (Grays) ^A	U	99	22	no
Tower Hamlets - Blackwall ^T	R	99	1	yes
Waterloo Place (The Crown Estate) ^O	R	95	5	yes
Westminster - Marylebone Road ^{AA}	K	95	1	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

- Only 4 sites out of 14 which achieved the 90% data capture requirement met the 8 hourly mean AQS objective for O₃ of no more than ten days measuring a daily mean greater than or equal to 100 $\mu\text{g m}^{-3}$.
- 10 sites exceeded the objective: three sites in central London boroughs four sites in outer London boroughs and three sites outside London. These were all urban background, suburban or rural sites. This was an increase in the number of sites that exceeded the objective compared to 2021, when four sites exceeded the objective, but a similar number to 2020 when 11 sites exceeded the objective.
- O₃ is a regional pollutant and higher concentrations occur in hot sunny conditions. It is greater away from busy roads as it is scavenged by NO_x from traffic. The UK recorded its highest ever temperature of 40.3°C which occurred during one of three heatwave periods. This prolonged hot weather contributed to the increased number of sites exceeding the O₃ AQS objective, with several O₃ episodes during the summer.

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	88	0	n/a
Bexley - Slade Green ^{AA}	S	93	0	yes
Camden - Bloomsbury ^A	U	94	0	yes
Kensington and Chelsea - North Ken ^{AA}	U	60	0	n/a
Lambeth - Bondway Interchange	I	97	0	yes
Thurrock - London Road (Grays) ^A	U	91	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, 2022).

Summary

- All five 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.

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	99	18	yes	2	yes
Bexley - Belvedere	S	73	14	n/a	0	n/a
Bexley - Belvedere West	U	77	13	n/a	0	n/a
Bexley - Slade Green FIDAS ^{AA}	S	99	15	yes	5	yes
Brent - ARK Franklin Primary Academy	R	89	17	n/a	1	n/a
Brent - Ikea	R	95	28	yes	24	yes
Brent - John Keble Primary School	R	96	17	yes	1	yes
Brent - Neasden Lane	I	100	19	yes	3	yes
Bromley - Harwood Avenue	R	96	15	yes	0	yes
Camden - Bloomsbury ^A	U	95	17	yes	4	yes
City of London - Beech Street	R	90	17	yes	3	yes
City of London - Bell Wharf Lane	R	47	18	n/a	0	n/a
City of London - The Aldgate School	U	80	17	n/a	3	n/a
Ealing - Acton Vale	U	26	21	n/a	4	n/a
Ealing - Hanger Lane Gyrotory	R	93	18	yes	0	yes
Ealing - Horn Lane ^{AA}	I	35	33	n/a	13	n/a
Ealing - Horn Lane TEOM	I	98	26	yes	17	yes
Ealing - Western Avenue	R	100	25	yes	14	yes
Enfield - Bowes Primary School	R	84	18	n/a	5	n/a
Greenwich - A206 Burrage Grove	R	65	15	n/a	3	n/a
Greenwich - Blackheath	R	93	17	yes	3	yes
Greenwich - Falconwood	R	100	17	yes	2	yes
Greenwich - Fiveways Sidcup Rd A20	R	93	16	yes	3	yes
Greenwich - John Harrison Way	R	99	19	yes	3	yes
Greenwich - Plumstead High Street	R	42	13	n/a	0	n/a
Greenwich - Trafalgar Road (Hoskins St)	R	64	19	n/a	4	n/a
Greenwich - Westthorne Avenue	R	98	18	yes	2	yes
Greenwich - Woolwich Flyover	R	99	18	yes	4	yes
Hackney - Amhurst Road	R	27	20	n/a	0	n/a
Hackney - Homerton Library	R	27	20	n/a	0	n/a
Hackney - Old Street ^T	R	83	18	n/a	1	n/a
Hackney - Queensbridge Road	R	31	20	n/a	5	n/a
Harrow - Stanmore	U	77	14	n/a	0	n/a
Havering - Rainham	R	92	17	yes	3	yes
Havering - Romford	R	88	18	n/a	4	n/a
Islington - Arsenal	U	98	17	yes	3	yes
Islington - Holloway Road	R	100	18	yes	2	yes
Kingston Upon Thames - Cromwell Road	R	98	30	yes	21	yes
Kingston Upon Thames - Kingston Vale	R	77	17	n/a	1	n/a
Kingston Upon Thames - Tolworth Broadway	R	20	26	n/a	1	n/a
Lambeth - Bondway Interchange	I	95	37	yes	82	no

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?
Lewisham - Honor Oak Park ^{AA}	U	99	13	yes	3	yes
Lewisham - Loampit Vale	R	98	20	yes	3	yes
Lewisham - New Cross	R	35	24	n/a	1	n/a
London Teddington Bushy Park	S	97	14	yes	1	yes
Marylebone Road - BAM	K	82	22	n/a	6	n/a
Marylebone Road - Fidas	K	98	18	yes	6	yes
Merton - Merton Road	R	36	26	n/a	6	n/a
Newham - Cam Road	R	93	16	yes	4	yes
Newham - Wren Close	U	96	18	yes	4	yes
Redbridge - Gardner Close	R	56	18	n/a	2	n/a
Redbridge - Ley Street	U	83	15	n/a	0	n/a
Reigate and Banstead - Horley	S	91	14	yes	0	yes
Reigate and Banstead - Horley FDMS	S	90	14	yes	0	yes
Reigate and Banstead - Horley FIDAS	S	29	15	n/a	1	n/a
Reigate and Banstead - Poles Lane	RU	100	15	yes	0	yes
Richmond Upon Thames - Barnes Wetlands	S	99	14	yes	1	yes
Richmond Upon Thames - Castelnau	R	90	15	yes	1	yes
Sevenoaks - Bat and Ball	R	99	18	yes	3	yes
Sevenoaks - Greatness Park	U	97	16	yes	1	yes
Southwark - A2 Old Kent Road BAM ^{AA}	R	87	21	n/a	7	n/a
Southwark - A2 Old Kent Road FIDAS	R	97	18	yes	6	yes
Southwark - Elephant and Castle	U	94	16	yes	4	yes
Southwark - Lower Road	R	99	17	yes	5	yes
Southwark - South Circular Road	R	93	15	yes	2	yes
Southwark - Tower Bridge Road	R	100	16	yes	6	yes
Southwark - Vicarage Grove	R	100	17	yes	6	yes
Sutton - Beddington Lane north	I	95	20	yes	1	yes
Sutton - Beddington Village	R	96	19	yes	1	yes
Sutton - Wallington	K	98	20	yes	1	yes
Sutton - Worcester Park	K	99	18	yes	2	yes
Thurrock - London Road (Grays) ^A	U	91	17	yes	2	yes
Thurrock - London Road (Purfleet)	R	61	22	n/a	1	n/a
Thurrock - Stanford-le-Hope ^{AA}	R	83	17	n/a	3	n/a
Tower Hamlets - Jubilee Park	U	47	14	n/a	0	n/a
Wandsworth - Battersea	R	98	20	yes	7	yes
Wandsworth - Lavender Hill (Clapham Jct)	R	90	20	yes	1	yes
Wandsworth - Putney	U	91	15	yes	1	yes
Wandsworth - Putney High Street	K	91	20	yes	2	yes
Wandsworth - Tooting High Street	R	55	19	n/a	0	n/a
Waterloo Place (The Crown Estate) ^O	R	90	19	yes	5	yes
Westminster - Cavendish Square	R	80	24	n/a	5	n/a
Westminster - Oxford Street	K	99	22	yes	7	yes
Westminster - Oxford Street East	R	97	23	yes	6	yes
Windsor and Maidenhead - Frascati Way	R	100	23	yes	6	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, 2022), 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 55 sites that achieved the 90% data capture requirement met the annual mean AQS objective of 40 µg^m⁻³ for PM₁₀.
- One site did not meet the daily mean objective of no more than 35 days with a daily mean greater than 50 µg^m⁻³. This site is thought to be affected by a local source of particulate emissions and is classified as an industrial site.
- In 2021, the WHO announced new guidelines (WHO, 2021) which cut the PM₁₀ recommended annual mean limit to 15 µg^m⁻³. Only 11 sites with at least 90% data capture achieved the guideline value, with 80% of sites exceeding this target.

3.7 Particulate Matter PM_{2.5}

Site Name	Type	Instrument	Capture Rate (%)	Annual Mean ug ^m - ³
Bexley - Belvedere	PM2.5	S	FDAS	66
Bexley - Belvedere West	PM2.5	U	FDAS	63
Bexley - Slade Green FIDAS ^{AA}	PM2.5	S	FDAS	100
Brent - ARK Franklin Primary Academy	FINE	R	TEOM*	95
Brent - Ikea	PM2.5	R	BAMH	99
Bromley - Harwood Avenue	PM2.5	R	BAMH	97
Camden – Bloomsbury ^A	PM2.5	U	FDMS	60
City of London - Farringdon Street	PM2.5	K	BAMH	91
City of London - The Aldgate School	PM2.5	U	BAMH	71
Croydon - Norbury Manor	PM2.5	U	BAMH	69
Greenwich - A206 Burrage Grove	PM2.5	R	FDMS	95
Greenwich – Eltham ^{AA}	PM2.5	S	FDAS	49
Greenwich - Falconwood FDMS	PM2.5	R	FDMS	37
Greenwich - John Harrison Way	PM2.5	R	FDMS	85
Greenwich - Plumstead High Street	PM2.5	R	FDMS	60
Greenwich - Trafalgar Road (Hoskins St)	FINE	R	TEOM*	90
Greenwich - Westthorne Avenue	PM2.5	R	FDMS	58
Hackney - Old Street ^T	PM2.5	R	BAMH	22
Havering - Rainham	PM2.5	R	FDMS	93
Kensington and Chelsea - North Ken ^{AA}	PM2.5	U	FDMS	89
Kingston Upon Thames - Tolworth Broadway	PM2.5	R	BAMH	55
Lambeth - Brixton Road	PM2.5	K	FDMS	80
Lewisham - Deptford	PM2.5	U	BAMH	98
Lewisham - Honor Oak Park	PM2.5	U	FDAS	99
Lewisham - New Cross	PM2.5	R	FDMS	64
Newham - Cam Road	PM2.5	R	BAMH	99
Newham - Wren Close	PM2.5	U	BAMH	97
Redbridge - Gardner Close	FINE	R	BAM*	66
Redbridge - Ley Street	PM2.5	U	BAMH	85
Reigate and Banstead - Horley FIDAS	PM2.5	S	FDAS	29
Southwark - A2 Old Kent Road FIDAS	PM2.5	R	FDAS	98
Southwark - Elephant and Castle	PM2.5	U	FDAS	94
Southwark - Lower Road	PM2.5	R	FDAS	99
Southwark - South Circular Road	PM2.5	R	FDAS	83
Southwark - Tower Bridge Road	PM2.5	R	FDAS	100
Southwark - Vicarage Grove	PM2.5	R	FDAS	100
Sutton - Beddington Lane north	PM2.5	I	BAMH	97
Thurrock - Dock Road Tilbury	PM2.5	R	BAMH	94
Thurrock - Stanford-le-Hope ^{AA}	PM2.5	R	BAMH	84
Tower Hamlets – Blackwall ^T	PM2.5	R	FDMS	46
Tower Hamlets - Jubilee Park	PM2.5	U	FDAS	47
Waterloo Place (The Crown Estate) ^O	PM2.5	R	FDAS	91
Westminster - Elizabeth Bridge	PM2.5	R	BAMH	96

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, 2022). 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 21 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.
- In 2021, the WHO recommended this limit be reduced to $5 \mu\text{g m}^{-3}$ (WHO, 2021) as an annual mean based on increased evidence of the harm caused by these very small particles. No sites achieved this target in 2022.

4 References

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