London Borough of Merton Air Quality Annual Status Report for 2021

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This report provides a detailed overview of air quality in the London Borough of Merton during 2021. It has been produced to meet the requirements of the London Local Air Quality Management (LLAQM) statutory process[1].

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[1] LLAQM Policy and Technical Guidance 2019 (LLAQM.TG(19))

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Abbreviations

Abbreviation	Description
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
BEB	Buildings Emission Benchmark
CAB	Cleaner Air Borough
EV	Electric Vehicle
GLA	Greater London Authority
LAEI	London Atmospheric Emissions Inventory
LAQM	Local Air Quality Management
LLAQM	London Local Air Quality Management
NRMM	Non-Road Mobile Machinery
PM_{10}	Particulate matter less than 10 micron in diameter
$PM_{2.5}$	Particulate matter less than 2.5 micron in diameter
TEB	Transport Emissions Benchmark
TfL	Transport for London

Table A. Summary of National Air Quality Standards and Objectives

Pollutant	Standard / Objective (UK)	Averaging Period	Date[(1)]
Nitrogen dioxide (NO_2)	200 µg m^{-3} not to be exceeded more than 18 times a year	1-hour mean	31 Dec 2005
Nitrogen dioxide (NO_2)	40 µg m^{-3}	Annual mean	31 Dec 2005
Particles (PM_{10})	50 µg m^{-3} not to be exceeded more than 35 times a year	24-hour mean	31 Dec 2004
Particles (PM_{10})	40 µg m^{-3}	Annual mean	31 Dec 2004
Particles ($PM_{2.5}$)	25 µg m^{-3}	Annual mean	2020
Particles ($PM_{2.5}$)	Target of 15% reduction in concentration at urban background locations	3-year mean	Between 2010 and 2020
Sulphur dioxide (SO_2)	266 µg m^{-3} not to be exceeded more than 35 times a year	15-minute mean	31 Dec 2005
Sulphur dioxide (SO_2)	350 µg m^{-3} not to be exceeded more than 24 times a year	1-hour mean	31 Dec 2004
Sulphur dioxide (SO_2)	125 µg m^{-3} mot to be exceeded more than 3 times a year	24-hour mean	31 Dec 2004

Notes:

(1) Date by which to be achieved by and maintained thereafter

1. Air Quality Monitoring

Air quality is a complex area of science with many variables to be considered. Monitoring needs to be carried out over an extended period of time in order to show real-world trends. It is affected by, temperature, weather, geography/local conditions and wind direction. It is not necessarily accurate to compare one year's data with the next without considering all the variable factors. However, this does provide an 'indication' of local changes.

As with all London boroughs the National Air Quality Objectives are exceeded at multiple locations in Merton, almost entirely along main roads and associated with traffic. There are two pollutants we are legally required to measure at this time, these are, nitrogen dioxide (NO_2) and Particulate Matter (PM_{10}). NO_2 is almost entirely linked to combustion and a reliable indicator of pollution arising from traffic, this is because it is generally not naturally occurring outside lightning strikes. Particulates, however, exist throughout the environment with many incidents or episodes of pollution being caused nationally or globally.

There are two automatic monitoring stations located in Merton, a nitrogen dioxide analyser at the Civic Centre in Morden and the second, a particulate matter (PM_{10}) monitor in South Wimbledon. These stations are expensive to install and maintain and so using them at multiple locations is cost prohibitive, they produce accurate, real-time data that feed into the London Air Quality Network (LAQN) and can be viewed on the LondonAir website, www.londonair.org . All data undergoes quality assurance and quality control (QA/QC) procedures to ensure that the data is of a high quality. The standards of QA/QC at LAQN sites are similar to those of the Government's national Automatic Urban and Rural Network (AURN) sites. All data has traceability to national standards and operational procedures are defined for the LAQN. For quality assurance purposes, all continuous analysers are manually checked and calibrated every two weeks, serviced every six months and audited by an independent auditor the National Physical Laboratory (NPL) every six months. Data management and ratification is undertaken by the Environmental research Group (ERG) at Imperial College London.

Merton Council also undertakes non-automatic monitoring of nitrogen dioxide (NO_2) using diffusion tubes, this provides a comprehensive coverage of all hotspots including most main roads and town centres throughout the borough. All sites are kept under constant review and a few will be amended or moved, often in response to requests for more relevant monitoring during the year. Diffusion tubes offer a relatively inexpensive means of gauging NO_2 concentrations at multiple locations across the borough. The results provide monthly NO_2 averages and can be used to compare measured concentrations with the annual mean NO_2 objective following annualisation. The accuracy of diffusion tube data is improved by comparing results with automatic monitoring data and applying a bias adjustment factor which is calculated by the National Physical Laboratory (NPL).

Effects of the COVID-19 Pandemic (2020-2021)

As in 2020, the latest monitoring data for 2021 appear to be influenced by COVID-19, manifesting in a borough wide reduction as compared to pre-pandemic data. The diffusion tube data provides a detailed local picture of the impact that the pandemic has had on localised pollution in the borough. Air pollution in the London Borough of Merton still exceeds the annual mean National Air Quality Objective for nitrogen dioxide in multiple locations but a marked reduction from 2019 during the sustained pandemic situation has been observed. It is vital that bold measures are taken to maintain the gains in air quality seen over the last two years, and there is still a need for Merton to be designated as an Air Quality Management Area (AQMA) and to pursue continued improvements in air quality.

In August 2019 an extensive ‘school air quality monitoring programme’ was initiated by Merton Council to gather information about actual nitrogen dioxide exposure at schools and to determine where any necessary mitigation or additional measures are required. Diffusion tubes were located at all educational institutions in the borough recorded on the Gov.UK register of schools. Initial ‘screening’ data indicated that the majority of educational sites are ‘low risk’. Following on from this extended monitoring period where monitoring found nitrogen dioxide concentrations to be potentially close to, or in excess of the annual air quality objective those sites

were added to the main diffusion tube network for observation, the results are presented in Appendix C Diffusion Tube Results for Schools Monitoring Programme.

The London Borough of Merton continues to support community air quality monitoring and provides training and nitrogen dioxide diffusion tubes to dedicated community groups. During 2021 Sustainable Merton and Wimbledon Park Residents Association carried out diffusion tube monitoring to investigate localised areas of concern, all available data is reported in Appendix D Diffusion Tube Results for Citizen Science Monitoring. Any new hot spots identified by through community monitoring are considered for addition to the council's diffusion tube monitoring network.

1.1 Locations

Table B. Details of Automatic Monitoring Sites for 2021

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance from monitoring site to relevant exposure (m)	Distance to kerb of nearest road (N/A if not applicable) (m)	Inlet height (m)	Pollutants monitored	Monitoring technique
ME2	Merton Road, South Wimbledon	525808	170122	Roadside	Y	3	0.6	1.6	PM_{10}	BAM
ME9	Civic Centre, Morden	525588	168498	Roadside	Y	0.6	3.0	2.5	NO_2	Chemiluminescent

Table C. Details of Non-Automatic Monitoring Sites for 2021

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance to kerb of nearest road (N/A if not applicable) (m)	Distance from monitoring site to relevant exposure (m)	Inlet height (m)	Pollutants monitored	Tube co-located with an automatic monitor? (Y/N)
1	A298 Bushey Rd nr Bushey Ct, SW20	523139	169056	Roadside	Y	1.5	15.3	2.5	NO_2	N
2 (GA)	A24 Jct with Garth Drive Morden, SM3 9HU	524131	166112	Roadside	Y	1.7	12.2	2.4	NO_2	N
3	A24 Jct Tudor Drive, SM4 4PE	524137	166122	Kerbside	Y	0.7	9.6	2.4	NO_2	N
4 (FA)	154 Grand Drive Raynes Park	523315	168048	Kerbside	Y	0.9	3.6	2.4	NO_2	N
5 (BA)	Sacred Heart Sch, Burlington Road New Malden	522501	168235	Kerbside	Y	0.7	7.9	2.4	NO_2	N
6 (JC)	17 Grand Drive Raynes Park	523207	169195	Kerbside	Y	0.3	8.4	2.4	NO_2	N

7	A298 Kingston Rd, SW20 8LX	524401	169351	Roadside	Y	1.5	8.3	2.4	NO_2	N
8	A238 Coombe Lane, SW20 8NF	523246	169333	Kerbside	Y	0.6	2	2.2	NO_2	N
9	2 Lambton Rd, SW20	523241	169415	Kerbside	Y	0.5	3.6	2.2	NO_2	N
10	A238 Coombe Lane, SW20	521912	169806	Roadside	Y	1.7	16.4	2.4	NO_2	N
11	Kingston Rd SW20 1JW	525602	170042	Kerbside	Y	0.4	3.4	2.4	NO_2	N
12 (RA)	Pepys Road Morden	523357	169534	Kerbside	Y	0.6	10.1	2.4	NO_2	N
13	B281 Cottenham Pk Rd, SW20	522069	169765	Kerbside	Y	0.6	12.4	2.2	NO_2	N
14 (AC)	20 The Ridgeway Wimbledon	524120	170874	Kerbside	Y	0.4	1.5	2.4	NO_2	N
15	20 High St,Wimbledon, SW19 5BY	523808	171100	Kerbside	Y	0.5	2.8	2.2	NO_2	N

16	84 High St, Wimbledon, SW19	524071	171076	Kerbside	Y	0.6	2.9	2.2	NO_2	N
17 (WA)	Woodside Wimbledon	524608	170873	Kerbside	Y	0.5	6.7	2.4	NO_2	N
18	Hand & Racquet, Wimbledon Hill	524696	170725	Kerbside	Y	0.3	2.6	2.4	NO_2	N
19	Wimbledon Station	524770	170645	Roadside	Y	2.5	3.6	2.4	NO_2	N
20	Hartfield Rd, Wimbledon b	524867	170500	Kerbside	Y	0.4	4.8	2.2	NO_2	N
21 (EA)	246 Merton Rd, Sth Wimbledon A219	525798	170081	Roadside	Y	0.5	1.9	2.4	NO_2	N
22	12-16 Upper Green West, CR4 3AA	527785	169049	Roadside	Y	2	4.2	2.4	NO_2	N
23	183 Kingston Rd, SW19 1LH	525156	169935	Kerbside	Y	0.6	1.9	2.2	NO_2	N
24	75 Hartfield Rd SW19 3TJ	524994	170329	Kerbside	Y	0.7	4.1	2.4	NO_2	N
25	Alexander Rd, SW19 7LE	525132	171174	Roadside	Y	2.1	4	2.2	NO_2	N

26	Gap Rd, SW19 8JG	525708	171413	Roadside	Y	2.3	5.1	2.2	NO_2	N
27	Plough Lane	526035	171472	Roadside	Y	2.3	6.5	2.2	NO_2	N
28 (BC)	11 Haydons Road SW19 1HG	526158	170167	Roadside	Y	2.4	5.9	2.4	NO_2	N
29 (HA)	A24 - 44 High St Colliers Wood, SW19 2AB	526927	170654	Kerbside	Y	0.7	2.6	2.4	NO_2	N
30	A24 Christchurch Rd, SW19 2PB	526791	170087	Roadside	Y	0.3	3	2.4	NO_2	N
31 (LA)	Alley Charminster Ave Morden	525449	169152	Background	Y	15	9	2.4	NO_2	N
32	Merantum Way, SW19 2JY	526109	169818	Kerbside	Y	0.8	4.8	2.4	NO_2	N
33	A24 Morden Rd, SW19 3BP	525803	169467	Roadside	Y	2.7	3.6	2.2	NO_2	N
34 (GC)	Western Rd Colliers Wood	526840	169694	Roadside	Y	2	2.3	2.2	NO_2	N
35 (MA)	Lavender Ave Morden	527621	169646	Kerbside	Y	0.4	5.8	2.2	NO_2	N

36 (DC)	35 London Rd Tooting	527913	170518	Roadside	Y	1.5	1.9	2.4	NO_2	N
37 (CC)	107 London Rd Tooting	527932	169502	Kerbside	Y	0.6	2.4	2.4	NO_2	N
38 (EC)	BHF, 265 London Rd, Mitcham	527743	168874	Kerbside	Y	0.6	4.2	2.4	NO_2	N
39 (FC)	Church Rd, Mitcham	527158	168646	Kerbside	Y	0.6	3	2.4	NO_2	N
40	A217 London Rd, CR4 4BF	527370	168312	Kerbside	Y	0.8	5.4	2.4	NO_2	N
41	A239 Morden Rd, SM4 6AU	526395	168172	Roadside	Y	1.5	3.1	2.4	NO_2	N
42	St Hellier Rd, SM4 6JE	526211	167683	Roadside	Y	3.3	12.8	2.4	NO_2	N
43	Morden Hall Rd nr jct, SM4 5JG	526151	168293	Roadside	Y	2.4	22.2	2.3	NO_2	N
44 (AA)	Oxfam, London Rd, Morden	525817	168643	Kerbside	Y	0.6	4.9	2.4	NO_2	N
45 (IC)	HSBC, London Rd Morden	525778	169824	Kerbside	Y	0.9	2.6	2.4	NO_2	N
46 (HC)	80 Crown Lane Morden	525401	168502	Kerbside	Y	0.6	5	2.4	NO_2	N

47	Civic Centre, Morden	525588	168498	Roadside	Y	1.5	1.5	2.4	NO_2	Y
48	Aberconway Rd, SM4 5LF	525757	168509	Roadside	Y	1.2	7.7	2.4	NO_2	N
49	Crown Rd, Jcn Stanley Rd	525500	168470	Kerbside	Y	0.8	2.9	2.4	NO_2	N
50	Martin Way, SM4 4AR	524638	168616	Kerbside	Y	0.7	9.7	2.4	NO_2	N
51	A24 Streatham Rd nr Sandy Lane/Gorringe Pk Sch	528219	169782	Roadside	Y	1.6	5.2	2.4	NO_2	N
52	West Barnes Lane nr level crossing	522749	168500	Kerbside	Y	0.6	1.4	2.4	NO_2	N
53	A24 139 Epsom Rd, nr traffic lights, SM3 9EY	524621	166786	Kerbside	Y	0.7	3.6	2.4	NO_2	N
54	43 Upper Green East, Mitcham, CR4 2PF	527890	168920	Roadside	Y	2.4	2.0	2.3	NO_2	N
55	213 Manor Road, Mitcham, CR4 1JH	529661	168839	Kerbside	Y	0.6	5.2	2.2	NO_2	N

1.2 Comparison of Monitoring Results with AQOs

The results presented are after adjustment using the national bias adjustment factor (refer to Appendix A2 for details). Annualisation was not required at any site in the main Merton diffusion network in 2021, as all sites achieved a data capture rate of 75% or higher.

Where the annual mean is 10% of, or above, the 40μg m^{-3} Air Quality Objective (AQO) relevant exposure has been calculated, refer to Table N, Appendix A3 for corrected data. All data presented in Table D has not been corrected for distance and represent a worst-case picture.

Notes:

Any ID's from 2016 or earlier are in brackets. Full site descriptions and the 2021 monitoring data for the revised network are provided in Table C.

Table D. Annual Mean NO_2 Ratified and Bias-adjusted Monitoring Results

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (μg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
ME9	Civic Centre, Morden	RS Automatic			34	Faulty	Faulty	**48**	**51**	**41(43)**	Insufficient valid results available for this year.

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
1	A298 Bushey Rd nr Bushey Ct, SW20	RS DT	100	100	not open	not open	**52**	**48**	**47**	34	36
2 (GA)	A24 Jct with Garth Drive Morden, SM3 9HU	RS DT	100	83	32	32[d]	**41[c]**	37	36	27	30
3	A24 Jct Tudor Drive, SM4 4PE	KS DT	closed	closed	not open	not open	34	closed	closed	closed	closed
4 (FA)	154 Grand Drive Raynes Park	KS DT	100	83	32	39[d]	37	30	30	27	28
5 (BA)	Sacred Heart Sch, Burlington Road New Malden	KS DT	100	100	28	32[c]	**42**	38	33	27	29

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
6 (JC)	17 Grand Drive Raynes Park	KS DT	100	100	N/A	34[d]	**45**	**43**	**43**	33	35
7	A298 Kingston Rd, SW20 8LX	RS DT	100	92	not open	not open	**44**	**46**	**41**	33	34
8	A238 Coombe Lane, SW20 8NF	KS DT	100	100	not open	not open	**53**	**43**	**46**	38	38
9	2 Lambton Rd, SW20	KS DT	100	100	not open	not open	**43**	**47**	**43**	37	35
10	A238 Coombe Lane, SW20	RS DT	closed	closed	not open	not open	38	**44**	closed	closed	closed
11	Kingston Rd SW20 1JW	KS DT	100	100	not open	not open	35	35	34	28	28
12 (RA)	Pepys Road Morden	KS DT	closed	closed	26	36	30	closed	closed	closed	closed

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
13	B281 Cottenham Pk Rd, SW20	KS DT	100	100	not open	not open	**44**	37	35	23	24
14 (AC)	20 The Ridgeway Wimbledon	KS DT	100	100	N/A	**45**[d]	**44**	**42**	**44**	27	28
15	20 High St, Wimbledon, SW19 5BY	KS DT	closed	closed	not open	not open	26	26	closed	closed	closed
16	84 High St, Wimbledon, SW19	KS DT	100	100	not open	not open	39	**45**	**45**	33	36
17 (WA)	Woodside, Wimbledon	KS DT	closed	closed	25	37	30	closed	closed	closed	closed
18	Hand & Racquet, Wimbledon Hill	KS DT	92	100	not open	not open	**64**	**66**	**65**	**57**	**58**

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
19	Wimbledon Station	RS DT	100	100	not open	not open	**52**	**55**	**51**	**40**	**40**
20	Hartfield Rd, Wimbledon	KS DT	100	100	not open	not open	**48**	**55**	**52**	39	**47**
21 (EA)	246 Merton Rd, South Wimbledon A219	KS DT	100	92	**65**	**61[d]**	**57**	**69**	**63**	**52**	**59**
22	12-16 Upper Green West, Mitcham, CR4 3AA	RS DT	100	83	not open	not open	**77**	**64**	**57**	**47**	**44**
23	183 Kingston Rd, Wimbledon, SW19 1LH	KS DT	100	100	not open	not open	**61**	**58**	**55**	**49**	**46**

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
24	75 Hartfield Rd, Wimbledon, SW19 3TJ	KS DT	100	92	not open	not open	38	39	32	31	29
25	Alexander Rd, Wimbledon, SW19 7LE	RS DT	100	83	not open	not open	**41**	39	**40**	32	34
26	Gap Rd, Wimbledon, SW19 8JG	RS DT	100	100	not open	not open	**47**	**45**	**45**	34	35
27	Plough Lane, Wimbledon, SW19	RS DT	100	100	not open	not open	**46**	**46**	**42**	32	32
28 (BC)	11 Haydons Road, Wimbledon, SW19 1HG	RS DT	100	92	N/A	**54[d]**	**46**	**49**	**43**	33	31

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
29 (HA)	A24 - 44 High St Colliers Wood, SW19 2AB	KS DT	100	100	31	**50**[c,d]	**61**	**66**	**60**	**45**	**46**
30	A24 Christchurch Rd, Colliers Wood, SW19 2PB	KS DT	100	100	not open	not open	**48**	**51**	**51**	35	36
31 (LA)	Alley Charminster Ave, Morden	BG DT	100	92	17	24	20	21	20	15	15
32	Merantum Way, Wimbledon, SW19 2JY	KS DT	100	92	not open	not open	**42**	38	35	29	29

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
33	A24 Morden Rd, Colliers Wood, SW19 3BP	RS DT	100	83	not open	not open	**49**	**48**	**47**	34	37
34(GC)	Western Rd, Colliers Wood	RS DT	100	83	**53**	**64[d]**	**59**	**55**	**54**	**43**	**41**
35 (MA)	Lavender Ave, Mitcham	KS DT	100	100	32	39	31	31	29	25	24
36 (DC)	35 London Rd, Tooting	RS DT	100	100	**45**	**57[d]**	**42**	**47**	**40**	33	34
37 (CC)	107 London Rd, Mitcham	KS DT	100	100	**64**	**62[d]**	**61**	**67**	**56**	**41**	**44**
38 (EC)	BHF, 265 London Rd, Mitcham	KS DT	100	100	37	39[d]	**41**	**44**	**41**	33	35
39 (FC)	Church Rd Mitcham	KS DT	100	100	37	**41[d]**	**45**	**48**	**40**	30	30

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
40	A217 London Rd, Mitcham, CR4 4BF	KS DT	100	100	not open	not open	**46**	**52**	**41**	33	33
41	A239 Morden Rd, Mitcham, CR4 6AU	RS DT	100	83	not open	not open	**41**	**48**	**45**	**41**	**40**
42	St Hellier Rd, Morden, SM4 6JE	RS DT	100	100	not open	not open	35	38	**42**	34	38
43	Morden Hall Rd nr jct, Morden SM4 5JG	RS DT	100	92	not open	not open	**44**	**50**	**45**	36	39
44 (AA)	Oxfam, London Rd, Morden	KS DT	100	100	N/A	38[c,d]	**57**	**62**	**62**	**51**	**54**
45 (IC)	HSBC, London Rd Morden	KS DT	100	100	**40**	**45[c,d]**	**45**	**48**	**48**	**43**	38

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
46 (HC)	80 Crown Lane, Morden	KS DT	100	83	**46**	**48[d]**	**61**	**53**	**49**	**42**	**40**
47	Civic Centre, Morden	RS DT	100	92	not open	not open	**51**	**51**	**52**	**44**	**42**
48	Aberconway Rd, Morden, SM4 5LF	RS DT	100	92	not open	not open	**41**	**42**	39	31	31
49	Crown Rd, Jcn Stanley Rd, Morden	KS DT	100	100	not open	not open	39	**40**	39	30	30
50	Martin Way, Morden, SM4 4AR	KS DT	100	100	not open	not open	**45**	**43**	**40**	31	33
51	A24 Streatham Rd nr Sandy Lane/Gorringe Park School, Mitcham	RS DT	100	92	not open	not open	not open	38	33	26	30

Site ID	Site Name	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2020 % [b]	Annual Mean Concentration (µg m^{-3})						
					2015[c]	2016 [c]	2017 [c]	2018 [c]	2019 [c]	2020 [c]	2021 [c]
52	West Barnes Lane nr level crossing	KS DT	100	100	not open	not open	not open	35	30	25	25
53	A24 139 Epsom Rd, nr traffic lights, Morden, SM3 9EY	KS DT	100	92	not open	not open	not open	**43**	**51**	**41**	**48**
54	43 Upper Green East, Mitcham, CR4 2PF	RS DT	100	92	not open	not open	not open	not open	**62**	**47**	**49**
55	213 Manor Road, Mitcham, CR4 1JH	KS DT	100	92	not open	not open	not open	not open	**45**	36	37

Notes over page

Notes

The annual mean concentrations are presented as µg m^{-3}.

Exceedances of the NO_2 annual mean AQO of 40 µg m^{-3} are shown in **bold**.

NO_2 annual means in excess of 60 µg m^{-3}, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias.

All means have been "annualised" in accordance with LLAQM.TG(19) if valid data capture for the calendar year is less than 75% and greater than 33%.

Results have been distance corrected where applicable see Appendix A, Table N for corrected data.

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

(b) data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

Notes about the data:

Table D shows the NO_2 diffusion tube monitoring results, with bias corrected values for each year from 2015 to 2021. (Note – see Table O for the uncorrected monthly data for 2021).

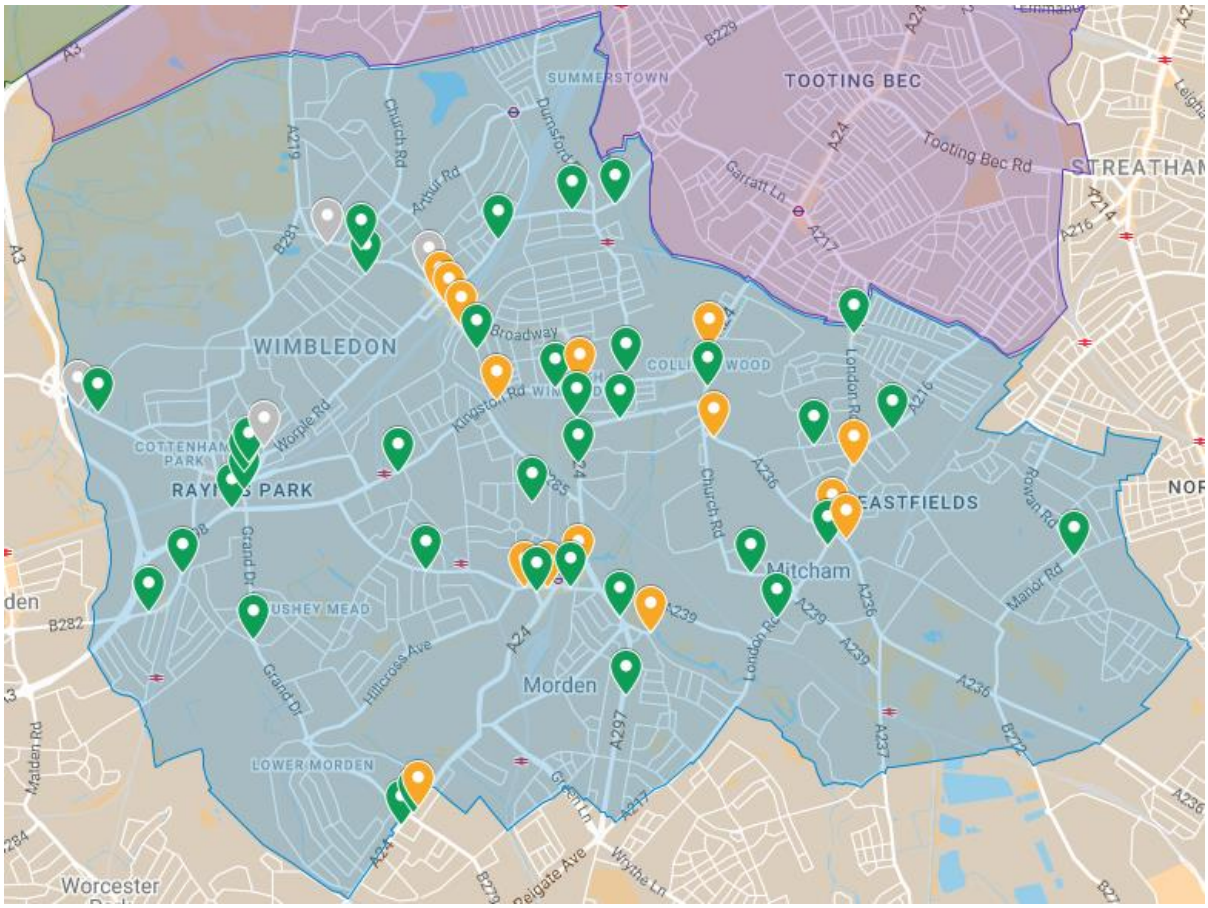
Prior to 11th October 2017 continuous monitoring of nitrogen dioxide was measured by instrument ME1. The roadside site was located at Morden Civic Centre and suffered a series of faults during 2016, no data is available for 2016 and 2017 for this reason. A new chemiluminescent NO_2 analyser was installed on the 11th October 2017 identified as ME9.

The results in bold indicate an exceedance of the annual mean Air Quality Objective (AQO) of 40 μgm^{-3} and the results underlined indicate an NO_2 annual mean in excess of 60 μgm^{-3} highlighting a potential exceedance of the NO_2 hourly mean AQO. Diffusion tube have been bias corrected (for details see

Appendix A Details of Monitoring Site Quality QA/QC), as the data capture was above 75% at all sites annualisation was not necessary. The overall the data capture rate in 2021 95% which is very good.

The distance correction calculations for monitoring sites that exceeded the annual mean objective are presented in Appendix A, Table N. Nitrogen dioxide concentration reduces rapidly with distance from the kerbside, the data in Table N shows what a substantial effect distance has on a roadside / kerbside measurement. After correcting for distance, 3 sites out of 50 are still predicted to exceed the annual mean AQO at the nearest sensitive receptor, that is the NO_2 concentration is predicted to be above 40 μgm^{-3}.

Figure 1: London Borough of Merton mapped 2021 NO_2 concentrations



Legend

Compliant site:

Annual mean NO_2 below 40 μgm^{-3}

Non-compliant site:

Annual mean NO_2 above 40 μgm^{-3} but below 60 μgm^{-3}

Closed site:

Following continued compliance with the annual mean air quality objective this site was closed to redirect monitoring resources to a new location.

Figure 2: Long term NO_2 concentration trends in Merton 2012-2021 (all data bias adjusted). *Presented in the following 4 charts.*

Chart 1 of 4: Raynes Park / New Malden

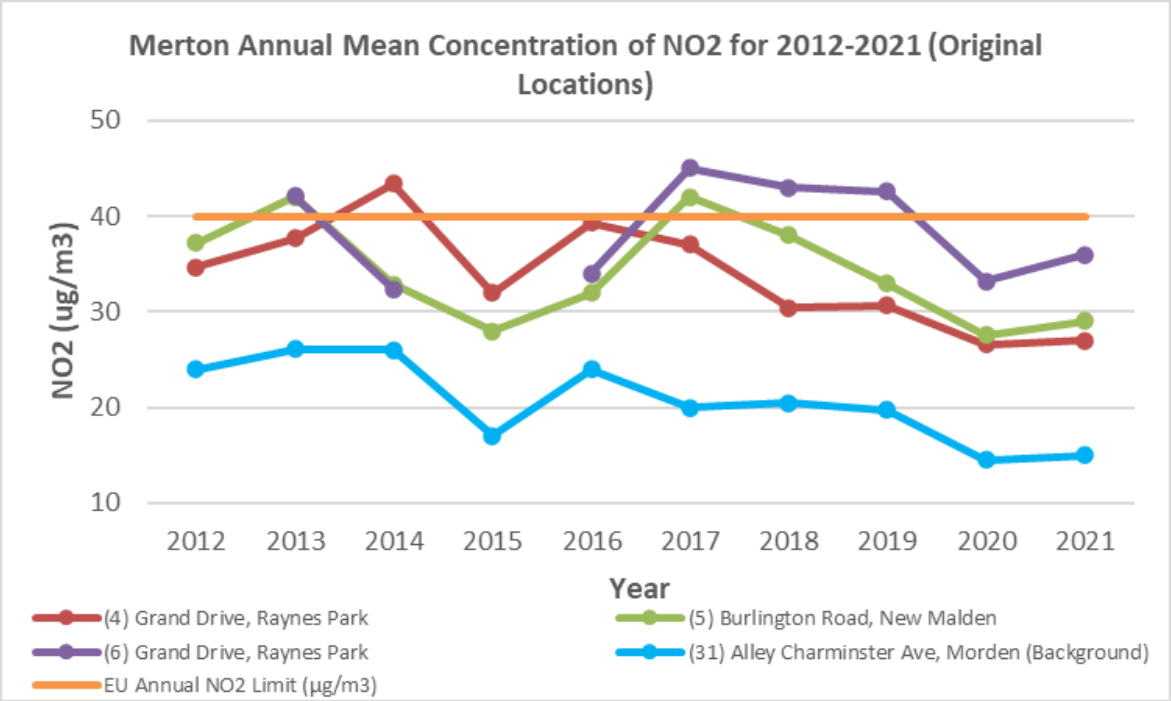


Chart 2 of 4: Wimbledon / South Wimbledon / Colliers Wood

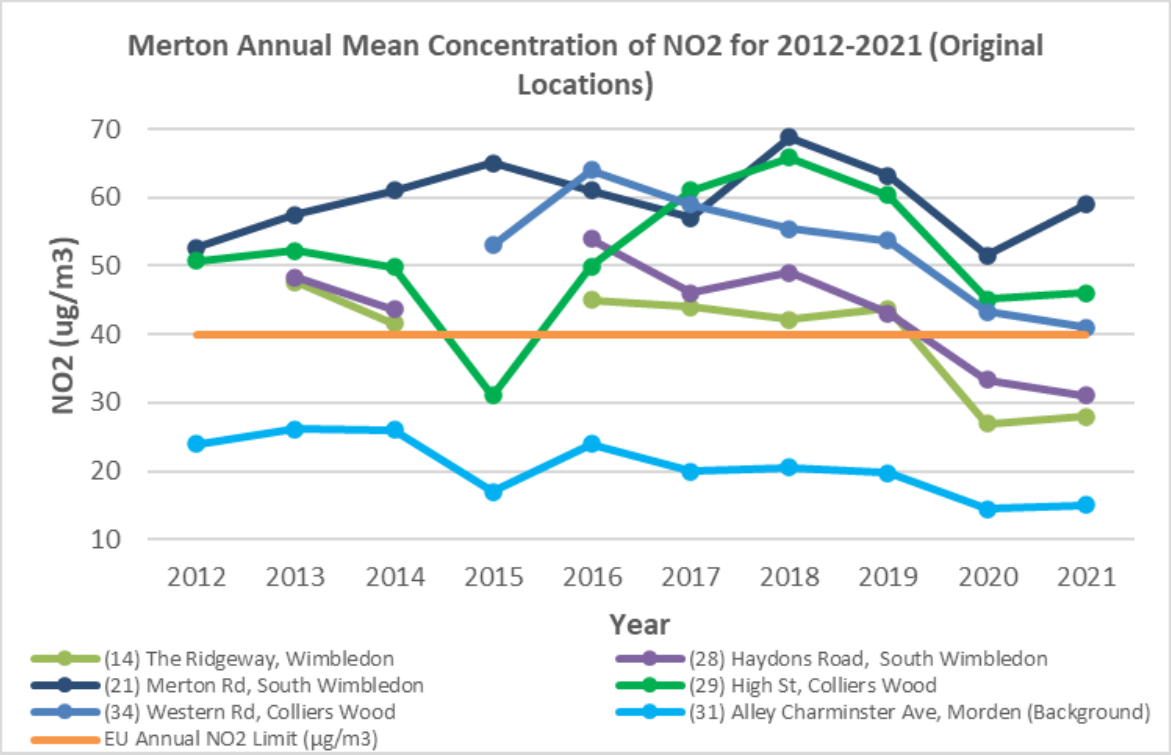


Chart 3 of 4: Morden

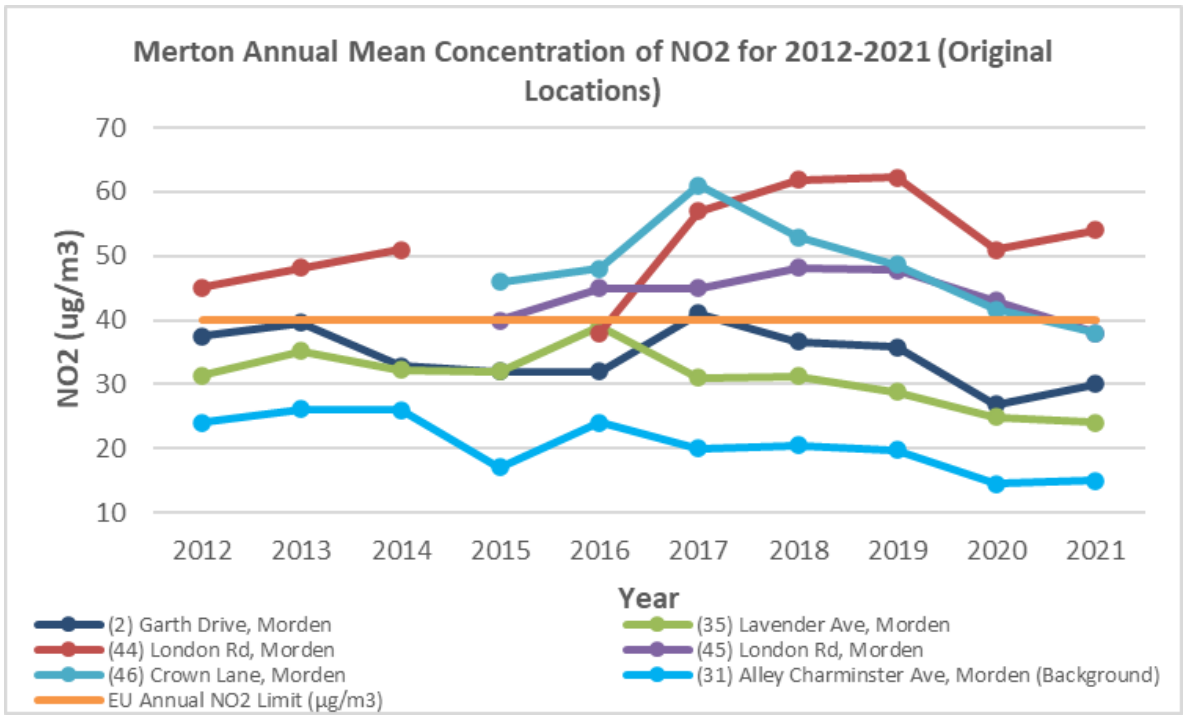
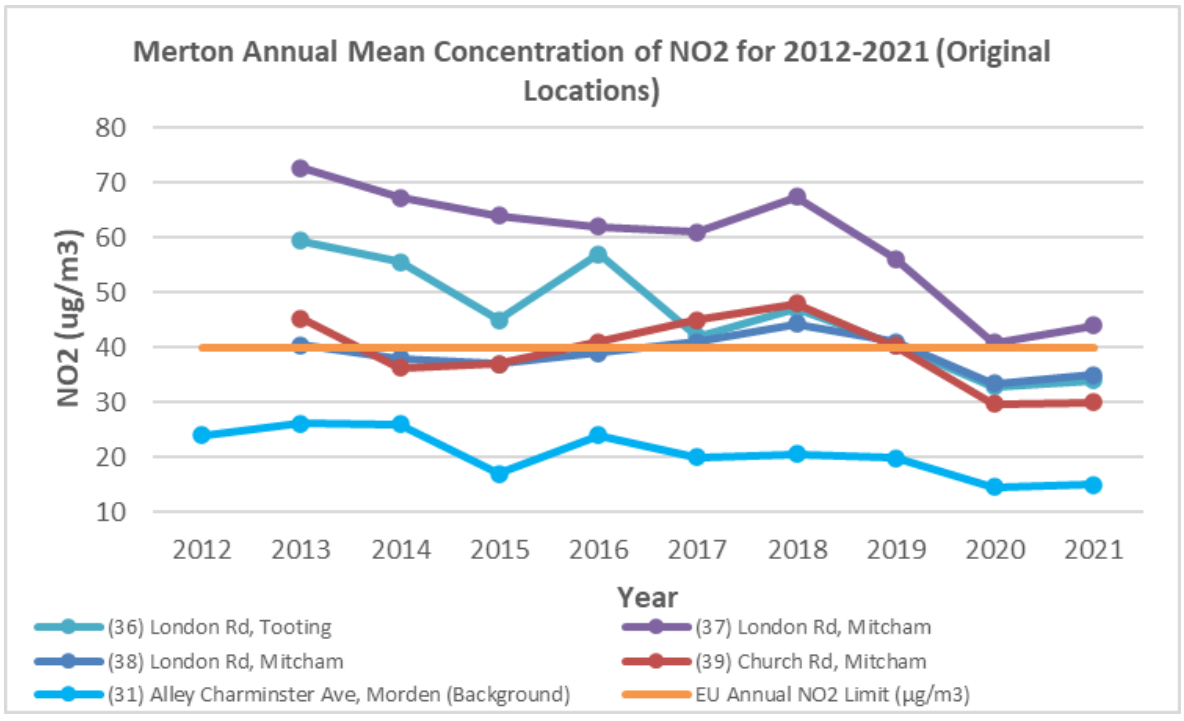


Chart 4 of 4: Mitcham / Tooting



Notes:

The site ID is provided in the chart legend in brackets and can be used to review full location details provided in Table C.

Data for Merton's background site has been included in all charts to aid the comparison of roadside/kerbside data with background concentrations.

Diffusion Tube Data Analysis

In 2021 the diffusion tube network consisted of 50 monitoring locations across Merton. The original diffusion tube network of 20 monitoring locations was incorporated into the 2017 revised network to help assess trends over time. For London boroughs, as per LLAQM.TG(19) paragraph 3.10, current guidance states that the last four years of monitoring data should be considered, and a trend analysis undertaken to identify any significant changes. Over the last four years nitrogen dioxide concentrations have on the whole decreased across Merton.

The results from the 2021 monitoring (Table D) show that the objective of 40 μgm^{-3} was exceeded at 15 monitored locations in the borough which is 33% of sites, a visual overview of compliance is provided in Figure 1. Long term monitoring data (2012-2021) is available for 20 locations in the borough and is charted in Figure 2 across 4 charts, the locations have been grouped geographically. The impact of COVID-19 manifested in a steep drop in NO_2 at all of these monitoring locations. Most significantly, all annual mean NO_2 concentrations were below an annual mean of 60 μgm^{-3} indicating that the 1 hour-mean objective is likely to have been achieved across the borough and in all town centres, this was first achieved in 2020 and has been maintained in 2021.

It was stated in the 2020 Annual Status Report (ASR) that all results for 2020 should be treated with caution due to the COVID-19 pandemic affecting traffic volume and in turn pollutant concentrations. Although restrictions were not as strict in 2021 the influence on COVID-19 was still very much present and continued to influence behaviour, as such a similar note of caution is applied to the 2021 data.

The main source of pollution in town centres remains road traffic, it is essential that bold measures are taken to remove the dirtiest vehicles and reduce vehicle numbers to relieve congestion so that pollution does not return to pre-COVID-19 concentrations.

As nitrogen dioxide concentrations are heavily dependent on road transport, transport colleagues in Future Merton were consulted for their insights into the possible reasons for the reduction in NO_2 measured across the borough from 2019. The feeling is that although Merton is one of London boroughs with the most school streets and Merton

has also been developing Low Traffic Neighbourhoods (LTN) in the last two years, the bulk of the improvement should probably be attributed to COVID-19, given the timescales.

Other contributing factors to NO_2 reduction are thought to be:

- Working from home (linked to COVID-19). It is clear this trend is continuing but it is not clear what overall effect this will have on car usage. For example, if people used to travel to work by public transport 5 days a week, if they are only travelling for 2 days are they still using public transport or are they driving? Are people driving more on their lunch breaks etc.
- Merton is fairly close to the Ultra Low Emission Zone (ULEZ) border and this could start to influence the sales of lower emission vehicles.
- The number of Electric Vehicles registered to Merton addresses nearly doubled in 2021 according to the Department of Transport but at 1,104 electric vehicles this is a fraction of the +70,000 vehicles registered in Merton. To support the uptake of EVs the Council introduced 90 lamp column chargers[2] in 2021, and has submitted a bid for Government funding to deliver a larger batch of lamp column chargers in 2022. There has been increased demand for and use of EV charge points from a greater than anticipated transition to ownership of lower emissions vehicles, which may have been accelerated by national policy announcements on the ending of petrol/ diesel car sales by 2030 and the expansion of the ULEZ in 2021. For this reason, Cabinet resolved that the proposed introduction of new emission-based parking charges was no longer necessary to encourage uptake of lower emission vehicles by residents[3] . Merton has continued to develop our transport policies including through the submission of Merton's New Local Plan[4], which strengthens the focus towards

[2] Merton Council – Charging your electric vehicle https://www.merton.gov.uk/streets-parking-transport/electric-vehicle-charging-points

[3] Merton's Emissions Based Parking Charges Review (2021), available at: https://democracy.merton.gov.uk/ieListDocuments.aspx?CId=146&MId=3975&Ver=4.

[4] Merton Local Plan submission to the Secretary of State (2021), available at: https://www.merton.gov.uk/planning-and-buildings/planning/local-plan/newlocalplan/localplan-submission.

active and sustainable travel, in accordance with the Mayor's Transport Strategy[5], the new London Plan[6] and the Government's recently published Decarbonising Transport strategy[7]. The Council will continue this approach in 2022, through the further development of a LIP delivery plan for the period up to 2025 and work towards long-term transport strategies for the delivery of integrated cycling, walking and EV charging networks.

- Delivery vans miles are definitely going up and this may have replaced the milage lost through private car use. This may be connected to people working at home more.
- Bus Route 200 went electric in 2021. In 2022, it may be possible to investigate the effect that this change has had on nitrogen dioxide concentrations using newly installed air quality and traffic monitors (refer to Table J Action 7 for more information).
- A project was undertaken to analyse high street Mastercard spend on clothing etc. in the borough over the past three years alongside the lockdowns. Data is provided in Figure 3. Please note that there are other factors at play that influenced the actual Mastercard spend on apparel during this time (e.g. Mastercard took over from Visa for three banks during 2021, which is why Mastercard spend looks higher than 2019) but it clearly shows the impact of successive lockdowns. This pattern of people not moving about as much during lockdowns will also have had a largely positive effect on air quality.

[5] Mayor's Transport Strategy, available at: https://tfl.gov.uk/corporate/about-tfl/the-mayors-transport-strategy

[6] Mayor's London Plan (2021), available at: https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/london-plan-2021

[7] Department for Transport's Decarbonising Transport (2021), available at: https://www.gov.uk/government/publications/transport-decarbonisation-plan

Figure 3: Merton Hight Street Spend on Apparel January 2019 to January 2022

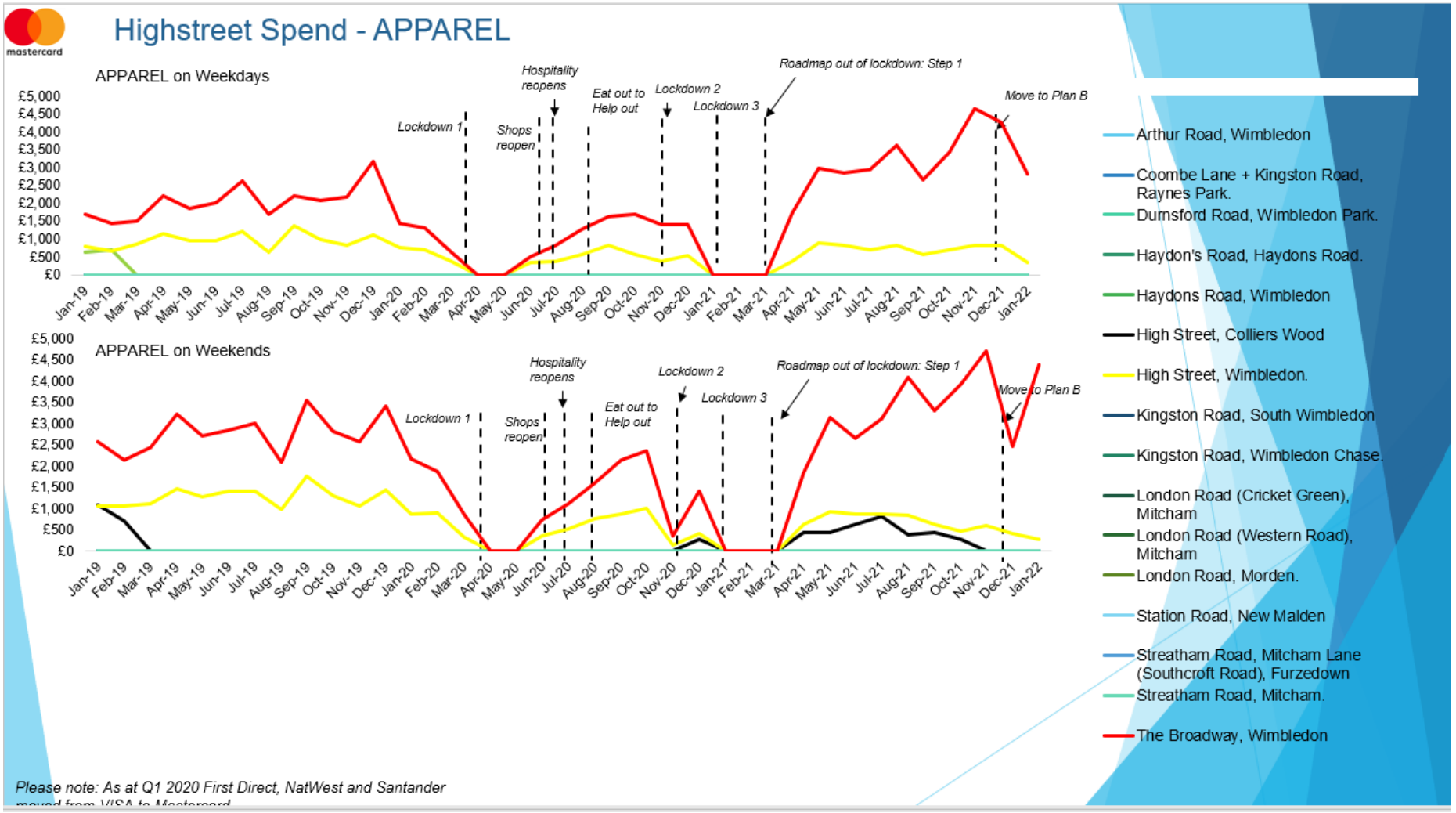


Table E. NO_2 Automatic Monitoring Results: Comparison with 1-hour Mean Objective, Number of 1-Hour Means > 200 µg m^{-3}

Site ID	Valid data capture for monitoring period %([a])	Valid data capture 2020 %([b])	2015	2016	2017	2018	2019	2020	2021
ME9	74	74	No data	No data	No data	0	1	0 (158.4)	No or insufficient valid results available for this year.

Notes

Results are presented as the number of 1-hour periods where concentrations greater than 200 µg m^{-3} have been recorded.

Exceedance of the NO_2 short term AQO of 200 µg m^{-3} over the permitted 18 hours per year are shown in **bold**.

If the period of valid data is less than 85%, the 99.8th percentile of 1-hour means is provided in brackets.

(a) Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

(b) Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

Prior to 11th October 2017 continuous monitoring of nitrogen dioxide was measured by instrument ME1. The roadside site was located at Morden Civic Centre and suffered a series of faults during 2016, no data is available for 2016 and 2017 for this reason. A new chemiluminescent NO_2 analyser was installed on the 11th October 2017 identified as ME9.

Table E provides results for the automatic monitoring station at the Civic Centre, Morden (ME9) site which houses a chemiluminescent NO_2 analyser. The automatic monitoring data are subject to correction by the Environmental Research Group (ERG) at Imperial College London as part of the London Air Quality Network (LAQN).

For London boroughs, as per LLAQM.TG(19) paragraph 3.10, current guidance states that the last four years of monitoring data should be considered, and a trend analysis undertaken to identify any significant changes. The last three years monitoring data from the Civic Centre site show the short term AQO to be consistently achieved, with very low (1) to nil exceedences of the 200 μgm^{-3} hourly mean concentration.

No valid results for ME9 in 2021

Unfortunately, during the data ratification process ERG found that there was too much uncertainty around the validity of the data and as such there is no data to report for 2021.

The automatic monitoring data are subject to correction by the Environmental Research Group (ERG) at Imperial College London as part of the London Air Quality Network (LAQN). Automatic monitoring took place over the full 12-month period in 2021, however, in March 2022 ERG were unable to complete the annual data ratification process following a failed audit. Unfortunately, ongoing issues with the monitoring equipment led to a high level of uncertainty with the 2021 data and ERG were unable to validate the measurements.

The NO_2 continuous analyser is serviced every six months by TRL and also audited by National Physical Laboratory (NPL) every six months as part of the LLAQN QA/QC procedure, to ensure optimum data quality. A full discussion of the QA/QC procedures are provided in Appendix A.

The monitoring equipment failed its spring audit March 2022 due to an oxidised cylinder, it was also found that the analyser's NO_2 converter returned a very low efficiency of 80% (95% is the minimum performance for this test). The faulty converter was replaced in April 2022 and an additional NPL audit completed. Steps are being taken to address the issues at the Monitoring Station.

In September 2021, WHO tightened the annual mean and 24-hour mean guideline values for NO_2 making them significantly lower than the current UK/EU standard at 10 μgm^{-3} (previously 40 μgm^{-3}) and 25 μgm^{-3} respectfully. The current WHO guideline value of 10 μgm^{-3} (annual mean) was set to protect the public from the health effects of gaseous nitrogen dioxide.

It is clear that it will be a huge challenge to drive down nitrogen dioxide concentrations to these levels in Merton based on borough monitoring data from 2015 to date. The same can be said for all London Boroughs.

Table F. Annual Mean PM_{10} Automatic Monitoring Results (µg m^{-3})

Site ID	Valid data capture for monitoring period %([a])	Valid data capture 2020 %([b])	2015	2016	2017	2018	2019	2020	2021
ME2	100	45	25	24[c]	24	34[c]	28	26	23 (21.9)

Notes

The annual mean concentrations are presented as µg m^{-3}.

Exceedances of the PM_{10} annual mean AQO of 40 µg m^{-3} are shown in **bold**.

All means have been "annualised" in accordance with LLAQM.TG(19), if valid data capture is less than 75% and more than 33%.

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

(b) Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

Table F provides results for the automatic monitoring station at the Merton Road, South Wimbledon (ME2) site which houses a Beta Attenuation Monitor (BAM) particulate analyser. The automatic monitoring data for the automatic monitoring stations are subject to correction by the Environmental Research Group (ERG) at Imperial College London as part of the London Air Quality Network (LAQN). At the time of reporting data have been fully ratified and is not subject to change.

BAM particulate analysers are equivalent to the PM_{10} reference method and the applicable correction factor has been applied by ERG for all data presented in this report.

As the data capture rate for 2021 was below 75% annualisation of the data was required. This was completed using the LondonAir Tool, the details are provided in Appendix A3.

In 2021, the annual mean objective of 40 μgm^{-3} was achieved at the Merton Road (ME2) site, with an annualised annual mean concentration of 21.9 μgm^{-3}, this correlates well with pre-2018 data. Please note that where data capture is below 75% no firm conclusions can be drawn as results may not be representative of the full year and should be used for guidance only.

For London boroughs, as per LLAQM.TG(19) paragraph 3.10, current guidance states that the last four years of monitoring data should be considered, and a trend analysis undertaken to identify any significant changes. The data from Merton Road indicates there has been no significant change to annual mean PM_{10} concentrations over the last 7 years (excluding 2018). It is important to highlight that despite reduced traffic during 2020 and 2021 due to COVID-19 a marked reduction in PM_{10} is not observed.

The annual Air Quality Objective is comfortably achieved however, in London a focus is required to be maintained on Particulate Matter even when meeting the PM_{10} targets, because the London boroughs are collectively working to meet the World Health Organization (WHO) health based $PM_{2.5}$ limits by 2030.

In September 2021, WHO tightened the annual mean guideline values for PM_{10} and $PM_{2.5}$ making them significantly lower than the current UK/EU standard at 15 μgm^{-3} (previously 20 μgm^{-3}) and 5 μgm^{-3} (previously 10 μgm^{-3}) respectfully.

It is clear that it will be a huge challenge to drive down particulate matter concentrations to these levels in Merton based on borough monitoring data from 2015 to date. The same can be said for all London Boroughs.

Table G. PM_{10} Automatic Monitoring Results: Comparison with 24-Hour Mean Objective, Number of PM_{10} 24-Hour Means > 50 µg m^{-3}

Site ID	Valid data capture for monitoring period %[(a)]	Valid data capture 2021 %[(b)]	2015	2016	2017	2018	2019	2020	2021
ME2	100	45	21	8 (36.6)	10 (37.6)	13 (47.3)	20	11	3 (37.4)

Notes

Exceedances of the PM_{10} 24-hour mean objective (50 µg m^{-3} over the permitted 35 days per year) are shown in **bold.**

Where the period of valid data is less than 85% of a full year, the 90.4th percentile is provided in brackets.

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

(b) data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

Table G provides a comparison of the 2021 monitoring data with the 24-hour mean objective. The objective of no more than 35 days exceeding 50 µgm^{-3} was achieved at the Merton Road (ME2) site in 2020, a total of 11 daily means exceeded 50 µgm^{-3}.

For London boroughs, as per LLAQM.TG(19) paragraph 3.10, current guidance states that the last four years of monitoring data should be considered, and a trend analysis undertaken to identify any significant changes. Due to historically poor data it is currently not possible to accurately identify a trend in the data. Data capture was below 85% in 2016, 2017, 2018 and 2021 data the 90.4th percentile result has also been reported for comparison, this figure is bracketed. Where data capture is below 85% no firm conclusions can be drawn as results may not be representative of the full year and should be used for guidance only. There appears to be a spike in 2019, elevated PM_{10} concentrations can result from 'pollution episodes', which are often the result of local combined

with imported transboundary conditions from elsewhere in the UK and Europe. It is important to highlight that despite reduced traffic during 2020 due to COVID-19 a marked reduction in PM_{10} was not observed. As discussed the data for 2021 should be viewed with caution due to poor data capture.

The 24 hour Air Quality Objective is comfortably achieved, however, in London a focus is required to be maintained on Particulate Matter even when meeting the PM_{10} targets, because the London boroughs are collectively working to meet the World Health Organization (WHO) health based PM2.5 limits by 2030.

In September 2021, WHO tightened the 24-hour mean guideline values for PM_{10} and $PM_{2.5}$ making them significantly lower than the current UK/EU standard at 45 μgm^{-3} and 15 μgm^{-3} respectfully.

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Takeaway messages

1. The pandemic does not lessen the need for action on air quality:

A number of cities (including Leeds, Bristol, Sheffield and Greater Manchester) have either delayed the implementation of Clean Air Zones or cancelled their plans on the grounds that these measures were not immediately necessary.

2. Greater home-working is not the answer to cleaner air:

A number of commentators have argued that a longer-term uptake of remote working is the solution to improve air quality in cities. London is the city that has seen the highest levels of home-working during the pandemic, with over half of workers being able to work from home and many continuing to do so. Despite this, London's NO_2 concentrations are back to normal exceedances. Research has shown that people who work from home are more likely to use their car for other purposes, such as leisure or shopping. It has also been suggested that more people spending more time at home as a result of remote working could worsen air quality because energy consumption overall increases.

3. We need to disincentivise car and other vehicle usage to improve air quality:

What 2020 and 2021 does show, is that anthropogenic (man-made) air pollution generated by traffic can be cut if behaviour changes, and that behaviours will not change without policy action. While it is clear that reducing vehicle usage to levels seen in April 2020 is not achievable any time soon, policies such as charging zones contribute to making driving less attractive, particularly for the most polluting vehicles. For example, the Ultra Low Emission Zone in London led to a 44 per cent decrease in NO_2 concentrations between February 2017 and February 2020, more than five times the national average reduction.

4. Reducing car usage does not affect all pollutants equally:

While NO_2 concentrations did fall with the reduction in traffic in most cities and large towns, $PM_{2.5}$ did not. This is because of the differing sources of $PM_{2.5}$. Action on traffic alone will not be enough to improve particulate pollution.

Key Focus

- Encourage people to return to, and swap to, public transport once the pandemic is under control. The implementation of charging Clean Air Zones will only be successful if people have alternatives to private vehicles.
- Expanding public transport usage must be at the core of long-term strategies for cleaner air, which need to work hard to rebuild habits and confidence eroded by the pandemic.
- Evaluate temporary active travel measures introduced during the pandemic and implement them if they are shown to be effective.
- Encouraging people to change behaviour, that should be made permanent.
- Move away from the reliance on private vehicles.
- Better understand our pollutants at a local and national level, in Particulates especially.

3. Action to Improve Air Quality

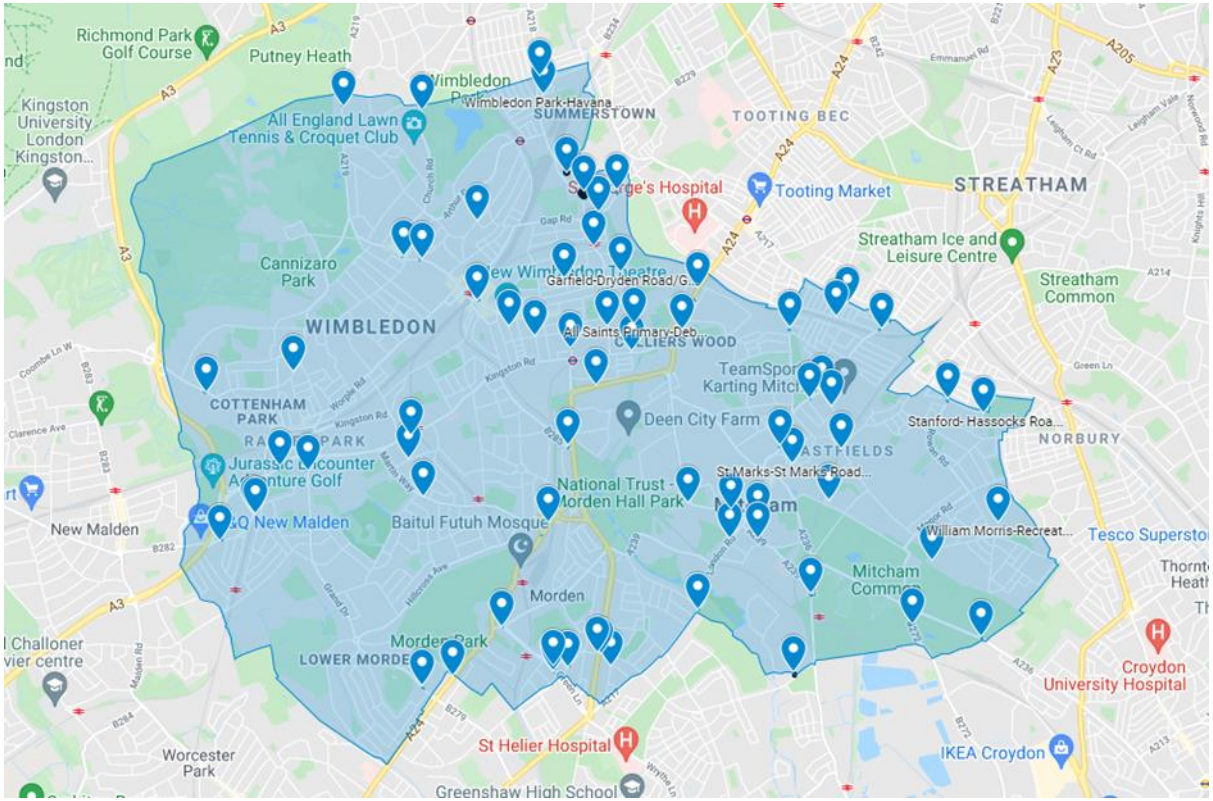
3.1 Air Quality Action Plan Progress

Table J provides a brief summary of the London Borough of Merton's progress against the Air Quality Action Plan, showing progress made this year. New projects which commenced in 2020 are shown at the bottom of the table.

Table J. Delivery of Air Quality Action Plan Measures

Measure	Action	Progress
Monitoring Air Quality		
1	Make available on the Council website all monitoring data in an accessible form.	Annual Status Reports containing tabulated and mapped data are publicly available on the Council website. Discussions ongoing to embed mapped air quality data on the Council website.
2	Continue to annually review our diffusion tube network and identify additional priority locations.	Community data can be found in Appendix D Diffusion Tube Results for Monitoring data is provided in Appendix C Diffusion Tube Results for Schools Monitoring Programme
3	Positively encourage and support citizen science activities where these actively contribute to identify and tackling air quality in the borough	Merton continue to support citizen science projects and provide training and resources including funding additional diffusion tubes. A Community Volunteer Coordinator has been appointed from the Environmental Sub Group (ESG) to liaise with the Council and coordinate all community diffusion tube monitoring.

4	Invest in hand-held monitoring equipment that can be used by citizen science groups and schools.	Ongoing. Investment planned in a new calibrated mobile monitor to use for monitoring specific locations and support projects, including PM $_{2.5}$ and sub PM_1 monitors A new deployable monitor was procured for the Pollution Team to be used for complaint investigation and/or citizen science projects.
5	Seek additional funding for a refresh and update of our monitoring network including grant funding, Section 106 and Community Infrastructure Levy.	Ongoing. Funding secured through Section 106 agreement at Wimbledon Stadium for an automated monitoring station. Quotes being submitted for fine particulate matter $PM_{2.5}$ and nitrogen dioxide analysers. Timeframe of installation will be determined by access to budget. The new monitoring station will be located on Plough Lane and the data will link into the London Air Quality Network as with the other stations in the borough. The installation of the new station was held off during 2021 pending the rollout of the 68 Breathe London Monitors in the borough (refer to Action 7).
6	Produce and update an interactive map of diffusion data that can be contributed to by groups and citizen science activities.	Ongoing: New GIS system in place. Work continues to embed web maps on the council website. It will be possible to embed web maps on the Council website for groups to view the data that they have collected (all data will be uploaded by the Council).
7	Assess and incorporate new technology in the world of air quality.	Merton is keen to adopt and use new technology to monitor & model how people travel within Borough and the resultant impact on air quality. In 2021 a large low-cost sensor roll out was completed as part of the InnOvaTe (Internet Of Things) (IOT) project. The network comprises 68 traffic sensors (Vivacity) co-located with air quality monitors (Breathe London Nodes) and for the first time links real-time

		traffic and air quality data as locations including but not limited to; industrial estates, Air Quality Focus Areas, Town Centres and routes in and out of the borough. Vivacity traffic sensors, traffic counts and vehicle classifications https://vivacitylabs.com/ Breathe London Nodes, pollutants measured; NO_2, PM2.5 https://www.breathelondon.org/ **Map of Breathe London Node / Vivacity Traffic Sensor Network in Merton** 

		A dashboard is under development to view both datasets to assist with data visualisation and analysis. A second project again funded through IOT is being trialled at waste transfer sites in Weir Road. Real-time monitoring of pollutants including NO_2, PM_{10}, $PM_{2.5}$, PM_1 and noise is in place to alert operators of exceedances of pollution and assist with better regulation of the sites.
8	We will commission modelling of air quality in the borough up to 2022, by King's College London, including predicted trends and contributing sources.	An updated London Atmospheric Emissions Inventory (LAEI) for the base year 2019 was published by the Greater London Authority in 2021. The inventory provides emissions estimates of key pollutants (NO_x, PM_{10}, $PM_{2.5}$ and CO_2) by source type. The LAEI provides a best estimate of pollution across the borough where direct monitoring is not available. These maps are available to view within the Council's mapping system and form part of the Air Quality data resource available to the Council and in the near future the public. Funding was secured for the key project in 2020 to complete borough specific air quality modelling through sunk funding arrangements. This has not yet been completed. Note: the faculty at King's College London that undertakes modelling moved to Imperial College London in 2020.
9	Map Focus Areas & air quality 'hotspots' on planning GIS mapping to ensure these areas are highlighted	Completed
Reducing Emissions from Buildings & Developments		

10	Ensure that air quality is a vital part of the Council's New Local Plan.	The submitted Local Plan has embedded measures to improve air quality in the borough. A number of policies within the Plan contribute to tackling poor air quality for example sustainable transport, air quality, places and spaces in a growing borough (design), health (including mental health) and wellbeing, and climate change policies. It clearly states that developers must have regard to and follow *any guidance provided by Merton Council on local environmental impacts and pollution as well as on noise generating and noise sensitive development*. Where necessary, the Council will set planning conditions to reduce and mitigate pollutant impacts (including air quality). The Local Plan requires Air Quality Assessment (AQA) (depending on development) to be submitted with planning applications. The further guidance on AQA can be found in the Air Quality SPD. In addition, the Local Plan has adopted a number of approach which contribute to tackling poor air quality for example: Healthy Streets Approach. 20 minutes neighbourhoods Importantly, the Local Plan has had regard to the London Plan and it associated guidance for example Mayor of London Transport Strategy and Environment Strategy and contributes to the target and aims of London as set by the Mayor of London. Merton's Local Plan submitted to the Planning Inspector on the 2nd December 2021. The public Examination of the Local Plan will be in two stages. Stage one will commence on the 14th June 2022 with stage two starting on the 4th October 2022. https://www.merton.gov.uk/planning-and-buildings/planning/local-plan/newlocalplan/local-plan-submission

11	Adoption of New AQ Supplementary Planning Document (SPD) to ensure emissions from new development are minimised and effective mitigation is integrated into the scheme of design.	Merton formally adopted the Air Quality Supplementary Planning Document (SPD) on 22nd June 2021 and is now a material planning consideration when determining development proposals submitted for planning permission.
12	Ensure air quality neutral development is required, and request where applicable an air quality assessment	This is now standard practice in the planning process.
13	Work with key partners in the GLA to explore the feasibility and delivery of air-quality-positive development particularly around our Focus Areas.	Ongoing. However, the submitted Local Plan requires that '*Development proposals in Air Quality Focus Areas (AQFAs) or development proposal that are likely to be, used by large numbers of people particularly vulnerable to poor air quality, such as children or older people should demonstrate that design measures have been used to minimise exposure following London Plan policy SI 1: Improving air quality'.* In March 2021 the Greater London Authority (GLA) published Air Quality Positive for consultation. The Air Quality Positive approach aims to maximise benefits to local air quality in and around a large-scale development sites and masterplan area while also minimising exposure to existing sources of poor air quality. It requires planners, designers, architects and air quality experts to demonstrate what measures have been taken during the design stages to achieve the best possible outcomes for air quality.

14	Ensure that new development contributes to funding air quality measures in the borough through Section 106 and CIL payments.	Ongoing. Merton's submitted Local Plan has embedded that the Council states clearly that the Council will seek financial contributions using Planning Obligations towards air quality measures where a proposed development is not air quality neutral, or mitigation measures do not reduce the impact upon poor air quality. In determining the contribution, the Council will refer to the London Plan Air Quality Neutral guidance (section 5).
15	Ensure that new development have a scheme of mitigation for tackling air quality including traffic reduction and low emissions strategies.	Ongoing.
16	Produce and promote guidance to homeowners on what they can do to their homes to help reduce pollution in the borough.	In November 2020, Council approved Merton's Climate Strategy and Action Plan which sets a framework to achieve a net-zero carbon borough for 2050 and a net-zero carbon Council by 2030. It sets out the major transitions that need to take place in the borough to buildings, transport and the economy. The action section on p10 and 11 contains a high-level but comprehensive set of actions that can be taken to reduce emissions targeted at those who own their own home, landlords, businesses and other organisations and also how the Council will support. These include reducing energy consumption and electrifying heating, both of which are likely to reduce the air pollution impact of boilers; responsible for about 1/5 of NOx emissions in the UK. Merton's Climate Delivery Plan Year 2 was adopted in February 2022 As part of the commitment to supporting emissions reduction, Merton Climate Action Group has been set up as a joint Council community initiative to support community-led carbon reduction projects. One of the themes is Building and Energy. In 2021 the group have focused on setting up Energy Advice Cafes in Merton to help people to reduce

		energy bills through switching, putting in place energy efficiency measures and undertaking retrofit on their properties.
17	Consider how we can extend the provision of vehicle charging to smaller residential development to ensure the borough is ready for electric vehicles.	Ongoing. Merton has continued to develop our transport policies including through the submission of Merton's New Local Plan[1], which strengthens the focus towards active and sustainable travel, in accordance with the Mayor's Transport Strategy[2], the new London Plan[3] and the Government's recently published Decarbonising Transport strategy[4]. The Council will continue this approach in 2022, through the further development of a LIP delivery plan for the period up to 2025 and work towards long-term transport strategies for the delivery of integrated cycling, walking and EV charging networks. (1) Merton Local Plan submission to the Secretary of State (2021), available at: https://www.merton.gov.uk/planning-and-buildings/planning/local-plan/newlocalplan/localplan-submission (2) Mayor's Transport Strategy, available at: https://tfl.gov.uk/corporate/about-tfl/the-mayors-transport-strategy (3) Mayor's London Plan (2021), available at: https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/london-plan-2021 (4) Department for Transport's Decarbonising Transport (2021), available at: https://www.gov.uk/government/publications/transport-decarbonisation-plan
18	Continue to run our Non-Road Mobile Machinery (NRMM) Project across the south of London and extend this to other boroughs.	Completed Year 3 of 3-year project, however secured bridging fund to continue into another year. Recovered match-funding from all boroughs. Numerous cluster group and industry presentations. Especially involved this year with the generator supply chain, driving to Stage V from a non-sites perspective.

19	Seek additional funding from DEFRA/GLA/Construction Industry to promote good practice on construction sites.	Funded as part of Action 18 – NRMM London Wide Project.
20	Request adoption of new techniques that have proven to be beneficial to air quality, such as Construction Logistics and Delivery and Service Planning.	Ongoing.
21	Review the Council's allocation of the Section 106 and CILs budget to see if this can provide funding to benefit air quality measures	Ongoing. Merton's Air Quality Supplementary Planning Document (SPD) was adopted in June 2021 and includes Section 106 arrangements. Planning Obligation (often called s106 agreements) are agreements with developers for the provision of site-specific mitigation measures necessary to ensure a development meets the requirements of the Local Plan and for a number of areas including affordable housing, local training, skills, job brokerage and the obligation of Merton's Air Quality Action Plan. Merton's Planning Obligation SPD explains how obligations are used.
22	Continue to request robust and enforceable measures to minimise the impact of developments during the construction phase	Ongoing. Now that the new London Plan SI (Improving Air Quality) and the Merton Air Quality Supplementary Planning Document (June 2021) is in place, planning conditions will be reviewed in 2022 as part of the Regulatory Services Partnership Pollution Team initiatives.

Reducing Emissions from Road Transport		
23	Commitment to a cycle Quiet-way between Clapham Common & Wimbledon forming the Merton section of the Wandle trail.	Ongoing. Merton to liaise with TfL regarding rebranding of route/ upgrade to signage.
24	Review funding available through Section 106 and CILs around transport and travel infrastructure.	Where necessary for development to take place, Merton' seeks section 106 contributions towards transport and travel infrastructure. In London all boroughs pay Community Infrastructure Levy towards Crossrail. Transport improvements around individual sites are provided through funding from developments (via Section 278 legal agreements) Since 2019 Merton's Neighbourhood fund has sponsored Merton Chamber of Commerce's "Community Champions" programme, one of whose roles was raising awareness of actions residents could take to improve air quality
25	Carryout a borough wide cycling network audit to review and update the network.	Cycling part of Merton's Local Improvement Plan 3, delivering the Mayor's Transport Strategy. Merton's Local Implementation Plan (LIP) to deliver the Mayor of London's transport strategy was formally signed off by TfL in August 2019 https://www.merton.gov.uk/streets-parking-transport/lip3 A cycling strategy will be developed by 2023 as set out in the Climate Strategy Action Plan.

26	Programme of installing bicycle infrastructure	To encourage more people to cycle and improve safety for cyclists within the borough of Merton, light segregation in the form of cycle lane defenders have been installed within the borough in response to Covid 19 at locations including Church Road, Plough Lane, Haydons Road Bridge and Merton High Street. Design work is underway to install segregated cycle lanes on Plough Lane in the vicinity of the stadium. Upgrades to an existing path are due to be completed summer 2022 between Deen City Farm and tram crossing. 20 secure cycle storage units (cycle hangars) have been installed around the borough, providing 120 cycle parking spaces. 20 cycle shelters have been installed at 16 schools providing over 200 cycle parking spaces. In 2021, Merton successfully completed the delivery of its emergency Covid Transport Strategy to help support active travel in the borough[1] . Projects delivered included 4 cycle lanes, 5 Low Traffic Neighbourhoods, 28 Schools Streets, 20 Cycle hangars and 20 school cycle shelters. However, the ongoing funding crisis at TfL resulted in the borough receiving a significantly reduced Local Implementation Plan (LIP) funding allocation in 2021/22, so delivery of transport infrastructure projects in the latter half of 2021 has been much less than anticipated. The Council continued to deliver programmes to support active travel, such as cycle training[2], health walks[3], the Stars School Travel Plans[4] , and maintaining Safer Routes to School[5] and Public Rights of Way. However, there was also a reduced level of delivery of some of these projects in 2021 compared to previous years due to the impact of Covid restrictions and the reduced TfL LIP funding allocation. The Council also supported Merton's Climate Action Group (Transport sub-group) who have been involved in promoting a number of national initiatives locally to engage with residents and promote active travel and wider climate action in Merton. These have included Sustrans' Big Pedal[6], World Car Free Day[7] and Cycle buddies[8]. (1) Merton's Covid-19 Transport Strategy available at: https://www.merton.gov.uk/streets-parking-transport/lip3

		(2) Merton cycle training for adults https://www.merton.gov.uk/streets-parking-transport/road-safety/adult-cycle-training and children https://www.merton.gov.uk/streets-parking-transport/road-safety/childrens-cycle-training (3) Merton Walks4Life https://www.merton.gov.uk/healthy-living/sport-and-healthy-living/walk-4life (4) Merton supports TfL's STARS programme https://stars.tfl.gov.uk/ (5) Merton Safer routes to schools: road safety improvements https://www.merton.gov.uk/streets-parking-transport/traffic-management/safer-routes-to-school (6) Sustrans' Big Pedal 2021 https://bigpedal.org.uk/ (7) Merton Play Streets https://www.merton.gov.uk/streets-parking-transport/streets-and-pavements/play-streets (8) Merton Cycle Buddies http://www.mertoncyclingcampaign.org.uk/p/cycle-buddies.html
27	Feasibility study to consider the use of Clean Air Zones (CAZ's) or a Merton Specific Ultra Low Emission Zone for Focus Areas and beyond.	This project was deferred due to funding. Traffic monitoring is being delivered through the IOT project refer to Action 7 for details and a Clean Air Village project focusing on Cargo bikes and business engagement was delivered in the Town Centre.
28	Air Quality Audit traffic and congestion in our three air quality focus areas.	Refer to Action 7.
29	Support and promote the use of a cleaner vehicle	Ongoing:

	checker to inform the public of cleaner vehicle choice.	
30	Lobby for Cleaner Buses and Taxis	Ongoing: The following activities are ongoing but were not focused on in 2020 or 2021 due to the pandemic. The Mayor's Transport Strategy (MTS) was published in March 2018. Proposal 29 sets outs timeframe as to how the Mayor will clean London's bus fleet and that by 2037 all TfL buses will be electric or hydrogen. Merton Council continues to lobby for a greater share of TfL bus fleet investment to be targeted towards providing zero emission vehicles on the most polluted routes passing through this borough. We believe that TfL's MTS target does not go far enough and that the bus procurement programme should be accelerated so that the whole of greater London can enjoy the benefits of cleaner buses much sooner. Individual bus route contracts are typically retendered on a rolling 5 to 7 year basis. This Council strongly believes that all new bus service contracts should explicitly stipulate the purchase of only electric or hydrogen buses now (or hybrid double deckers, if cleaner alternatives at not available at the time). It is also noted that from 2020 TfL will buy only electric or hydrogen single deck vehicles and all double deckers meet Euro VI standard as a minimum. Since 2021 the 200 bus route that runs through the borough (Mitcham – South Wimbledon – Raynes Park) has become low emissions.
31	Introduce Air Quality initiatives, benefits and monitoring in the new South Wimbledon Junction design and build.	Ongoing – not progressed due to lack of Transport for London Funding: South Wimbledon junction will be reviewed in line with the Healthy Streets objectives, which include sustainable transport and improved air quality. All measures that are funded via the Mayor's Transport Strategy (LIP) will be considered against the healthy streets agenda and objectives.

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<tr><td>32</td><td>Review the impact of our diesel levy* and consider a review of parking and charges to help reduce combustion engine vehicle use and the consequent emissions.

**Note: The Sustainable Communities and Transport Overview and Scrutiny Panel to conduct pre-decision scrutiny on the scope of any reviews on parking levies.</td><td>Merton consider the use of the parking agenda as key to delivering cleaner air.

The diesel levy was one of a number of Parking/Air Quality Initiatives which now include a review of parking charges throughout the borough.

In April 2017, Merton took the innovative and bold decision to implement a diesel levy to encourage drivers/owners to move away from diesel vehicles. Diesel vehicle ownership as a percentage of permits sold has reduced slightly in nearly all permit zones since the introduction of the diesel levy in April 2017. This is believed to be mainly a result of national and regional policy signals on diesel cars including the London Ultra Low Emission Zone (ULEZ) zone but the Merton diesel levy may have had an effect in further amplifying this pricing signal.

Permit holders that had changed their vehicles from diesel to petrol were contacted to establish the reason for their change. Customers gave a range of reasons such as, environmental concerns and change in work arrangements. However, price was one of the top reasons cited, particularly in relation to the proposed expansion of ULEZ, which highlights that pricing signals can influence decision making.

In 2019/20 there was a decline in permits issued particularly for diesel vehicles, and while there was an increase in the number of permits issued in 2020/21 and 2021/22, this is likely as a result of COVID and the perceived risks of travelling on public transport, as well as changes to how people work, with more people working from home and needing permits, where previously, their vehicle was normally absent from the CPZ during its operational hours, in addition to the introduction and expansion of CPZs in the borough.

<table>
<tr><th>Period</th><th>Petrol</th><th>% of total sales</th><th>Diesel</th><th>% of total sales</th><th>Electric</th><th>% of total sales</th><th>Total</th></tr>
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		<table><tr><td>2016/17</td><td></td><td></td><td></td><td></td><td></td><td></td><td>17541</td></tr><tr><td>2017/18</td><td>13345</td><td>70%</td><td>5578</td><td>29.5%</td><td>23</td><td>0.5%</td><td>18946</td></tr><tr><td>2018/19</td><td>14332</td><td>70%</td><td>5990</td><td>29.4%</td><td>51</td><td>0.6%</td><td>20373</td></tr><tr><td>2019/20</td><td>14107</td><td>73%</td><td>5025</td><td>26%</td><td>112</td><td>1%</td><td>19244</td></tr><tr><td>2020/21</td><td>16108</td><td>73%</td><td>5565</td><td>25%</td><td>263</td><td>2%</td><td>21936</td></tr><tr><td>2021/22</td><td>17461</td><td>75%</td><td>5248</td><td>22.5%</td><td>504</td><td>2.5%</td><td>23213</td></tr></table> What the figures do show is that since the introduction of the diesel levy, in conjunction with the proposed extension of the ULEZ, there has been a drop of 7% in the total percentage of permits issued to diesel vehicles, a 5% increase in the number of permits issued to petrol vehicles, and a 2% increase in the number of permits issued to electric vehicles. As a result of COVID and the impact upon businesses and the cost of living, it was decided that the new proposed emissions based charges would not be introduced, however, any future proposals may seek to raise the costs of parking for more polluting vehicles to encourage a positive shift towards cleaner vehicles to improve air quality and health.
Raising Awareness		
33	We will continue to support, fund and promote airText	Ongoing: Merton continues to fund airText a publicly available air pollution forecast service.

	and other health based initiatives in the borough.	https://www.airtext.info/
34	We will continue to support and update information on our Love Clean Air Website.	Ongoing. The 'South London Cluster Group' formed of Bromley, Croydon, Kingston, Lewisham, Merton, Richmond, Sutton, and Wandsworth councils worked together to create Love Clean Air to promote air quality in the region. Love Clean Air is all about letting you know how clean the air is in South London, and what you and others can do to make it even cleaner. https://lovecleanair.org/
35	We will review and update our own corporate website to include themed initiatives.	Ongoing: Council Communications Plan reviewed to keep air quality a running feature. Anti-idling comms were sent via Social Media in March 2021 in support of the Idling Action London campaign. A high level of engagement was received via Twitter. On Twitter we posted three times: on 3 March, 6 March and 10 March. Put together, these posts managed: 16,751 impressions 40 retweets 45 likes 5 link clicks We put out one Facebook post on 3 March, this received: 1961 impressions 18 shares 19 reactions (all 'like' or 'love')

		3 comments Refer to Action 36 for details on Clean Air Day themed webpage.
36	We will play an active and co-ordinating role in national and regional campaigns such as National Clean Air Day.	Ongoing: **Clean Air Day - 17June 2021** To support Clean Air Day 2021 Merton Council ran a school poster competition, with the theme London's Lungs. Full artistic licence was given to students to interpret the theme in any way they wished to produce an A4 poster. Entrants were invited from Key Stages 1, 2 and 3 with schools permitted to submit up to five entries from each Key Stage. Prizes were awarded to the winner and runner-up, and their school in each Key Stage. https://www.merton.gov.uk/communities-and-neighbourhoods/pollution/air-quality-and-air-pollution/clean-air-day-2021 **Car Free Day - 22nd September 2021** The Air Quality Team were in Mitcham on Sunday 19th September. Positive public engagement took place at the AQ stall which consisted of: • Freebies including pens, snapbands, frisbees • AQ information leaflets • AQ monitoring equipment demo • Presentation of diffusion tube monitoring data • Promotion of anti-idling, pledge sign-ups on the Council website • Promotion Fleet Training to local businesses • Promotion Love Clean Air as info source

		• Promotion airTEXT for air pollution alerts Roaming public engagement completed on the day itself (22nd September) in Wimbledon Town Centre.
37	Continue to aspire to London's Cleaner Air Borough status award.	Ongoing.
38	Ensure that the good work and best practice we are delivering is publicised and disseminated to colleagues in the air quality industry.	Ongoing: Merton continues to run the ground breaking Non-Road Mobile Machinery (NRMM) project throughout London as Cleaner Construction. Best practice is shared with stakeholders including London Boroughs, the GLA and construction industry. In December 2021 the Air Quality Team began production of a quarterly 'Air Quality Newsletter' to showcase the variety of work undertaken in the field. The newsletter is circulated to both internal and external partners including the GLA and has been positively received.
39	Work closely with our Public Health colleagues around joint health benefits.	Ongoing: We work closely and meet regularly with colleagues in Public Health including Directorship. Almost all air quality initiatives are now linked to the public health agenda.
Working Together		
40	Establish a borough-wide air quality group.	Completed:

		The Environmental Sub Group which brings together interested and influential people to help deliver the Air Quality Action Plan (AQAP) and help lobby for changes, meets on a quarterly basis.
41	Establish an internal steering group within the local authority.	Completed: The steering group includes colleagues from Public Health and Climate Change.
42	Provide internal training sessions on air quality to internal partners and Councillors.	Planning ties continue to be strengthened. Planning and Air Quality training session for Councillors deferred to 2022 due to COVID-19. In July 2021, anti-idling Fleet Training was offered to Council fleet to raise anti-idling awareness across Council departments. Merton Enforcement Agents and Civil Enforcement Officers received training from Air Quality Officers.
43	Co-ordinate air quality funding and lobby national government to provide further financial and strategic support for local authorities to improve air quality.	Ongoing: We actively respond to all consultations and initiatives, locally, regionally and nationally to raise the issues of air quality and the support needed for Local Authorities. The new Environment Act was finally passed into statute on 10th November 2021. Merton, together with other London authorities continue to attend meetings with Defra and respond to consultations, including on PM2.5's, to try to strengthen targets and standards.
44	Lobby Transport for London (TfL) for action on cleaner buses and taxis in our Air Quality Focus Areas.	This is a priority for the borough and an action we continue to do through partnership meetings with TfL. Active discussions were held at the end of 2019 with TfL to undertake partnership working to tackle taxi idling in Wimbledon Town Centre in 2020. Not progressed in 2020 and 2021 due to COVID-19 and Transport for London's funding situation.

45	The Director of Public Health (DPH) to be kept fully updated on air quality status and initiatives.	See Action 39
46	Public Health teams to support engagement and projects aimed at local stakeholders (businesses, schools, community groups and healthcare providers).	**Superzone project:** The Superzone primary school's community, including pupils and parents, participated in three engagement workshops, followed by a communal 'walk home' in which participants took photos of the environment and discussed how it impacts their wellbeing. Issues raised included traffic congestion around school gates, air quality, safety concerns on walking routes due to poor lighting, under-use of green assets, litter, and the lack of public art and community ownership of public spaces. Three areas of action were developed in partnership with the school community and council officers: active travel and air quality; green and public space; and community safety. Actions included a 'kiss and drop' scheme (a drop-off area to prevent parents driving into a congested area), an anti-idling promotion, allowing the school to take ownership of a local park, and reviewing the placement of street lighting. Despite interruptions during the pandemic (2020-2021), the pilot provided good opportunities to build relationships with partners. Moving forwards, the council plans to review the action plan with partners and investigate the possibility of further expansion to other schools in Merton. **Behavioural Insights project:** At the end of 2019 funding was obtained by the Council's Public Health Team from the Local Government Association (LGA) Behavioural Insights programme. Progress was delayed during 2020 and 2021 due to COVID-19, the project continues in 2022. This project will investigate the effect an LED sign has on idling vehicles queuing at West Barnes Lane Level Crossing.

47	All air quality policies to be signed off by the Director of Public Health and to form close links to Public Health objectives.	Ongoing.
48	Make air quality part of The Health & Wellbeing Strategy / Joint Strategic Needs Assessment (JSNA) – the Director of Public Health to be retained as a member of the Air Quality steering group.	The Merton Story is a snapshot of the local needs which have been identified through the JSNA process, which is developed to inform commissioning intentions in the borough. This work is complemented by health needs assessments and JSNA profiles to provide a rich picture of health and wellbeing within Merton. Air quality was included in Merton Story 2021 https://www.merton.gov.uk/healthy-living/publichealth/jsna/the-merton-story
Leading by Example		
49	Review our procurement contracts for outsourced transport services and incorporate policies to establish the best and most cost effective fleet possible.	The Council continues to operate with c90 front line vehicles which are purchased through an agreed Capital programme. We are committed in our aim of being carbon neutral by 2030 and are currently seeking external funding for a power upgrade into the Garth road transport depot. If successful we will look into the required infrastructure required to support a fully carbon neutral fleet of vehicles.

		With reference to the Council's outsourced service such as waste collection and street cleansing the current fleet is scheduled to be replaced in 2025. For more information Merton Council's fleet and transport policies are set out in **Merton's climate strategy and action plan** on pages 22-25 in relation to the borough, and 28 and 29 in relation to actions to electrify the Council fleet.
50	Review our maintenance and servicing arrangements for our buildings to ensure that these are as energy efficient and cost effective as possible.	The Council have continued to invest in the installation of low carbon measure such as insulation and solar PV through a 10-year long programme called "Invest to Save" which has resulted in a 40% reduction in carbon emissions from the Council's building stock since 2009. Since the declaration of a climate emergency, work has begun to carry out deeper retrofit on buildings to work towards our net-zero targets. After a successful bid to the Public Sector Decarbonisation Fund, a range of low carbon measures are planned for a number of children centres and community buildings for completion before the end of 2021, which includes the replacement of gas boilers with low carbon electric heating; which will reduce NOx emissions from the building stock.
51	Ensure all new build and extensions within the council portfolio are to the highest, most efficient standards possible within the allocated budget.	See Action 50
52	Encourage more walking, cycling and use of public transport for council	The review of the Council's Active Travel Plan and parking arrangements for staff across the council which was not been progressed in 2020 or 2021 due to COVID-19 and the Civic Centre being closed and most staff continuing to work outside the civic

	business and review active travel plan for all staff.	centre. However, the Council's review of working arrangements post pandemic will influence commuting frequency and staff travel. The review is likely to conclude in 2023 Merton Council have a fleet of electric and non-electric bikes for staff and investment in new Brompton bikes that can be taken on public transport to move staff away from private vehicle use Merton also offer a business mileage scheme for cycling, to push staff towards cycling. Our Cleaner Construction project (NRMM) operates a Brompton bicycle loan scheme for staff to travel across London sustainably by public transport and bicycle.
53	Review staff parking to reduce the use of personal vehicles.	Project currently underway to reduce use of private vehicles by staff. This will include any emission charging for staff permits. This was not progressed in 2020 and 2021 due to the Civic Centre being closed due to the pandemic. However, the council's review of working arrangements post pandemic will influence commuting frequency and staff travel.
54	Recruit an Air Quality Officer, funded by our Diesel Surcharge.	Completed. Air Quality Officer appointed in 2018 and funded fulltime on a permanent contract.
Innovation & Technology		
55	We will work closely with our Public Health colleagues to keep up-to-date with the latest research relating to air quality and health.	The overwhelming focus of the Public Health Team during 2020 and 2021 was COVID-19.

56	We will work closely with Imperial College London*, the Greater London Authority and APRIL (Air Pollution Research in London – air quality expert group) to review the latest monitoring techniques *Formerly King's College London	Annual meetings attended. The low-cost air quality sensors (Breathe London Nodes) rolled out across Merton in 2021 (refer to Action 7) are managed by Imperial College London. We continue to work closely with Imperial to maximise the benefit of the new monitoring network.
57	Apply for grant schemes and incorporate new technologies and best practice.	Ongoing projects in 2021: Those supported by the third round of the Mayor's Air Quality Fund (2019-2022): • Idling Action – a project to take action on idling (including enforcement), spanning 27 boroughs. • South London Construction Consolidation Centre – an initiative to consolidate construction deliveries across six south London boroughs, cutting at least 150 construction vehicle movements per day. • Non-Road Mobile Machinery Clean Air Zone enforcement – a pan-London project to inspect construction sites in every borough to ensure they are using the cleanest construction equipment. • Healthy Streets Everyday – bespoke environmental pocket spaces delivered at three primary schools in Merton. Funding awarded from Defra's Air Quality Grant scheme:

		• Clean Air Villages 4 (CAV4) - to deliver a CAV in Wimbledon Town Centre 2021/22. Delivery of a free 120hr trial cargo bike courier service for businesses in Wimbledon. Funding awarded from Local Government Association (LGA) Behavioural Insights programme. This 12-month pilot project will investigate the most effect form of anti-idling messaging at Primary Schools. Progress delayed during 2020 and 2021 due to COVID-19, the project continues in 2022.
58	Disseminate and publicise our ground-breaking work around schools and Non Road Mobile Machinery (NRMM).	This is ongoing through working with partner boroughs, the South London Air Quality Cluster Group and the Greater London Authority. Continue to deliver and implement the Pan London NRMM Low Emission Zone. Delivered many training events to industry stakeholders. Presented at numerous Air Quality events for the Greater London Authority, City of London, Air Quality Cluster Groups and other stakeholders. Presented at the Institute of Air Quality Management, to delegates from many UK cities who expressed interest.
Tackling Pollution in our Borough		
59	Anti-idling to be adopted as an enforcement action in the borough with associated signage in problem areas.	Over 200 anti-idling signs have been installed in the borough at schools, level crossings and taxi ranks. No further signage was installed in 2021. Currently 50% of schools have anti-idling signage installed. With the large scale roll-out of Schools Streets at schools in Merton. Refer to Action 46/57. Civil Enforcement Officers (CEOs) are trained to engage with idling drivers during their daily duties with a particular focus at schools during drop-off and pick-up times. Refresher training was delivered in 2021. An Anti-Idling Action Plan (AIAP) was created in 2021, the plan covers internal and external partner engagement, communications, signage and events. The plan delivers

		at least one idling event each month, 4 events were delivered between September and December 2021. Events are primarily delivered by Air Quality Officers and focus on idling hotspots such as level crossings and schools but also in response to complaints. The AIAP is a live document and continues to be used in 2022.
60	Start partnership working with the GLA and surrounding boroughs on anti-idling campaigns.	Merton were successful in its bid to the Pan London Idling Action project, this project closed in March 2022. For details visit https://idlingaction.london/ Additional resources being sought from Councillors and Community Leaders to supplement our internal anti-idling campaigns. An Anti-Idling Event Plan launched in September 2021 which delivers at least one event in Merton per month. Events are primarily delivered by Air Quality Officers. Events are held at idling hotspots such as level crossings and schools but also in response to complaints.
61	Work with neighbouring boroughs to consider tighter restrictions on bonfires.	Ongoing: Considering options and lobbying for greater powers.
62	Conduct campaigns relating to wood burning appliances and seek additional funding from DEFRA to carry out an impact assessment and explore further controls	Future action. We continue to lobby for tighter regulations on wood burning appliances. The Air Quality (Domestic Solid Fuels Standards) (England) Regulations 2020 became effective on the 21st May 2021. These Regulations are made under section 87 of the Environment Act 1995 (c. 25) and they make provision restricting the sale of certain solid fuels, and provide for the enforcement of breaches of these Regulations by a local authority. Relevant training was provided to Council Officers including Trading Standard Officers and Pollution Officers to assist in enforcing the new Regulations.

		DEFRA funding secured in 2022 following an unsuccessful id in 2020 for a Wood Burning project – refer to the end of this table for details.
62	Deliver cleaner construction throughout South London through our Non Road Mobile Machinery (NRMM) project and extend this nationally.	In London the NRMM project is funded by Mayors Air Quality Fund (MAQF) / Greater London Authority (GLA) and match funding from participating London Boroughs. This Pan-London Project has been extended to 22/23. We are working with a city outside London in order to assist in the development on an NRMM Low Emission Zone.
64	Assess and inspect newly installed CHPs to ensure compliance with planning conditions	Future action. No resource available to perform this function.
Our Schools		
65	Maintain our ongoing commitment to school travel plans and the STARS review.	A Healthy Streets Officer was employed by Sustrans and Transport for London on a fixed term basis, with the contract ending in June 2022 There has been a reduced programme in 2020 and 2021 due to schools being closed due to the pandemic and restrictions on activities such as cycle training. However physical measures including installing cycle parking at 16 schools and School Streets at 25 schools have been progressed instead. See Action 69. Of the 105 institutions (including nursery, primary and secondary) listed on the Edubase database the accreditation split is as follows: Gold: 14

		Silver: 4 Bronze: 13 Engaged: 1 Not engaged: 74 Some of the institutions listed with an EAN number will not have or chose to have a STARS School Travel Plan.
66	Carry out audits of schools in the most polluted areas of the borough and help provide a scheme of mitigation where necessary and possible.	Ongoing: Based on the results of a 12-month air quality monitoring programme using nitrogen dioxide diffusion tubes, 9 school sites were added to the Council's main diffusion tube network in January 2021. These schools were prioritised to receive an Air Quality Audit (AQA) however, not all schools identified took up the offer of an AQA and the offer was extended to all schools. In 2021 a total of 4 schools were audited in Merton. Including: All Saints' C of E Primary School (72-74 Haydons Road, Wimbledon) audited 20/04/21. All Saints' C of E Primary School (3-19 Hanover Road, Wimbledon) audited 20/04/21. Wimbledon High School (Mansel Road, Wimbledon) St John Fisher Primary School (Grand Drive, Morden) audited 12/11/21. Monitoring data is provided in Appendix C Diffusion Tube Results for Schools Monitoring Programme
67	Review and assess annually the necessity for audits at schools and nurseries in areas subject to high levels of pollution.	As Action 66.

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td>68</td><td>Incorporate schools in areas of poor air quality into our monitoring network and regime.</td><td>As Action 66</td></tr>
<tr><td>69</td><td>Joint working arrangements with Public Health partners around schools to deliver joint health benefits.</td><td>As Action 46

In April 2022 £30K was secured from the GLA School Superzone Grant for Merton Abbey Primary School to create a system of behaviour change to enable all students, parents and staff to be confident and skilled active travel users (walking, cycling and public transport) to build out vehicular reliance on the school run. The funding will be used from April 2022 – July 2023.

The operation of three School Streets commenced in 2019. At the time of writing this report, Merton is one of London boroughs with the most school streets with some 30 active locations:
<table>
<tr><th>School</th><th>Restricted roads</th></tr>
<tr><td>All Saints</td><td>Hanover Rd; Deburgh Rd (between Norman Rd and Hanover Rd)</td></tr>
<tr><td>Aragon</td><td>Aragon Rd (between Kingsbridge Rd and Cleveland Rise); Aragon Place</td></tr>
<tr><td>Beecholme</td><td>Beecholme Ave</td></tr>
<tr><td>Benedict Primary</td><td>Benedict Road</td></tr>
<tr><td>Bishop Gilpin</td><td>Lake Rd (from Leopold Rd to Church Hill); Ricards Rd; Leopold Ave; Helme Close</td></tr>
<tr><td>Date Valley</td><td>Cricket Green (cul-de-sac section)</td></tr>
</table></td></tr>
</table>

		Garfield	Garfield Rd (from Tennyson Rd to Milton Rd) and Dryden Rd
		Gorringe Park	Sandy Lane (between Fernlea Rd and Streatham Rd); Harbour Close; Tide Close; Summerhill Way; Spring Grove
		Harris Primary Academy	Ivy Gardens
		Hillcross	Ashridge Way (between Leamington Ave to Hillcross Ave); Woodland Way; Monkleigh Rd (from Hillcross Ave to Northernhay Walk); Shaldon Drive (from Monkleigh Rd to Northernhay Walk)
		Holy Trinity	Effra Rd (from Evelyn Rd to Trinity Rd); Faraday Rd (from Evelyn Rd to Trinity Rd)
		Hollymount	Cambridge Rd SW20 (from Pepys Rd to Lambton Rd)
		Links Primary School	Frinton Road; Gunton Road
		Malmesbury	Malmesbury Rd and Leominster Rd (between Newminster Rd and Netley Gdns); Neath Gardens
		Merton Park Primary	Erridge Rd from its junction with Poplar Rd; Stratton Close; Stratton Road; Keswick Ave Church Lane (cul de sac)
		Pelham Primary	Southey Rd SW19 (from Pelham Rd to Kingston Rd)
		Poplar	Poplar Rd South (between Cranleigh Rd and Crown Lane)
		Ricards Lodge	Lake Rd (from Leopold Rd to Church Hill); Ricards Rd; Leopold Ave; Helme Close
		Rutlish	Watery Lane and Manor Gardens
		Singlegate Primary	South Gardens

<table>
<tr><td></td><td></td><td>
<table>
<tr><td>St Marks Primary</td><td>St Marks road (between St Mark's Rd to Armfield Crescent); Chalkley Close</td></tr>
<tr><td>St Marys</td><td>Russell Rd, SW19 (from Pelham Rd to car Park)</td></tr>
<tr><td>St Matthews</td><td>Cottenham Park Rd SW20 (from Burdett Ave to cul de sac)</td></tr>
<tr><td>St Teresa</td><td>Montacute Rd (From Middleton Rd to Lilleshall Rd)</td></tr>
<tr><td>St Thomas of Canterbury Catholic Primary School</td><td>Commonside East (access road)</td></tr>
<tr><td>Stanford</td><td>Chilmark Rd SW16; Hassocks Rd; Oxtoby Way; Byards Croft</td></tr>
<tr><td>The Sherwood</td><td>Abbots Rd (from Sherwood Park Rd to Commonside East); Castleton Rd; Hadley Rd</td></tr>
<tr><td>Ursuline High</td><td>Crescent Road and Southdown Drive</td></tr>
<tr><td>William Morris</td><td>Recreation way, Mitcham (between the roundabout and Huntington Close)</td></tr>
<tr><td>Wimbledon Park primary</td><td>Havana Rd SW19; Wellington Rd</td></tr>
</table>
https://www.merton.gov.uk/streets-parking-transport/traffic-management/school-streets-programme
</td></tr>
<tr><td>70</td><td>Work with and provide specialist advice and support to schools around air quality issues.</td><td>There is much collaborative working internally at Merton Council to maximise the resources available, share knowledge and avoid unnecessary duplication. Various examples of this have been provided in previous specific action updates.</td></tr>
</table>

New Projects (NP) commenced in post publication of the AQAP - updates		
NP1:2019	Healthy Streets Everyday (HSE)	Funding awarded by the Mayor of London. Active dates 2019-2022. A project spanning 16 boroughs, which will deliver 250 car-free and pedestrianisation initiatives or events over three years During 2020 Merton's HSE Mayors Air Quality Fund (MAQF) funding was reallocated to delivering Parklets outside three primary schools (Benedict Primary, Lonesome Primary and St Mark's Primary School). Delivery this project was delayed in 2020 and 2021 due to COVID-19 restrictions. The parklets idea was adapted to create bespoke environmental pocket areas at the schools in 2021/22. https://crossriverpartnership.org/projects/healthy-streets-everyday/
NP2:2019	Behavioural Insights	Funding awarded from Local Government Association: Behavioural Insights programme. This 12-month pilot project was originally designed to investigate the most effect form of anti-idling messaging at Primary Schools. However, due to delays and a changing landscape due to COVID-19 the project was rescoped in 2021 to focus on idling at West Barnes Lane Level Crossing. The project continues in 2022.
NP1:2020	Clean Air Villages 3 (CAV3)	Funding awarded by DEFRA. Active dates April 2020 – March 2021. Delivery of a Clean Air Village in Wimbledon Town Centre 2020/21. The year-long project spanning 12 London boroughs and 4 Business Improvement Districts, aims to improve air quality in 16 different London 'villages', where both air pollution and population density levels are high. A cargo bike scheme with 80 hours available was implemented to support businesses and organisations in Wimbledon. This launched in December 2020 and concluded on

		the 10th of April 2021. In January and February 2021, CRP approached pharmacies and not-for-profit causes to help support local deliveries for the Covid-19 response. All the organisations that took part in the scheme previously used vans or cars to deliver and collect goods across the London Borough of Merton. The demand from pharmacies came as many vulnerable individuals were shielding at home so would need their medicines to be delivered to them. AFC Wimbledon and Little A.R.K contacted CRP through a local business group. Both organisations needed support for extra collections and deliveries due to the demand from the pandemic. They wanted to ensure that the delivery method being used would not have a negative impact on congestion or air quality for the communities they were serving. Estimated emissions savings have been calculated using CRPs in-house measureBEST emissions calculator. The below scenario calculations are based on the ten weeks (27 days dedicated to deliveries) the cargo bike scheme operated during (November 2020 – March 2021). Delivery scenarios have all been based on "average car" classifications, comprised of the average mix of London's diesel and petrol cars. 734.7km of zero-emission journeys have been made through the scheme. Below are the emissions associated with this. **Total emissions avoided from cargo bike scheme.** | NOX (g) | PM2.5 (g) | PM10 (g) | CO2 (kg) | | --- | --- | --- | --- | | 228.40 | 13.50 | 24.49 | 107.41 | *Table 41: Merton total emissions saving.* The full report and case study can be viewed at: https://crossriverpartnership.org/projects/clean-air-villages-3/ https://crossriverpartnership.org/wp-content/uploads/2021/06/Defra-Air-Quality-Grant-Scheme-201920-CAV3-Summary-Report-Final-1.pdf

		https://crossriverpartnership.org/wp-content/uploads/2021/05/CRP-Clean-Air-Villages-3-Cargo-Bike-Case-Study.pdf
New Projects (NP) (2021)		
NP1:2020	Clean Air Villages 4 (CAV4)	Funding awarded by DEFRA. Active dates May 2021 – June 2022. Delivery of a Clean Air Village in Wimbledon Town Centre 2021/22. The year-long project spanning 13 London Boroughs, 11 Business Improvement Districts, a Landowner and Strategic Partner, aims to improve air quality in different London 'villages', where both air pollution and population density levels are high. Building on the business engagement exercise in 2020/21 a cargo bike courier service was procured in late 2021 for delivery of a free 120 hour trial for businesses in Wimbledon. he project continues in 2022 and will be reported upon in the 2022 Annual Status Report. https://crossriverpartnership.org/projects/clean-air-villages-4/

4. Planning Update and Other New Sources of Emissions

Table K. Planning requirements met by planning applications in the London Borough of Merton in 2021

Condition	Number
Number of planning applications where an air quality impact assessment was reviewed for air quality impacts	26
Number of planning applications required to monitor for construction dust	6
Number of CHPs/Biomass boilers refused on air quality grounds	0
Number of CHPs/Biomass boilers subject to GLA emissions limits and/or other restrictions to reduce emissions	0
Number of developments required to install Ultra-Low NO_x boilers	?
Number of developments where an AQ Neutral building and/or transport assessments undertaken	26
Number of developments where the AQ Neutral building and/or transport assessments not meeting the benchmark and so required to include additional mitigation	3
Number of planning applications with S106 agreements including other requirements to improve air quality	S106 Contributions (commenced in 2021) Air Quality Contribution x 1 Car Club x 4 Cycle Provision x 1
Number of planning applications with CIL payments that include a contribution to improve air quality	Under the CIL Regulations 2010 CIL expenditure is not accounted for at the planning application level.
NRMM: Central Activity Zone and Canary Wharf Number of conditions related to NRMM included. Number of developments registered and compliant. Please include confirmation that you have checked that the development has been registered with the GLA through the relevant NRMM website and that all	The London Borough of Merton is entirely outside of the Central Activity Zone and Canary Wharf

Condition	Number
NRMM used on-site is compliant with Stage IIIB of the Directive and/or exemptions to the policy.	
NRMM: Greater London (excluding Central Activity Zone and Canary Wharf)	
Number of conditions related to NRMM included.	NRMM condition recommended to be attached to all planning applications where construction and demolition is proposed (26).
Number of developments registered and compliant.	At the time of writing this report a total of 17 registered active sites identified on the NRMM website.
Please include confirmation that you have checked that the development has been registered at www.nrmm.london and that all NRMM used on-site is compliant with Stage IIIA of the Directive and/or exemptions to the policy.	Cleaner Construction for London undertook 20 site audit(s) in the borough of Merton. • 3 site(s) achieved Self-Compliant status • 12 site(s) worked towards and achieved Compliance • 2 site(s) failed and were recorded as non-Compliant. • 1 site(s) upon arrival/engagement were completed • 2 site(s) had No NRMM within scope (37-560kW) presently deployed. • 35% of sites audited were cold engaged and therefore not registered prior to auditing. • 65% of sites audited were not cold engaged and therefore not registered prior to auditing.

4.1 New or significantly changed industrial or other sources

No new sources identified.

Appendix A Details of Monitoring Site Quality QA/QC

A.1 Automatic Monitoring Sites

All data undergoes quality assurance and quality control (QA/QC) procedures to ensure that the data obtained are of a high quality.

The NO_2 continuous analyser is automatically calibrated every night and also manually checked and calibrated every two to four weeks by the contractor, TRL, employed by the London Borough of Merton for Local Support Officer (LSO) visits during 2021. There is a need for frequent calibration adjustments as the gradual build-up of dirt within the analyser reduces the response rate. This fall off in response needs appropriate correction, to ensure the recording of the true concentrations. The calibration process involves checking the monitoring accuracy against a known concentration of span gas. The span gas used is nitric oxide and is certified to an accuracy of 5%. Both the automatic and manual calibrations use this same certified span gas (i.e. the automatic overnight one does not use the less accurate permeation tube method).

The NO_2 continuous analysers is serviced every six months by TRL and audited by the National Physical Laboratory (NPL) every six months as part of Environmental Research Groups (ERG) - Imperial College London's, London Air Quality Network (LAQN) QA/QC procedure, to ensure optimum data quality.

PM_{10} Monitoring Adjustment

PM_{10} particulates are measured using a Tapered Element Oscillating Microbalance (TEOM) analyser, with the data presented as the gravimetric equivalent.

No automatic or fortnightly calibrations are carried out on the TEOM. Calibrations are only carried as part of the routine servicing and regular independent audits. The on-going performance of the monitor is checked online, by the ERG - Imperial College London Duty Officer[8]. The role of the LSO at the fortnightly visits is to make more

[8] In July 2020 King's College London merged with Imperial College London. The Environmental Research Group (ERG) also moved across to Imperial.

detailed performance checks. The LSO is also on standby at other times, to change the TEOM's monitoring filter as required, depending on the filter loading.

Since 2009, TEOM data have been improved by routine adjustments, using the volatile correction method (VCM). This corrects for the loss of any volatile mass, which has been driven off by the heat applied in the TEOM's inlet column. The VCM adjustments are carried out by Imperial College London, prior to dissemination of the data.

The TEOM equipment is serviced every six months by TRL and also audited by NPL every six months as part of the Imperial LAQN QA/QC procedure, to ensure optimum data quality. Both sites are part of the LAQN and KCL are responsible for the daily data collection, storage, validation and dissemination via the LAQN website (www.londonair.org.uk). KCL ratifies the data periodically, viewing data over longer time periods and using the results from fortnightly checks, equipment services and equipment audits.

A.2 Diffusion Tube Quality Assurance / Quality Control

Directive 2008/50/EC of the European Parliament and of the Council on ambient air quality and cleaner air for Europe (EC, 2008) sets air quality objectives for NO_2 along with other pollutants. Under the Directive, annual mean NO_2 concentration data derived from diffusion tube measurements must demonstrate an accuracy of ±25 % to enable comparison with the NO_2 air quality objectives of the Directive.

In order to ensure that NO_2 concentrations reported are of a high quality, strict performance criteria need to be met through the execution of QA and QC procedures. A number of factors have been identified as influencing the performance of NO_2 diffusion tubes including the laboratory preparing and analysing the tubes, and the tube preparation method (AEA, 2008). QA and QC procedures are therefore an integral feature of any monitoring programme, ensuring that uncertainties in the data are minimised and allowing the best estimate of true concentrations to be determined.

Our NO_2 diffusion tubes are analysed for us by Gradko using 50% TEA in acetone method of preparation. Gradko take an active role in developing rigorous QA and QC procedures in order to maintain the highest degree of confidence in their laboratory

measurements. Gradko were involved in the production of the Harmonisation Practical Guidance for NO_2 diffusion tubes (AEA, 2008) and have been following the procedures set out in the guidance since January 2009. Since April 2014 Gradko has taken part in a new scheme AIR-PT, which combines two long running PT schemes: LGC Standards STACKS PT scheme and HSL WASP PT scheme.

This section contains details of Gradko International Ltd.'s Results of laboratory precision

- Performance in AIR NO2 PT Scheme (Feb – October 2021)

- Summary of Precision Scores for 2019 – 2021

- UKAS schedule of accreditation (April 2020)

Gradko International Ltd is a UKAS accredited laboratory and participates in laboratory performance and proficiency testing schemes. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high calibre.

Summary of Laboratory Performance in AIR NO2 Proficiency Testing Scheme (February – October 2021)

Gradko participate in the AIR PT NO_2 diffusion tube scheme, which uses artificially spiked diffusion tubes to test each participating laboratory's analytical performance on a quarterly basis. The scheme is designed to help laboratories meet the European Standard. Gradko demonstrated "good" laboratory performance in 2021 for 50% TEA in Acetone.

The laboratory follows the procedures set out in the Harmonisation Practical Guidance and participates in the AIR proficiency-testing (AIR-PT) scheme. Previously to the Air-PT scheme, Gradko participated in the Workplace Analysis Scheme for Proficiency (WASP) for NO2 diffusion tube analysis. Defra and the Devolved Administrations advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the AIR-PT scheme.

Laboratory performance in the AIR-PT is also assessed by the National Physical Laboratory (NPL), alongside laboratory data from the monthly NPL Field Inter-

Comparison Exercise carried out at for Gradko at Marylebone Road, central London. A laboratory is assessed and given a ‘z’ score, a score of ± 2 or less indicates satisfactory laboratory performance. Gradko International Ltd.’s performance for 2021 is covered by rounds AR041 to AR046 of the AIR-PT scheme. For 2021 the laboratories results were deemed to be good for 101 participating local authorities and poor for 13 participating local authorities based upon a z score of ≤ ± 2.

In 2021, the tube precision for NO_2 Annual Field Inter-Comparison for Gradko International using the 50% TEA in acetone method was ‘good’ for the results of 14 participating local authorities, no participating local authorities were deemed to be ‘bad’.

Table 1: Laboratory summary performance for AIR NO_2 PT rounds AR0030, 31, 33, 34, 36. 37, 39, 40 and 42

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of ≤ ± 2 as defined above.

AIR PT Round	AIR PT AR030	AIR PT AR031	AIR PT AR033	AIR PT AR034	AIR PT AR036	AIR PT AR037	AIR PT AR039	AIR PT AR040	AIR PT AR042
Round conducted in the period	January – February 2019	April – May 2019	July – August 2019	September – November 2019	January – February 2020	May – June 2020	July – August 2020	September – October 2020	January – March 2021
Aberdeen Scientific Services	75 %	100 %	100 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
Edinburgh Scientific Services	100 %	NR [2]	100 %	25 %	50 %	NR [3]	NR [3]	100 %	25 %
SOCOTEC	87.5 % [1]	100 % [1]	100 % [1]	100 % [1]	100 % [1]	NR [3]	NR [3]	100 % [1]	100 % [1]
Glasgow Scientific Services	100 %	100 %	100 %	50 %	100 %	NR [3]	NR [3]	100 %	50 %
Gradko International	75 %	100 %	100 %	100 %	75 %	NR [3]	NR [3]	75 %	25 %
Lambeth Scientific Services	50 %	100 %	50 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
Milton Keynes Council	100 %	100 %	50 %	100 %	100 %	NR [3]	NR [3]	25 %	0 %
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	NR [3]	NR [3]	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	75 %	100 %	NR [3]	NR [3]	100 %	100 %
Staffordshire County Council	100 %	75 %	75 %	75 %	100 %	NR [3]	NR [3]	50 %	100 %
Tayside Scientific Services (formerly Dundee CC)	100 %	NR [2]	100 %	NR [2]	100 %	NR [3]	NR [3]	100 %	NR [2]
West Yorkshire Analytical Services	100 %	100 %	100 %	50 %	100 %	NR [3]	NR [3]	NR [2]	NR [2]

[1] Participant subscribed to two sets of test results (2 x 4 test samples) in each AIR PT round.
[2] NR, No results reported.
[3] Round was cancelled due to pandemic.
Cardiff Scientific Services, Exova (formerly Clyde Analytical), Kent Scientific Services, Kirklees MBC and Northampton Borough Council; these labs are not detailed as they no longer carry out NO2 diffusion tube monitoring and therefore did not submit results for any of the AIR NO_2 PT rounds listed.

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AIR PT Nitrogen Dioxide Proficiency Scheme Results 2021

Methods: GLM 7 – CARY 60 Spectrophotometer

AIR PT Proficiency Scheme - Nitrogen Dioxide 2021					
			Procedure GLM 7		
Date	Round	Assigned value	Measured concentration	z-Score	% Bias
Feb-21	AIR PT 42-1	1.71	1.13	-4.17	-33.9%
Feb-21	AIR PT 42-2	1.74	0.81	-6.29	-53.4%
Feb-21	AIR PT 42-3	1.40	0.83	-5.43	-40.7%
Feb-21	AIR PT 42-4	1.37	1.16	-1.91	-15.3%
Mar-21	AIR PT 42-1 Rpt	1.71	1.79	0.62	4.7%
Mar-21	AIR PT 42-2 Rpt	1.74	1.75	0.08	0.6%
Mar-21	AIR PT 42-3 Rpt	1.40	1.40	0	0.0%
Mar-21	AIR PT 42-4 Rpt	1.37	1.41	0.39	2.9%
May-21	AIR PT 43-1	1.19	1.23	0.35	3.4%
May-21	AIR PT 43-2	1.19	1.22	0.26	2.5%
May-21	AIR PT 43-3	2.00	1.97	-0.2	-1.5%
May-21	AIR PT 43-4	1.94	1.98	0.26	2.1%
Aug-21	AIR PT 45-1	1.58	1.58	0	0.0%
Aug-21	AIR PT 45-2	1.57	1.56	-0.08	-0.6%
Aug-21	AIR PT 45-3	2.43	2.41	-0.08	-0.8%
Aug-21	AIR PT 45-4	2.42	2.37	-0.28	-2.1%
Oct-21	AIR PT 46-1	2.7	2.77	0.33	2.6%
Oct-21	AIR PT 46-2	2.71	2.6	-0.49	-4.1%
Oct-21	AIR PT 46-3	2.17	2.06	-0.65	-5.1%
Oct-21	AIR PT 46-4	2.13	2.15	0.13	0.9%

Results from AIR-PT 42 showed a significant negative bias. An investigation was carried out and a repeat set of samples ordered (Mar-21) to confirm results.

Results from the investigation showed for AIR PT samples, extraction of nitrite was not complete and required further time on the shaker to extract all nitrite from the tubes. Successful extraction was demonstrated on the repeat Air PT samples in March 2021.

The investigation also showed that for laboratory standards and customer samples, extraction of nitrite from tubes was complete without further shaking, and there was no risk associated with results reported to customers.

For any queries please contact the Laboratory Manager at linda@gradkolab.com

Linda Gates 05/05/2022

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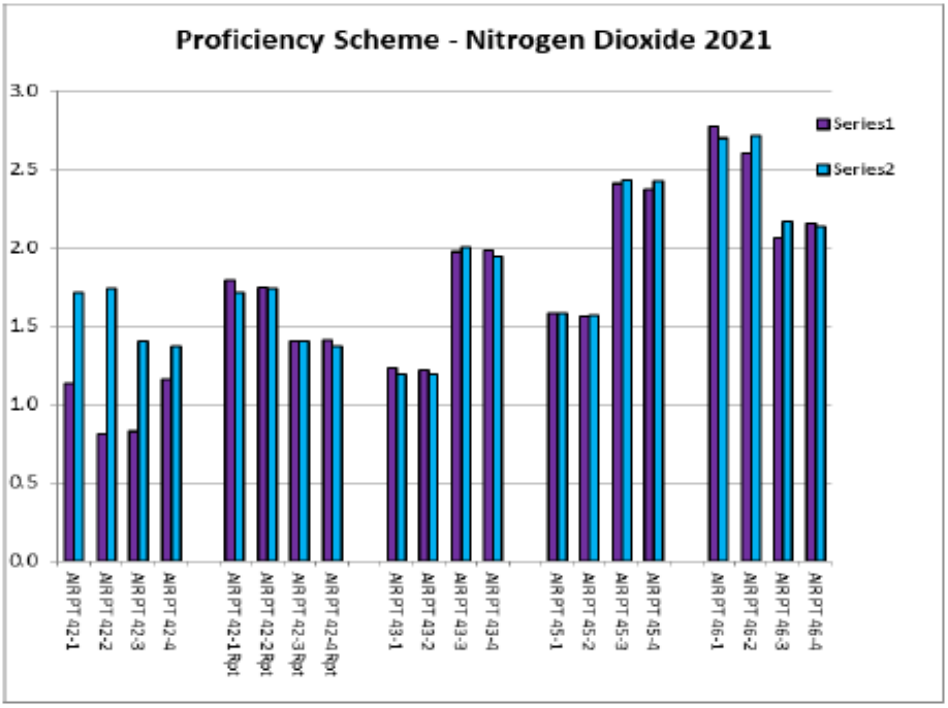

Precision Summary Results

The diffusion tube precision summary results are provided below. This details the total number of recorded good/bad precision results for the last 3 years for laboratories that currently provide diffusion tube analysis.

2019 - 2021 Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Collocation Studies UK Laboratories including for Gradko Laboratory 50% TEA in Acetone

Precision Summary Table

Diffusion Tube Preparation Method	2019 Good	2019 Bad	2020 Good	2020 Bad	2021 Good	2021 Bad
Gradko, 50% TEA in Acetone	27	0	19	1	14	0
Gradko, 20% TEA in Water	30	1	27	0	32	0
ESG Didcot / SOCOTEC, 50% TEA in Acetone	40	1	24	0	20	3
ESG Didcot / SOCOTEC, 20% TEA in Water	12	0	6	0	4	1
Staffordshire Scientific Services	17	0	15	0	13	1
Glasgow Scientific Services	9	2	2	7	1	5
Edinburgh Scientific Services	4	2	4	1	1	0
Milton Keynes Council	2	0	4	0	1	0
Tayside Scientific Services	1	0	1	0	1	0
Lambeth Scientific Services	8	1	8	2	4	1
West Yorkshire Analytical Services	1	1	0	0	0	0
Aberdeen Scientific Services	6	0	7	0	7	0
South Yorkshire Air Quality Samplers	3	0	1	0	1	0
ESG Glasgow, 50% TEA in Acetone	1	0	1	0	0	1
ESG Glasgow, 20% TEA in Water	1	0	1	0	0	1
Somerset County Council	9	0	10	0	2	0

Numerical results for this data are contained in the National Bias Adjustment Spreadsheet version 03/22

Gradko is accredited by UKAS for the analysis of NO_2 diffusion tubes. It undertakes the analysis of the exposed diffusion tubes by ultra violet spectrophotometry.

Schedule of Accreditation

issued by

United Kingdom Accreditation Service

2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK

UKAS TESTING

2187

Accredited to ISO/IEC 17025:2017

Gradko International Ltd
(Trading as Gradko Environmental)

Issue No: 024 **Issue date:** 15 April 2020

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SO23 0RH	**Website: www.gradko.co.uk**

Testing performed at the above address only

DETAIL OF ACCREDITATION

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
ATMOSPHERIC POLLUTANTS Collected on diffusion (sorbent) tubes and monitors	Chemical Tests	Documented In-House Methods
	Ammonia as ammonium (NH_4^+)	GLM 8 by Ion Chromatography
	Benzene Toluene Ethyl benzene Xylene	GLM 4 by Thermal Desorption/ FID Gas Chromatography
	Hydrogen chloride as chloride (Cl^-) Nitrogen dioxide as nitrite (NO_2^-) Sulphur dioxide as sulphate (SO_4^{2-}) Hydrogen fluoride as fluoride (F^-)	GLM 3 by Ion Chromatography
	Hydrogen sulphide	GLM 5 by Colorimetric determination (UV Spectrophotometry)
	Ozone as nitrate (NO_3^-)	GLM 2 by Ion Chromatography
	Nitrogen Dioxide as nitrite (NO_2^-)	GLM 7 by Colorimetric determination (UV Spectrophotometry)
	Sulphur dioxide as sulphate (SO_4^{2-})	GLM 1 by Ion Chromatography
	Formaldehyde as formaldehyde-DNPH	GLM 18 by HPLC
	Volatile Organic Compounds including: Benzene Toluene Ethylbenzene p-Xylene o-Xylene	GLM 13 by Thermal Desorption GC-Mass Spectrometry

UKAS TESTING 2187 Accredited to ISO/IEC 17025:2017	**Schedule of Accreditation** issued by **United Kingdom Accreditation Service** 2 Pine Trees, Chertsey Lane, Staines-upon-Thames, TW18 3HR, UK **Gradko International Ltd** **(Trading as Gradko Environmental)** **Issue No:** 024 **Issue date:** 15 April 2020

Testing performed at main address only

Materials/Products tested	Type of test/Properties measured/Range of measurement	Standard specifications/ Equipment/Techniques used
ATMOSPHERIC POLLUTANTS Collected on diffusion (sorbent) tubes and monitors (cont'd)	Chemical Tests (cont'd)	
	Qualitative Analysis and Estimation of Volatile Organic Compounds on diffusion (sorbent) tubes and monitors	GLM 13 by Thermal Desorption GC-Mass Spectrometry with estimations in accordance with ISO standard 16000-6
	Naphthalene	GLM 13-1 by Thermal Desorption GC-Mass Spectrometry
	Tetrachloroethylene Trichloroethylene	GLM 13-2 by Thermal Desorption GC-Mass Spectrometry
	trans-1,2-Dichloroethene cis-1,2-Dichloroethene	GLM 13-3 by Thermal Desorption GC-Mass Spectrometry
	Indane Styrene	GLM 13-4 by Thermal Desorption GC-Mass Spectrometry
	1,2,3-Trimethylbenzene 1,2,4-Trimethylbenzene 1,3,5-Trimethylbenzene	GLM 13-5 by Thermal Desorption GC-Mass Spectrometry
	1,3-Butadiene	GLM 13-6 by Thermal Desorption GC-Mass Spectrometry
	Carbon Disulphide	GLM 13-7 by Thermal Desorption GC-Mass Spectrometry
	Vinyl Chloride	GLM 13-8 by Thermal Desorption GC-Mass Spectrometry
	Flexible scope for quantitative analysis of Volatile Organic Compounds on diffusion (sorbent) tubes and monitors in accordance with methods developed and validated by in-house procedure LWI 47	LWI 47 by Thermal Desorption GC-Mass Spectrometry
END		

NO_2 diffusion tube analysis method

NO_2 diffusion tubes are passive monitoring devices. They are made up of a Perspex cylinder, with two stainless steel mesh discs, coated with triethanolamine (TEA) absorbent held inside a polythene cap, which is sealed onto one end of the tube. Diffusion tubes operate on the principle of molecular diffusion, with molecules of a gas diffusing from a region of high concentration (open end of the tube) to a region of low concentration (absorbent end of the tube) (AEA, 2008). NO_2 diffuses up the tube because of a concentration gradient and is absorbed by the TEA, which is present on the coated discs in the sealed end of the tube. All of Merton's NO_2 diffusion tubes are prepared by Gradko using 50% v/v TEA with Acetone as the absorbent.

Prior to and after sampling, an opaque polythene cap is placed over the end of the diffusion tube opposite the TEA coated discs to prevent absorption. The NO_2 diffusion tubes are labelled and kept refrigerated in plastic bags prior to and after exposure.

In the laboratory, the steel mesh is removed and washed with distilled water which is then analysed. The concentration of nitrogen dioxide is found by shining ultraviolet light (UV) through the water sample. The amount of light absorbed is equivalent to the concentration of nitrogen dioxide that was present in the air during the monitoring period.

Factor from Local Co-location Studies

In 2021 the Borough undertook a co-location study placing with three NO_2 diffusion tubes (Site IDs 47, 47/2, 47/3) with the continuous NO_2 monitoring equipment at the Civic Centre Morden (ME9).

However, it was not possible to derive the local bias adjustment factor for 2021 as Environmental Research group (ERG) were unable to validate the measurements from ME9. As such the national bias adjustment factor of 0.83[9] has been used to correct diffusion tube data. The guidance states, the use of nationally derived bias adjustment factor will provide the best estimate of the true annual mean concentration as it is based on more studies than a locally derived one.

[9] National Diffusion Tube Bias Adjustment Factor Spreadsheet. Spreadsheet Version Number 03/22.

Table L. Bias Adjustment Factor

Year	Local or National	If Local, Version of National Spreadsheet	Adjustment Factor
2021	National	03/22	0.83
2020	National	03/21	0.82
2019	Local	03/20	0.89
2018	National	03/19	0.92
2017	National	03/18	0.97
2016	National	03/17	1.03
2015	National	03/16	0.96
2014	National	03/15	0.80

A.3 Adjustments to the Ratified Monitoring Data

Short-term to Long-term Data Adjustment

NO_2 Adjustment (Diffusion tubes)

No data adjustment (annualisation) required for diffusion tube monitoring locations as all sites achieved a data capture rate of 75% or more in 2021.

NO_2 Adjustment (ME9)

The automatic monitoring data are subject to correction by the Environmental Research Group (ERG) at Imperial College London as part of the London Air Quality Network (LAQN). Automatic monitoring took place over the full 12-month period in 2021, however, in March 2022 ERG were unable to complete the annual data ratification process following a failed audit. Unfortunately, ongoing issues with the monitoring equipment led to a high level of uncertainty with the 2021 data and ERG were unable to validate the measurements.

The NO_2 continuous analyser is serviced every six months by TRL and also audited by National Physical Laboratory (NPL) every six months as part of the LLAQN QA/QC procedure, to ensure optimum data quality. A full discussion of the QA/QC procedures are provided in Appendix A.

The monitoring equipment failed its spring audit March 2022 due to an oxidised cylinder, it was also found that the analyser's NO_2 converter returned a very low efficiency of 80% (95% is the minimum performance for this test). The faulty converter was replaced in April 2022 and an additional NPL audit completed.

PM_{10} Adjustment (ME2)

Data capture for the automatic analyser ME9 in 2021 was 45% and as such data adjustment (annualisation) was required. Data was annualised using the LondonAir web tool as described below. The results are also provided in Table M.

https://www.londonair.org.uk/LondonAir/latools/Annualisation.aspx?sitecode=ME2&year=2021&species=pm10

It is not always possible to measure for a whole year to obtain an annual mean for a pollutant. Sometimes instrument faults or problems with data quality can also lead to

missing data and a full year's measurements are not achieved. Defra technical guidance (TG16, Feb 18) provides a method for estimating an annual mean that should be used if available data capture is below 75%. This process is termed annualising.

The tool below allows you to do this for any LondonAir measurement site. Simply select the measurement site and period that you wish to annualise and then select between two and four nearby background measurement sites to act as a reference for the annualisation. The tool matches available measurements from the site being annualised with measurements from each background site to produce a ratio. TG16 provides the following guidance on the choice of reference sites for the annualisation, "Identify two to four nearby, long-term, continuous monitoring sites... The data capture for each of these sites should be at least 85%. These sites should be background (Urban Background, Suburban or Rural) sites to avoid any very local effects that may occur at Urban Centre, Roadside or Kerbside sites, and should, wherever possible lie within a radius of about 50 miles."

This annualisation tool only selects background sites with at least 85% data capture for the corresponding year for use in the calculation.

Results of the annualisation process

Selected species

PM10

Selected site

Merton - Merton Road

Selected Year

2021

Select between 2-4 background sites

Hillingdon - Harlington | Wandsworth - Putney | Lambeth - Streatham Green | Richmond Upon Thames - Barnes Wetlands

Calculate Annualisation

Original Annual Mean	Annualisation Factor	Annualised Mean
23	0.953	21.9

Background Site	Annual Mean	Period Mean	Ratio
Lambeth - Streatham Green	17.5	18.4	0.949
Hillingdon - Harlington	12.6	13.2	0.955
Richmond Upon Thames - Barnes Wetlands	14.6	15.8	0.925
Wandsworth - Putney	16.4	16.7	0.985

Table M. Short-Term to Long-Term Monitoring Data Adjustment

Site ID	Annualisation Factor Lambeth - Streatham Green	Annualisation Factor Wandsworth - Wandsworth Town Hall	Annualisation Factor Richmond Upon Thames – Barnes Wetlands	Annualisation Factor Hillingdon - Harlington	Average Annualisation Factor	Raw Data Annual Mean (µg m^{-3})	Annualised Annual Mean (µg m^{-3})	Comments
ME2	0.949	0.955	0.925	0.985	0.953	23	21.9	ME2 experienced poor data capture (45%) in 2021.

Distance Adjustment

Where an exceedance has been measured at a monitoring site which is not representative of public exposure, the procedure specified in LLAQM.TG(19) and NO_2 fall-off with distance calculator (Version 4.2) Excel tool has been used to estimate the concentration at the nearest receptor.

NO_2 fall-off with distance calculator

This Excel tool has been developed to help local authorities derive the NO_2 concentration at locations relevant for exposure as it is not always possible to measure concentrations at precisely the desired location. The calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site. The monitoring can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be.

The methodology consists of comparing the monitored annual mean NO_2 concentrations at a given point against known relationships between NO_2 concentrations and the distance from a road source.

Limitations

1. Each distance inputted should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitoring is closer to the kerb than this is likely to be reasonable).
2. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other.
3. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.
4. Distances should be measured perpendicular to the kerb and the calculator assumes that the monitor and receptor have similar elevations.
5. The results of the calculator will have a greater uncertainty than measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.
6. The measurement and the background must be for the same year. The background concentration could come from the national maps published at https://uk-

air.defra.gov.uk/data/laqm-background-home , or alternatively from a nearby monitor in a background location.

7. The calculator can only be used where the influence of one road source is present i.e. an increasing distance from a road source in one direction cannot lead to a decreased distance toward a secondary road source.

Table N. NO_2 Fall off With Distance Calculations for 2021

Site Name/ID		Distance (m)		NO_2 Annual Mean Concentration (μgm^{-3})			Comment
	Site Description	**Monitoring Site to Kerb**	**Receptor to Kerb**	**Background (Merton Site ID 31 – bias adjusted)**	**Monitored at Site (bias adjusted)**	**Predicted at Receptor**	
1	A298 Bushey Rd nr Bushey Ct, SW20	1.5	16.8	15	36	24.9	
8	A238 Coombe Lane, SW20 8NF	0.6	2.6	15	38	31.8	
16	84 High St, Wimbledon, SW19	0.6	3.5	15	36	29.2	
18	Hand & Racquet, Wimbledon Hill	0.3	2.9	15	58	**42.2**	Predicted concentration at Receptor above AQS objective.
19	Wimbledon Station	2.5	6.1	15	40	34.5	
20	Hartfield Rd, Wimbledon	0.4	5.2	15	47	33.0	
21 (EA)	246 Merton Rd, South Wimbledon A219	0.5	2.4	15	59	**46.8**	Predicted concentration at Receptor above AQS objective.
22	12-16 Upper Green West, Mitcham, CR4 3AA	2	6.2	15	44	*36.3*	Predicted concentration at Receptor within 10% the AQS objective.

23	183 Kingston Rd, Wimbledon, SW19 1LH	0.6	2.5	15	46	*37.9*	Predicted concentration at Receptor within 10% the AQS objective.
29 (HA)	A24 - 44 High St Colliers Wood, SW19 2AB	0.7	3.3	15	46	*37.0*	Predicted concentration at Receptor within 10% the AQS objective.
30	A24 Christchurch Rd, Colliers Wood, SW19 2PB	0.3	3.3	15	36	27.8	
33	A24 Morden Rd, Colliers Wood, SW19 3BP	2.7	6.3	15	37	32.3	
34(HC)	Western Rd, Colliers Wood	2	4.3	15	41	*36.3*	Predicted concentration at Receptor within 10% the AQS objective.
37 (CC)	107 London Rd, Mitcham	0.6	3	15	44	35.5	
41	A239 Morden Rd, Mitcham, CR4 6AU	1.5	4.6	15	40	33.9	
42	St Hellier Rd, Morden, SM4 6JE	3.3	15.5	15	38	28.6	
43 (HA)	Morden Hall Rd nr jct, Morden SM4 5JG	2.4	24.6	15	39	25.3	Warning: your receptor is more than 20m further from the kerb than your monitor - treat result with caution.
44 (AA)	Oxfam, London Rd, Morden	0.6	5.5	15	54	*38.2*	Predicted concentration at Receptor within 10% the AQS objective.

45 (IC)	HSBC, London Rd Morden	0.9	3.5	15	38	31.8	
46 (HC)	80 Crown Lane, Morden	0.6	5.6	15	40	29.8	
47IC)	Civic Centre, Morden	1.5	3	15	42	*37.9*	Predicted concentration at Receptor within 10% the AQS objective.
53	A24 139 Epsom Rd, nr traffic lights, Morden, SM3 9EY	0.7	4.3	15	48	*36.7*	Predicted concentration at Receptor within 10% the AQS objective.
54	43 Upper Green East, Mitcham, CR4 2PF	2.4	4.4	15	49	**44.0**	Predicted concentration at Receptor above AQS objective.
55	213 Manor Road, Mitcham, CR4 1JH	0.6	5.8	15	37	27.9	

Notes

For an NO_2 concentration within 10% of the annual mean objective of 40 μgm^{-3} (between 36.0 μgm^{-3} and <40 μgm^{-3}) the concentration is shown in italics.

Exceedances of the NO_2 annual mean objective of 40 μgm^{-3} are shown in bold.

Appendix B Full Monthly Diffusion Tube Results for 2021

Table O. NO_2 Diffusion Tube Results

				Annual Mean NO_2 (ugm^{-3})													
Site Code	**Site Description**	**Valid data capture for monitoring period % a**	**Valid data capture 2021 % b**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual mean – raw data c**	**Annual mean – bias adjusted c**
1	A298 Bushey Road nr Bushey Court, SW20 0JN	100	100	**53**	**42**	**44**	**46**	**40**	**44**	**40**	34	**51**	**40**	**45**	**41**	**43**	36
2 (GA)	A24 7 Stonecot Hill, SM3 9HB	100	83	**43**	31	**40**	**41**	25	38	36	25	**49**	M	M	32	36	30
4 (FA)	154 Grand Drive, Raynes Park, SW20 9NQ	100	83	39	31	M	34	32	33	32	23	36	29	**43**	M	33	27
5 (BA)	Sacred Heart School, Burlington Road, New Malden, KT3 4NE	100	100	**49**	34	31	37	34	37	32	25	**42**	29	**42**	33	35	29
6 (JC)	17 Grand Drive, Raynes Park, SW20 0JB	100	100	**48**	**41**	**43**	**43**	**40**	**44**	**41**	36	**47**	**41**	**49**	40	**43**	36

7	A298 276-288 Kingston Road, SW20 8LX	100	92	**57**	34	21	**48**	38	**45**	39	33	**44**	32	**49**	38	**42**	35
8	A238 28 Coombe Lane, SW20 8NF	100	100	**55**	38	**47**	**51**	**42**	**48**	**47**	34	**49**	**40**	**56**	**43**	**46**	38
9	2 Lambton Road, SW20 9LR	100	100	**52**	**46**	**44**	**49**	39	**45**	**41**	31	**52**	34	**40**	**40**	**43**	36
11	51-55 Kingston Road, SW20 1JW	100	100	**45**	33	37	**45**	28	32	30	19	36	27	**41**	30	34	28
13	B281 4 Cottenham Park Rd, SW20 0RZ	100	100	39	31	31	31	23	25	26	17	33	25	34	29	29	24
14 (AC)	20 The Ridgeway, Wimbledon, SW19 4SQ	100	100	**42**	25	32	36	29	39	32	19	38	28	**49**	31	33	28
16	84 High Street, Wimbledon, SW19 5EG	100	100	**52**	**44**	**44**	**50**	36	**44**	**50**	32	**53**	32	**54**	36	**44**	36
18	25-27 Wimbledon Hill Road, SW19 7NE	100	100	**79**	**66**	**61**	**68**	**62**	**79**	**86**	**63**	**74**	**67**	**73**	**59**	**70**	**58**
19	Wimbledon Station, SW19 3SE	100	100	**58**	**47**	**42**	**52**	**48**	**52**	**53**	39	**58**	**40**	**48**	**43**	**48**	**40**
20	27 Hartfield Rd, Wimbledon, SW19 3SG	100	100	**56**	**44**	**50**	**58**	**49**	**68**	**70**	**48**	**73**	**47**	**64**	**48**	**56**	**47**
21 (EA)	A219 246 Merton Rd, South Wimbledon, SW19 1AU	100	83	**59**	**49**	**55**	**45**	**55**	**54**	**53**	M	M	**57**	**59**	**50**	**54**	**45**
22	12-16 Upper Green West, CR4 3AA	100	92	**70**	**65**	**64**	**86**	**68**	**84**	**76**	**53**	**82**	M	**68**	**60**	**71**	**59**

23	183 Kingston Road, SW19 1LH	100	100	**64**	**51**	**65**	**60**	**55**	**65**	**58**	**42**	**53**	**43**	**67**	**44**	**56**	**46**
24	75 Hartfield Road, SW19 3TJ	100	92	**49**	31	**40**	39	M	32	31	26	38	29	**42**	32	35	29
25	25 Alexander Road, SW19 7LE	100	83	**48**	39	**41**	**46**	37	**40**	**40**	32	**45**	M	M	**41**	**41**	34
26	22 Gap Road, SW19 8JG	100	100	**48**	**43**	**44**	**46**	**40**	**40**	**41**	33	**45**	33	**51**	39	**42**	35
27	56 Plough Lane, SW19 8HA	100	100	**49**	35	**40**	**43**	37	37	35	30	36	34	**52**	38	39	32
28 (BC)	11 Haydons Road, SW19 1HG	100	92	**43**	39	M	**42**	34	**42**	38	28	**46**	30	**42**	30	38	31
29 (HA)	44 High Street (A24), Colliers Wood, SW19 2AB	100	100	**64**	**49**	**58**	**63**	**53**	**56**	**53**	44	**64**	**48**	**58**	**52**	**55**	**46**
30	A24 Christchurch Rd - Christchurch Close junction, SW19 2PB	100	100	**51**	36	**45**	**42**	**40**	**46**	**44**	36	**44**	39	**55**	**40**	**43**	36
31 (LA)	28 Charminster Avenue, Morden, SW19 3FL	100	92	32	19	52	21	12	14	14	9	20	15	24	20	18	15
32	Merantum Way, SW19 2JY	100	92	**47**	33	**41**	36	26	34	M	25	**41**	25	**47**	34	36	30
33	A24 Morden Road, SW19 3BP	100	83	**52**	M	**43**	**45**	39	**42**	**40**	M	**51**	**45**	**46**	**42**	**44**	37
34 (GC)	211 Western Road, Colliers Wood, SW19 2QD	100	83	**60**	**46**	**50**	**48**	**42**	**51**	**52**	**40**	**47**	<0.62	118	**52**	**49**	**41**

35 (MA)	53 Lavender Avenue, Morden, CR4 3HL	100	100	**42**	27	35	29	24	25	24	18	31	25	37	28	29	24
36 (DC)	35 London Road, Tooting, SW17 9JR	100	100	**51**	**48**	**44**	**48**	37	39	37	31	**50**	35	**43**	33	**41**	34
37 (CC)	107 London Road, Tooting, CR4 3JA	100	100	**58**	**49**	**53**	**62**	**45**	**51**	**52**	**40**	**64**	**47**	**55**	**55**	**53**	**44**
38 (EC)	265 London Road, Mitcham, CR4 3NH	100	100	**52**	35	**47**	**50**	35	45	38	34	**49**	36	**47**	36	**42**	35
39 (FC)	80 Church Road, Mitcham, CR4 3BE	100	100	**50**	33	**40**	**46**	33	37	34	25	**42**	27	**42**	31	37	30
40	A217 361 London Road, Mitcham, CR4 4BF	100	100	**49**	37	**46**	38	31	38	40	32	**48**	37	**51**	37	**40**	33
41	A239 Morden Road, Morden, SM4 6AU	100	83	**63**	39	**55**	**59**	**46**	M	**48**	**42**	**59**	42	M	29	**48**	**40**
42	155 St Hellier Road, Morden, SM4 6JE	100	100	**52**	**45**	**49**	**55**	**40**	**49**	**41**	37	**53**	34	**52**	**44**	**46**	38
43	86 Morden Hall Road, Morden, SM4 5JG	100	92	**40**	**44**	**52**	**58**	**41**	**47**	M	**42**	**59**	39	**51**	39	**47**	39
44 (AA)	31, London Road, Morden, SM4 5HT	100	100	**68**	**63**	**62**	**69**	**57**	**69**	**71**	**62**	**80**	**67**	**62**	**55**	**65**	**54**
45 (IC)	192-110 London Road, Morden, SM4 5AX	100	100	**60**	**46**	**48**	**50**	38	**52**	**47**	**41**	**48**	34	**52**	33	**46**	38
46 (HC)	80 Crown Lane, Morden, SM4 5BN	100	83	**64**	**43**	M	M	**49**	**53**	**49**	38	**57**	**45**	**44**	**41**	**48**	**40**

47	Civic Centre, Morden, SM4 5DX	100	92	**56**	**56**	**54**	**48**	**49**	**47**	**51**	**42**	**64**	**57**	M	**44**	**52**	**43**
47/2	Civic Centre, Morden, SM4 5DX	100	92	**65**	**56**	**47**	**46**	**49**	**56**	**58**	39	**58**	M	**47**	**48**	**52**	**43**
47/3	Civic Centre, Morden, SM4 5DX	100	100	**55**	**52**	**50**	**52**	**54**	**45**	**49**	38	**51**	49	**54**	**45**	**50**	**41**
48	28 Aberconway Road, Morden, SM4 5LF	100	100	**52**	34	**44**	**42**	29	37	35	28	**41**	28	**45**	33	37	31
49	37 Crown Road, Morden, SM4 5DD	100	92	**47**	38	37	**42**	33	37	35	27	**41**	33	M	30	36	30
50	75 Martin Way, SM4 4AR	100	100	**54**	35	**40**	**43**	38	39	40	28	**46**	30	**58**	33	**40**	34
51	A24 49 Streatham Rd, Mitcham, CR4 2AD	100	92	**49**	35	39	35	31	31	M	22	**40**	32	**44**	34	36	30
52	50 West Barnes Lane, New Malden, KT3 4PS	100	92	38	27	38	31	28	29	26	19	34	27	38	M	30	25
53	A24 139 Epsom Rd, SM3 9EY	100	92	**62**	**52**	**51**	**52**	**53**	**60**	**59**	M	**60**	**63**	**63**	**55**	**57**	**48**
54	43 Upper Green East, Mitcham, CR4 2PF	100	92	**79**	**50**	**57**	**64**	**56**	**64**	**55**	**48**	M	**55**	**72**	**47**	**59**	**49**
55	213 Manor Road, Mitcham, CR4 1JH	100	100	**54**	37	**50**	**50**	38	**48**	**44**	39	**49**	**41**	**55**	36	**45**	37

Notes

Concentrations are presented as µg m^{-3}.

Exceedances of the NO_2 annual mean AQO of 40 µg m^{-3} are shown in **bold**.

NO_2 annual means in excess of 60 µg m^{-3}, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in **bold and underlined**.

All means have been "annualised" in accordance with LLAQM.TG(19) if valid data capture for the calendar year is less than 75% and greater than 33%.

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

(b) data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

A missing diffusion tube is identified by the letter 'M'.

A black cell highlights erroneous data. Erroneous data has been deleted from the annual mean calculation and reflected in a reduction in the data capture.

Table P. Monthly triplicate NO_2 diffusion tube results for co-location site Civic Centre Morden

Site ID	Data Capture	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unadjusted annual mean	Bias adjusted (National factor = 0.83)
47	92	**56**	**56**	**54**	**48**	**49**	**47**	**51**	**42**	**64**	**57**	M	**44**	**52**	**43**
47/2	92	**65**	**56**	**47**	**46**	**49**	**56**	**58**	39	**58**	M	**47**	**48**	**52**	**43**
47/3	100	**55**	**52**	**50**	**52**	**54**	**45**	**49**	38	**51**	49	**54**	**45**	**50**	**41**

Notes

Concentrations are presented as µg m^{-3}.

Exceedances of the NO_2 annual mean AQO of 40 µg m^{-3} are shown in **bold**.

NO_2 annual means in excess of 60 µg m^{-3}, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in **bold and underlined**.

A missing diffusion tube is identified by the letter 'M'.

Appendix C Diffusion Tube Results for Schools Monitoring Programme

In August 2019 an extensive school air quality monitoring programme was initiated by LBM. Diffusion tubes were located at all educational institutions in the borough recorded on the Gov.UK register of schools https://get-information-schools.service.gov.uk/ . Where there were two road sources tubes were installed on both school/road boundaries.

Due to the large number of sites it was decided the monitoring programme would be split into two phases:

- A screening phase August to December 2019.

The screening phase was used to establish which schools were low risk and could be removed from the programme. Low risk sites were characterised as having an average NO_2 concentration of at least 20% below the annual AQO (32 μgm^{-3} 'raw' unadjusted value). The results for the screening phase were reported in the 2019 Annual Status Report. To summarise the majority of educational sites were found to be 'low risk' and additional monitoring was completed at 24 schools.

- Full 12 months monitoring programme January to December 2020.

A total of 24 schools were monitored between January and December 2020. The annual mean AQO was achieved at all monitoring locations however 9 school sites were added to the Council's main diffusion tube network in January 2021 for observation, nitrogen dioxide concentrations were the highest at these sites.

- Further monitoring in 2021

The schools which will receive ongoing monitoring are listed in Table Q and are mapped in Figure 4. In line with Action 66 of the Air Quality Action Plan (AQAP) the schools will be offered an Air Quality Audit in order to assess how the impact of air pollution can be mitigated.

Table Q. Schools added to main diffusion network 2021

School	ID	Postcode	Street
*Abbey Children's Centre / Merton Abbey Primary School	S1/2	SW19 2JY	High Path
All Saints' C of E Primary School	S4B	SW19 1HL	Haydons Road
Eagle House School	S68	CR4 3HD	London Road
Just Learn	S69	CR4 2QA	Commonside East
Morden Primary School	S51	SM4 5PX	London Road
Park Community School (Dorset Rd / Merton Road)	S36 / S36B	SW19 3EF	Dorset Road
RISE Education	S67	CR4 3ED	Western Road
St Peter and Paul Catholic Primary School	S12	CR4 4LA	Cricket Green
Wimbledon High School	S63	SW19 4AB	Wimbledon Hill

*Added to main diffusion network to ongoing monitoring commitments not due to air quality concerns.

Figure 4. School monitoring locations 2021

Table R School nitrogen dioxide monitoring data for 2021

				Annual Mean NO_2 (ugm^{-3})													
Site Code	**Site Description**	**Valid data capture for monitoring period % a**	**Valid data capture 2021 % b**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Annual mean – raw data c**	**Annual mean – Annualised and bias adjusted c**
S36B	Park Community Primary School Merton Rd	100	92	**50**	39	**44**	**47**	**40**	**40**	**46**	37	**48**	38	M	**41**	**43**	35
S4B	All Saints Primary School Haydons Rd	100	100	**43**	36	**43**	30	24	35	38	29	**40**	35	**41**	36	36	30
S63	Wimbledon High	100	42	**56**	39	**43**	**44**	**41**	M	M	M	M	M	27	23	39	33
S51	Morden Primary School	100	92	**54**	35	**49**	**41**	**40**	**40**	**43**	M	**49**	**41**	**56**	**41**	**44**	37
S12	St Peter + St Paul Primary School	100	100	**51**	**42**	**47**	40	38	38	**43**	30	48	37	**42**	**40**	**41**	34
S67	Rise Education	100	100	**49**	37	**44**	36	36	34	38	30	45	38	**48**	**40**	**40**	33
S68	Eagle House School	100	100	**58**	**45**	**53**	**48**	**44**	**50**	**45**	**44**	**56**	**41**	**56**	33	**48**	**40**
S01/ 02	Abbey Children's Centre / Merton Abbey Primary School	100	100	33	26	29	24	21	16	18	14	25	23	32	24	24	20
S69	Just Learn	100	100	**56**	33	**46**	**45**	**42**	**43**	**44**	38	**47**	36	**51**	38	43	36

Notes

The annual mean concentrations are presented as µg m^{-3}.

Exceedances of the NO_2 annual mean AQO of 40 µg m^{-3} are shown in **bold**.

NO_2 annual means in excess of 60 µg m^{-3}, indicating a potential exceedance of the NO_2 hourly mean AQS objective are shown in **bold and underlined**.

Means for diffusion tubes have been corrected for bias.

All means have been "annualised" in accordance with LLAQM.TG(19) if valid data capture for the calendar year is less than 75% and greater than 33%.

It was necessary to annualise data for site S63 – Wimbledon High School as data capture fell below 75% for 2021, the calculation is provided in Table S.

The school sites will be reviewed at the end of 2022 and a decision will be made whether or not to continue monitoring the current 9 locations. The data from 2021 indicates that only one of the sites S68 Eagle House School should continue to be monitored as the annual average was on the annual mean Air Quality Objective in 2021. It is important to note that the monitoring location for Eagle House school is on the main road (London Road) and is a substantial distance from the façade of the school and school grounds. As nitrogen dioxide reduces with distance from source the AQO will be met at the school building, the worst case is presented here.

Table S Annualisation calculation

Start Date	End date	Barnes Wetland Suburban Continuous Monitor DC for 2019 = 94% (B1)	D1	B1 when D1 available	Annualised Concentration
30/12/2020	03/02/2021	20.8	56.0	20.8	
03/02/2021	02/03/2021	15.2	39.3	15.2	
02/03/2021	31/03/2021	15.3	42.6	15.3	
31/03/2021	11/05/2021	15.5	44.4	15.5	
11/05/2021	03/06/2021	12.7	41.2	12.7	

03/06/2021	20/07/2021	8.2	Missing		
20/07/2021	04/08/2021	12.0	Missing		
04/08/2021	01/09/2021	8.5	Missing		
01/09/2021	27/09/2021	16.1	Missing		
27/09/2021	03/11/2021	8.9	Missing		
03/11/2021	01/12/2021	16.5	26.6	16.5	
01/12/2021	05/01/2022	No data	23.5		
	Averages	**13.6**	**39.1**	**16.0**	
			Annualisation Ratio	0.8506	**33.2**

Appendix D Diffusion Tube Results for Citizen Science Monitoring

During 2021 diffusion tubes were supplied by the London Borough of Merton to two community groups:

- Wimbledon Park Residents Association
- Sustainable Merton

While monitoring instructions were provided to a representative of each group the monitoring locations have not been verified by LBM, nor can the correct usage and storage be confirmed. All tubes were prepared and analysed by Gradko Limited, refer to

Appendix A Details of Monitoring Site Quality QA/QC for quality assurance/quality control procedures. Tubes were supplied to a representative of the group on a monthly basis in to allow monitoring to follow the Defra diffusion tube exposure calendar and returned to LBM for collation and onward shipping to Gradko. All analysis reports were sent directly to LBM for checking and the distributed to a representative of each group.

We would like to take the opportunity to thank all groups and the individuals who gave up their time to extend diffusion tube monitoring in the borough.

D.1. Wimbledon Park Residents Association

The Wimbledon Park Residents Association (WPRA) monitor air quality at set locations on a quarterly basis. Monitoring results are provided in Table T. A comprehensive list of monitoring locations and descriptions provided by WPRA is presented Table U. Data have not been annualised as results are comfortably within the annual mean Air Quality Objective (AQO) of 40 μgm^{-3} at all locations, apart from Wimbledon Park 3. As a precaution, Wimbledon Park 3 was added to Merton Council's diffusion tube monitoring network in January 2022 for monthly monitoring, as nitrogen dioxide concentrations were closer to the annual mean AQO at this location.

Table T. Wimbledon Park Residents Association nitrogen dioxide diffusion tube data 2021

Site Code	Site Description	Data Capture	January	April	July	October	Annual Mean NO2 concentration (μgm^{-3})	Bias Adjusted Annual Mean (National Factor 0.83)
Wimbledon Park 1	12a Ravensbury Terrace	33%	27	21	14	21	21	17
Wimbledon Park 2	37 Wellington road	33%	31	20	15	20	22	18

Wimbledon Park 3	363 Durnsford Road	33%	42	36	29	31	35	29
Wimbledon Park 4	162 Durnsford road	33%	39	26	19	28	28	23
Wimbledon Park 5	141 Arthur Road	33%	35	30	24	29	30	24
Wimbledon Park 6	44 Home Park Road	33%	26	12	19	22	20	16

Table U. Wimbledon Park Residents Association monitoring locations

Site ID	Location	Description	Distance from tube to kerb (m)	Distance to nearest receptor	Height to tube inlet (m)
Wimbledon Park 1	12A Ravensbury Terrace SW18 4RL		At kerb		2m

		On lamppost 009. Between 2 large housing construction sites 1 of 24 dwellings the other 129 dwellings on the old Haslemere Industrial site. Opposite an allotment, nearest current housing 50 metres.			
Wimbledon Park 2	37 Wellington Road SW19 8EQ	 On lamp post 001. Near the junction with Havana Road. Outside WP Primary school in a residential area. Road used by vehicles entering the Wellington Road Industrial Estate.	At kerb		2m

Wimbledon Park 3	363 Durnsford Road SW19 8EF	 On lamppost 045. On the main road by a pelican crossing used by children to access the primary school. Housing both sides of the road.	2m		2m
Wimbledon Park 4	Opposite 162 Durnsford Road SW19 8GY	 On lamp post 018. On the junction with Endeavour Way. Entry to an industrial estate used by very large	At kerb		2m

		wagons eg Occado, Reston Waste and others. Housing other side of the road.			
Wimbledon Park 5	141 Arthur Road SW19 8AB	 On the zebra crossing outside Wimbledon Park tube station	At kerb		2m
Wimbledon Park 6	44 Home Park Road SW19 7HN	 Residential area. Road links WP with Wimbledon town centre therefore a lot of through traffic.	At kerb		2m

Figure 5 Map of annual mean NO2 concentrations in Wimbledon Park (WPRA)