London Borough of Merton
Air Quality Annual Status Report for 2017
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This report provides a detailed overview of air quality in the London Borough of Merton during 2017. It has been produced to meet the requirements of the London Local Air Quality Management statutory process[1].

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[1] LLAQM Policy and Technical Guidance 2016 (LLAQM.TG(16)). https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/working-boroughs

Executive Summary

The London Borough of Merton is committed to improving air quality in the Borough. As such the Council is demonstrating its political leadership; taking action; leading by example; monitoring air quality; using the planning system; integrating air quality into the public health system and informing the public.

This 2017 Annual Status Report (ASR) fulfils one further aspect of this ongoing commitment, reviewing and assessing air quality against the objectives in the Air Quality Regulations 2000 and amendment regulations.

The air quality objectives to be assessed by local authorities include the following seven pollutants: carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particles (PM10). The Council has previously undertaken earlier reviews and is satisfied that for carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide, there is no a significant risk of the objectives being exceeded in the Council's area:

The report identifies that for nitrogen dioxide and particles (specifically PM10) the Council has previously designated an Air Quality Management Area (AQMA) across the Borough. The findings from this report indicate that the AQMA should be maintained.

In view of the findings from the report, the Council will undertake the following actions:

1. Undertake consultation with the relevant statutory consultees as required.
2. Maintain and where possible enhance the existing monitoring regime.
3. Implement the boroughs new Air Quality Action Plan 2018 – 2023 in pursuit of the AQS objectives.
4. Prepare for the submission of its next Air Quality Status Report.

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Abbreviations

AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
AQO	Air Quality Objective
BEB	Buildings Emission Benchmark
CAB	Cleaner Air Borough
CAZ	Central Activity Zone
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	Objective (UK)	Averaging Period	Date[1]
Nitrogen dioxide - NO_2	200 □g m^{-3} not to be exceeded more than 18 times a year	1-hour mean	31 Dec 2005
	40 □g m^{-3}	Annual mean	31 Dec 2005
Particles - PM_{10}	50 □g m^{-3} not to be exceeded more than 35 times a year	24-hour mean	31 Dec 2004
	40 □g m^{-3}	Annual mean	31 Dec 2004
Particles - $PM_{2.5}$	25 □g m^{-3}	Annual mean	2020
	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
	350 µg m^{-3} not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125 µg m^{-3} not to be exceeded more than 3 times a year	24 hour mean	31 Dec 2004

Note: [1]by which to be achieved by and maintained thereafter

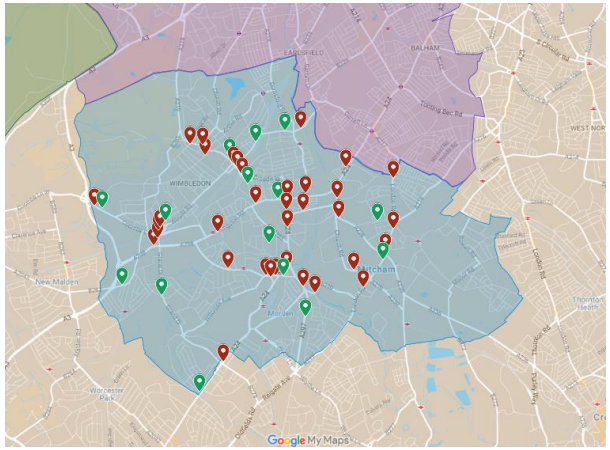
1. Air Quality Monitoring

In 2017 Merton operated two automatic air quality monitoring sites and saw a complete refresh of the diffusion tube network which now covers 50 locations around the borough.

Despite being moved to a more reliable location on 27th January 2017, the continuous monitor measuring NO_2 at a roadside site located at the Civic Centre in Morden, suffered from a series of continuous faults during 2017 and no effective annual data is available for this period. This was of great concern to Merton Council and the boroughs Air Quality Action Panel, and resulted in the purchase of a new analyser which was installed on 11th October 2017. This chemiluminescent analyser(ME9) is now successfully measuring NO2. The monitoring station is sited 3.0m from kerb of the nearest road and 0.5m from nearest point of relevant exposure. Results from 11th October 2017 are very good but represent too short of a period to be included in this 2017 report. Results for the new NO2 monitor will be presented in the next Annual Status Report.

All data from the automatic monitoring analysers 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 the London Air Quality Network (LAQN) sites are similar to those of the government's national Automatic Urban and Rural Network (AURN) sites. All data is traceability to national standards and operational procedures defined for the London Air Quality Network (LAQN). For QA/QC purposes, all continuous analysers are manually checked and calibrated every two weeks, serviced every six months and audited by an independent auditor (National Physical Laboratory) every six months. With data ratification being undertaken by King's College London.

Merton Council also undertakes non-automatic monitoring of nitrogen dioxide using diffusion tubes. In January 2017 following a comprehensive review of the monitoring provision in Merton, the diffusion tube network was expanded from 20 to 50 sites. This provides a comprehensive coverage of all hotspots including most main roads and town centres throughout the borough. Diffusion tubes offer a relatively inexpensive means of gauging NO2 concentrations at a number of locations across the borough. The results provide monthly NO2 averages and can be used to compare measured concentrations with the annual mean NO2 objective. The accuracy of diffusion tube data is improved by comparing results with automatic monitoring data and a bias adjusted applied based on calculation of a national factor.



Details of Automatic Monitoring Sites for 2017

Table B.

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	3m	0.6m	1.6m	PM_{10}	BAM
ME9	Civic Centre, Morden	525588	168498	Roadside	Y	0.6m	3.0m	2.5m	NO_2	chemiluminescent

Please note – ME1 was replaced by ME9 and was set up with new equipment in Oct 2017. ME1 , suffered from a series of continuous faults during 2017 and no effective annual data is available for this period. ME9 is running extremely well; results will be reported in 2018 ASR.

Table C. Details of Non-Automatic Monitoring Sites for 2017

Note: A number of the 2016 NO2 diffusion tube sites have been moved slightly to improve the quality of monitoring data across the borough. Site ID's have been simplified. Any ID's from 2016 or earlier are in brackets. Full site descriptions and the 2017 monitoring data for the revised network are provided below.

Site ID	Site Name	X (m)	Y (m)	Site Type	In AQMA?	Distance of tube to kerbside (m)	Distance of receptor to kerbside (m)	Inlet height (approx.) (m))	Pollutants monitored	Tube co-located with an automatic monitor? Y/N
1	A298 Bushey Rd nr Bushey Ct, SW20	523139	169056	kerbside	Y	1.5	15.3	2.5	NO2	N
2 (GA)	A24 Jct with Garth Drive Morden, SM3 9HU	542131	166112	kerbside	Y	1.7	12.2	2.4	NO2	N
3	A24 Jct Tudor Drive, SM4 4PE	524511	166757	roadside	Y	0.7	9.6	2.4	NO2	N
4 (FA)	154 Grand Drive Raynes Park	523207	169195	kerbside	Y	0.9	3.6	2.4	NO2	N
5 (BA)	Sacred Heart Sch, Burlington Road New Malden	522501	168235	kerbside	Y	0.7	7.9	2.4	NO2	N
6 (JC)	17 Grand Drive Raynes Park	523315	168048	kerbside	Y	0.3	8.4	2.4	NO2	N
7	A298 Kingston Rd, SW20 8LX	524401	169351	kerbside	Y	1.5	8.3	2.4	NO2	N
8	A238 Coombe Lane, SW20 8NF	523246	169333	kerbside	Y	0.6	2	2.2	NO2	N
9	2 Lambton Rd, SW20	523241	169415	kerbside	Y	0.5	3.6	2.2	NO2	N

10	A238 Coombe Lane, SW20	521912	169806	roadside	Y	1.7	16.4	2.4	NO2	N
11	Kingston Rd SW20 1JW	525602	170042	kerbside	Y	0.4	3.4	2.4	NO2	N
12 (RA)	Pepys Road Morden	523357	169534	kerbside	Y	0.6	10.1	2.4	NO2	N
13	B281 Cottenham Pk Rd, SW20	522069	169765	kerbside	Y	0.6	12.4	2.2	NO2	N
14 (AC)	20 The Ridgeway Wimbledon	524120	170874	kerbside	Y	0.4	1.5	2.4	NO2	N
15	20 High St,Wimbledon, SW19 5BY	523808	171100	kerbside	Y	0.5	2.8	2.2	NO2	N
16	84 High St, Wimbledon, SW19	524071	171076	kerbside	Y	0.6	2.9	2.2	NO2	N
17 (WA)	Woodside Wimbledon	524608	170873	kerbside	Y	0.5	6.7	2.4	NO2	N
18	Hand & Racquet, Wimbledon Hill	524696	170725	kerbside	Y	0.3	2.6	2.4	NO2	N
19	Wimbledon Station	524770	170645	roadside	Y	2.5	3.6	2.4	NO2	N
20	Hartfield Rd, Wimbledon SW19 3TA	524867	170500	kerbside	Y	0.4	4.8	2.2	NO2	N
21 (EA)	246 Merton Rd, Sth Wimbledon A219	525798	170081	roadside	Y	0.5	1.9	2.4	NO2	N
22	12-16 Upper Green West, CR4 3AA	527785	169049	roadside	Y	2	4.2	2.4	NO2	N
23	183 Kingston Rd, SW19 1LH	525156	169935	kerbside	Y	0.6	1.9	2.2	NO2	N
24	75 Hartfield Rd SW19 3TJ	524994	170329	kerbside	Y	0.7	4.1	2.4	NO2	N

25	Alexandra Rd, SW19 7LE	525132	171174	kerbside	Y	2.1	4	2.2	NO2	N
26	Gap Rd, SW19 8JG	525708	171413	roadside	Y	2.3	5.1	2.2	NO2	N
27	Plough Lane	526035	171472	kerbside	Y	2.3	6.5	2.2	NO2	N
28 (BC)	11 Haydons Road SW19 1HG	526158	170167	roadside	Y	2.4	2.4	2.4	NO2	N
29 (HA)	A24 - 44 High St Colliers Wood, SW19 2AB	526955	170707	kerbside	Y	0.7	2.6	2.4	NO2	N
30	A24 Christchurch Rd, SW19 2PB	526791	170087	roadside	Y	0.3	3	2.4	NO2	N
31 (LA)	Alley Charminster Ave Morden	525449	169152	background	Y	15	9	2.4	NO2	N
32	Merantum Way, SW19 2JY	526109	169818	kerbside	Y	0.8	4.8	2.4	NO2	N
33	A24 Morden Rd, SW19 3BP	525803	169467	roadside	Y	2.7	3.6	2.2	NO2	N
34 (GC)	Western Rd Colliers Wood	526840	169694	roadside	Y	2	2.3	2.2	NO2	N
35 (MA)	Lavender Ave Morden	527621	169646	kerbside	Y	0.4	5.8	2.2	NO2	N
36 (DC)	35 London Rd Tooting	527913	170518	roadside	Y	1.5	1.9	2.4	NO2	N
37 (CC)	107 London Rd Tooting	527932	169502	kerbside	Y	0.6	2.4	2.4	NO2	N
38 (EC)	BHF, 265 London Rd, Mitcham	527743	168874	kerbside	Y	0.6	4.2	2.4	NO2	N
39 (FC)	Church Rd Mitcham	527158	168646	kerbside	Y	0.6	3	2.4	NO2	N
40	A217 London Rd, CR4 4BF	527370	168312	kerbside	Y	0.8	5.4	2.4	NO2	N

41	A239 Morden Rd, nr O, CR4 6AU	526395	168172	roadside	Y	1.5	1.5	2.4	NO2	N
42	St Hellier Rd, SM4 6JE	526211	167683	roadside	Y	3.3	12.8	2.4	NO2	N
43	Morden Hall Rd nr jct, SM4 5JG	526151	168293	roadside	Y	2.4	22.2	2.3	NO2	N
44 (AA)	Oxfam, London Rd, Morden	525817	168643	kerbside	Y	0.6	4.9	2.4	NO2	N
45 (IC)	HSBC, London Rd Morden	525778	169824	kerbside	Y	0.9	2.6	2.4	NO2	N
46 (HC)	80 Crown Lane Morden	525401	168502	kerbside	Y	0.6	5	2.4	NO2	N
47	Civic Centre, Morden	525588	168498	roadside	Y	1.5	1.5	2.4	NO2	Y
48	Aberconway Rd, SM4 5LF	525757	168509	kerbside	Y	1.2	7.7	2.4	NO2	N
49	Crown Rd, Jcn Stanley Rd	525500	168470	roadside	Y	0.8	2.9	2.4	NO2	N
50	Martin Way, SM4 4AR	524638	168616	kerbside	Y	0.7	9.7	2.4	NO2	N

1.2 Comparison of Monitoring Results with the Objectives

The results presented are after bias adjustment and adjustments for “annualisation” (see Appendix A).

Table D. Annual Mean NO2 Ratified and Bias-adjusted Monitoring Results (µg m-3) For results that indicate the exposure estimate, calculated for the nearest residential façade see, **Appendix A3**.

Site ID	Site Name	Site Description	Site Type	Valid Data Capture for period of monitoring %	Valid Data Capture for 2017 %[a]	Annual Mean Concentration (µgm^{-3})					
						2012	2013	2014	2015	2016	2017
ME1		Roadside	Automatic	100	0	**48 (48.1)**	**40.1**	38 (37.9)	34	Faulty	Faulty
1	**A298 Bushey Rd nr Bushey Ct, SW20**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**52**
2 (GA)	**A24 Jct with Garth Drive Morden, SM3 9HU**	kerbside	Diffusion tube	100	58	37.5	39.6	32.8	32	32[d]	**41[c]**
3	**A24 Jct Tudor Drive, SM4 4PE**	roadside	Diffusion tube	100	100	not open	not open	not open	not open	not open	34

4 (FA)	**154 Grand Drive Raynes Park**	kerbside	Diffusion tube	100	100	34.7	37.7	**43.4** (36.5)	32	39.3[d]	37
5 (BA)	**Sacred Heart Sch, Burlington Road New Malden**	kerbside	Diffusion tube	100	83	37.2	42	32.9	28	32[c]	**42**
6 (JC)	**17 Grand Drive Raynes Park**	kerbside	Diffusion tube	100	100	N/A	**42.1**	32.4	N/A	34[d]	**45**
7	**A298 Kingston Rd, SW20 8LX**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**44**
8	**A238 Coombe Lane, SW20 8NF**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**53**
8	**2 Lambton Rd, SW20**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**43**
10	**A238 Coombe Lane, SW20**	roadside	Diffusion tube	100	100	not open	not open	not open	not open	not open	38
11	**Kingston Rd SW20 1JW**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	35
12 (RA)	**Pepys Road Morden**	kerbside	Diffusion tube	100	100	32	35.9	32.8	26	36	30

13	**B281 Cottenham Pk Rd, SW20**	kerbside	Diffusion tube	100	92	not open	not open	not open	not open	not open	**44**
14 (AC)	**20 The Ridgeway Wimbledon**	kerbside	Diffusion tube	100	92	N/A	**47.6**	**41.6** (38)	N/A	**45**[d]	**44**
15	**20 High St,Wimbledon , SW19 5BY**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	26
16	**84 High St, Wimbledon, SW19**	kerbside	Diffusion tube	100	75	not open	not open	not open	not open	not open	39
17 (WA)	**Woodside Wimbledon**	kerbside	Diffusion tube	100	100	33.3	33.7	**40.5** (36.1)	25	37	30
18	**Hand & Racquet, Wimbledon Hill**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**64**
19	**Wimbledon Station**	roadside	Diffusion tube	100	92	not open	not open	not open	not open	not open	**52**
20	**Hartfield Rd, Wimbledon b**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**48**
21 (EA)	**246 Merton Rd, Sth Wimbledon A219**	roadside	Diffusion tube	100	92	**52.7**	**57.5**	**61.1 (50.5)**	**65**	**61**[d]	**57**

22	**12-16 Upper Green West, CR4 3AA**	roadside	Diffusion tube	100	92	not open	not open	not open	not open	not open	**77**
23	**183 Kingston Rd, SW19 1LH**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**61**
24	**75 Hartfield Rd SW19 3TJ**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	38
25	**Alexandra Rd, SW19 7LE**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**41**
26	**Gap Rd, SW19 8JG**	roadside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**47**
27	**Plough Lane**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**46**
28 (BC)	**11 Haydons Road SW19 1HG**	roadside	Diffusion tube	100	100	N/A	**48.3**	**43.6 (42.6)**	N/A	**54**[d]	**46**
29 (HA)	**A24 - 44 High St Colliers Wood, SW19 2AB**	kerbside	Diffusion tube	100	100	**50.7**	**52.2**	**49.8 (46.6)**	31	**49.9**[c,d]	**61**
30	**A24 Christchurch Rd, SW19 2PB**	roadside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**48**

31 (LA)	**Alley Charminster Ave Morden**	background	Diffusion tube	100	100	24	26.1	26	17	24	20
32	**Merantum Way, SW19 2JY**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**42**
33	**A24 Morden Rd, SW19 3BP**	roadside	Diffusion tube	100	75	not open	not open	not open	not open	not open	**49**
34(GC)	**Western Rd Colliers Wood**	roadside	Diffusion tube	100	92	N/A	N/A	N/A	**53**	**64[d]**	**59**
35 (MA)	**Lavender Ave Morden**	kerbside	Diffusion tube	100	92	31.4	35.2	32.2	32	39	31
36 (DC)	**35 London Rd Tooting**	roadside	Diffusion tube	100	100	N/A	**59.3**	**55.5 (50.2)**	**45**	**57[d]**	**42**
37 (CC)	**107 London Rd Tooting**	kerbside	Diffusion tube	100	100	N/A	**72.6**	**67.2 (54.5)**	**64**	**62[d]**	**61**
38 (EC)	**BHF, 265 London Rd, Mitcham**	kerbside	Diffusion tube	100	100	N/A	**40.4**	38	37	39[d]	**41**
39 (FC)	**Church Rd Mitcham**	kerbside	Diffusion tube	100	92	N/A	**45.2**	36.2	37	**41[d]**	**45**

40	**A217 London Rd, CR4 4BF**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**46**
41	**A239 Morden Rd, nr O, CR4 6AU**	roadside	Diffusion tube	100	92	not open	not open	not open	not open	not open	**41**
42	**St Hellier Rd, SM4 6JE**	roadside	Diffusion tube	100	92	not open	not open	not open	not open	not open	35
43	**Morden Hall Rd nr jct, SM4 5JG**	roadside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**44**
44 (AA)	**Oxfam, London Rd, Morden**	kerbside	Diffusion tube	100	100	**45.1**	**48.2**	**51 (48.7)**	N/A	38[c,d]	**57**
45 (IC)	**HSBC, London Rd Morden**	kerbside	Diffusion tube	100	100	N/A	N/A	N/A	**40**	**45[c,d]**	**45**
46 (HC)	**80 Crown Lane Morden**	kerbside	Diffusion tube	100	100	N/A	N/A	N/A	**46**	**48[d]**	**61**
47	**Civic Centre, Morden**	roadside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**51**
48	**Aberconway Rd, SM4 5LF**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**41**

49	**Crown Rd, Jcn Stanley Rd**	roadside	Diffusion tube	100	92	not open	not open	not open	not open	not open	39
50	**Martin Way, SM4 4AR**	kerbside	Diffusion tube	100	100	not open	not open	not open	not open	not open	**45**

Notes:
Exceedance of the NO_2 annual mean AQO of 40µgm^{-3} are shown in **bold** (Red)
Exceedance of the NO_2 annual mean AQO of 60µgm-3 are shown in **bold** and underlined (Dark Red)
[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%)
[c] Means have been "annualised" in accordance with LLAQM Technical Guidance, where data capture less than 75%
[d] Mean concentrations have been adjusted for distance to point of relevant exposure using the LAQM NO_2 Fall-off with distance Calculator (Version 4.1)

Table D shows the NO_2 diffusion tube monitoring results, with bias corrected values for each year from 2012 to 2017. (Note – see Table K for the uncorrected monthly data for 2017). The results in bold indicate an exceedance of the annual mean objective of 40µg/m^3 and the results underlined indicate NO_2 annual means in excess of 60µg/m3 indicating a potential exceedance of the NO_2 hourly mean AQS objective. All diffusion tube data has been bias corrected and one site – site 2 was "annualised" due to data capture rates falling below 75%. In addition, all sites measuring annual mean concentrations in excess of the AQ objective (40µg/m^3) have also been corrected for distance between the monitoring site and the nearest relevant receptor using the LAQM NO_2 Fall-off with Distance Calculator. The correction calculations are presented in Appendix A3.

Data capture for 2017 has improved significantly with 46 sites achieving a minimum of 92% data capture rate and only 4 sites slipping below this level. The overall data capture rate was 96%; this was very good. Only one site, site 2, had a data capture rate capture rate less than 75%, so was the only site where annualising of data was required. Results for 2017 are therefore far more robust than in 2015 and 2016. A new monitoring regime is now in place and it is hoped that very good data will be achieved in future years. The reliability and accuracy of the data is therefore much improved.

The overall trend for measured annual mean NO_2 in Merton indicates that concentrations have remained more or less static for the period 2012 to 2017. The number of sites has increased from 20 sites in 2016 and earlier to 50 sites in 2017 significantly improving coverage for the whole borough. This will be very useful to gauge trends in future years. Triplicate tubes have also been co located next to the real time analyser, so that local bias adjustment factors will be possible in future years. The 2017 data shows that compared with 2016, out of the 20 original sites, 9 sites have gone up whilst 10 have gone down and one has stayed the same.

1.3 Diffusion Tube Data Analysis

The results from the 2017 monitoring show that the objective of 40 μg m-3 was exceeded at 38 monitored locations in the borough, which is at 76% of all sites. Six of these sites also exceeded an annual mean of 60 μg m-3 which indicates that the 1 hour-mean objective may also have been exceeded at these locations.

These sites were:

- Mitcham town centre, recording **77 μg m-3**
- Wimbledon Hill, recording **64μg m-3** ,
- Kingston Rd, SW19, recording **61μg m-3**
- High Street Colliers Wood recording **61μg m-3**
- London Rd, Tooting, recording **61μg m-3**
- Crown Lane, Morden, recording **61μg m-3**

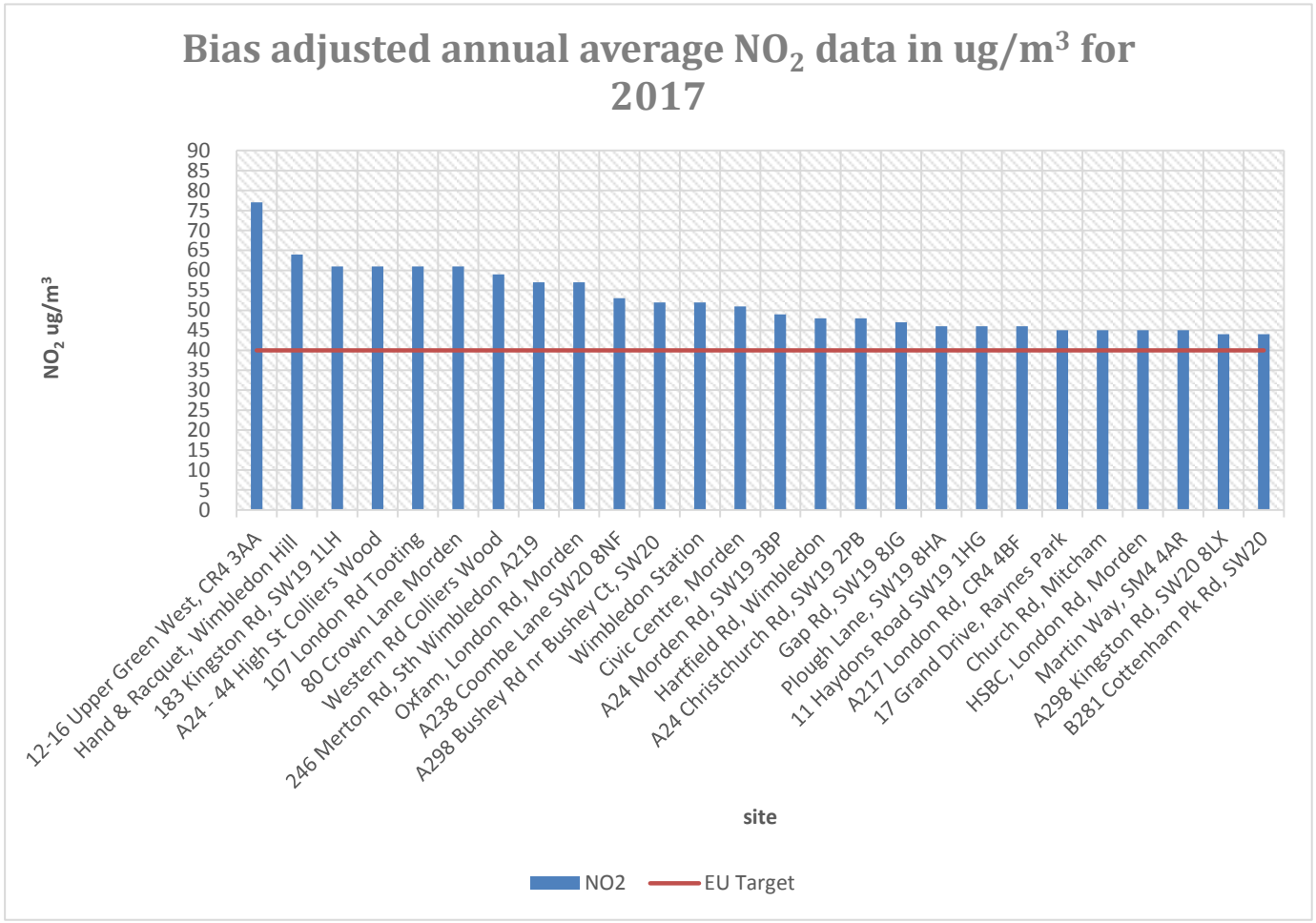
Due to the increase in both the number of sites and the improved data capture rate, it is difficult to be clear on annual trends. The data does appear to represent a slight decrease. Compared to the 2016 data, the highest 3 sites of 2016 have each gone down slightly in 2017: site 21 (EA) 246 High St Merton has gone down from 61 μg m-3 in 2016 to 57 μg m-3 in 2017, site 37 (CC) 107 London Road Tooting, has gone down from 62 μg m-3 to 61μg m-3 and site 34 (GC) 211 Western Rd Colliers Wood, has gone down from 64 μg m-3 to 59 μg m-3 .

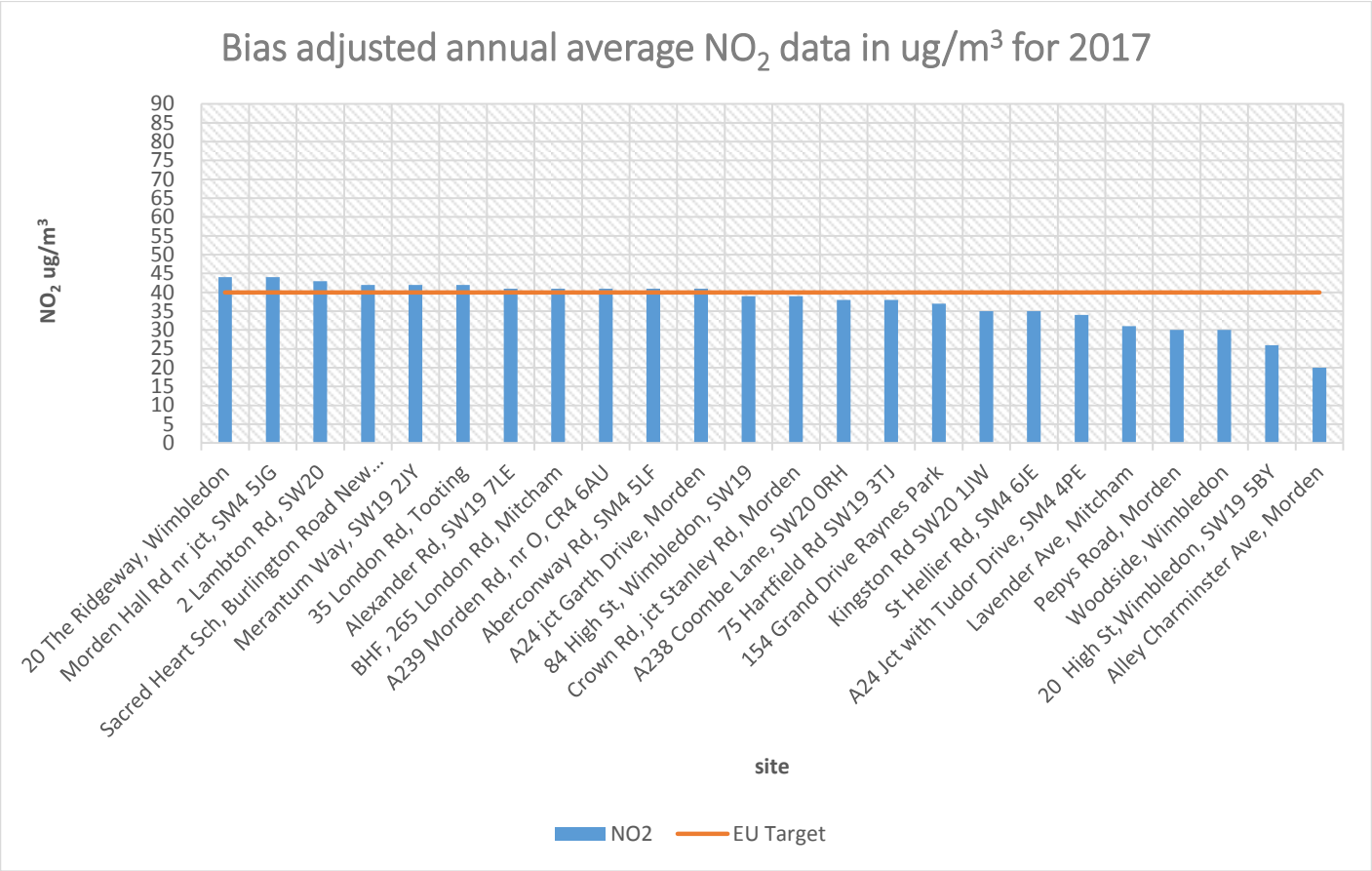
Although encouraging, it is too early to be sure of any long-term downward trend in levels of NO2. It is known that Euro VI/6 standards have failed to deliver the forecast reductions in NO2 levels in real world driving conditions that were predicted. The sale of diesel cars has seen a significant reduction over the last 18 months but the rental market for diesels remains somewhat buoyant and the number of overall vehicles on the road has continued to increase; this has hindered reductions in NO2. It is a little early to say whether the Council's diesel levy has helped motivate this trend in Merton, however early indicators are encouraging. It is also this brave action to tackle the most polluting vehicles that has assisted in the reduction in purchasing of diesel vehicles throughout the country.

The data for 2017 indicates that approximately three quarters of the sites exceed the objective of 40 μg m-3 with one site recording almost double the objective: Upper Green West in Mitcham town centre. Throughout 2017 Mitcham town centre has undergone significant redevelopment resulting in roadworks and queuing traffic throughout the year, which will partly be responsible for the high level of NO2 recorded. This is now complete. It will be interesting to see how this affects the NO2 levels for 2018 – we hope to see a decrease. After the distance correction, the annual mean objective is exceeded at 20 sites, with 2 of them – site 22, Mitcham town centre and site 34, High Street Colliers Wood - exceeding the annual mean concentration of 60 μg m-3 (see Table K below).

The overall monitoring results for the Borough show that NO2 concentrations exceeded the UK annual mean objective (as it has done for each year since 2005), and improvements are still required.

Figure 1: Nitrogen Dioxide Bias Adjusted Annual Average Concentrations for all sites for 2017 (split over 2 graphs)




Bias adjusted annual average NO2 data in ug/m3 for 2017
NO2 ug/m3
90
85
80
75
70
65
60
55
50
45
40
35
30
25
20
15
10
5
0
20 The Ridgeway, Wimbledon
Morden Hall Rd nr jct, SM4 5JG
2 Lambton Rd, SW20
Sacred Heart Sch, Burlington Road New...
Merantum Way, SW19 2JY
35 London Rd, Tooting
Alexander Rd, SW19 7LE
BHF, 265 London Rd, Mitcham
A239 Morden Rd, nr O, CR4 6AU
Aberconway Rd, SM4 5LF
A24 jct Garth Drive, Morden
84 High St, Wimbledon, SW19
Crown Rd, jct Stanley Rd, Morden
A238 Coombe Lane, SW20 0RH
75 Hartfield Rd SW19 3TJ
154 Grand Drive Raynes Park
Kingston Rd SW20 1JW
St Hellier Rd, SM4 6JE
A24 Jct with Tudor Drive, SM4 4PE
Lavender Ave, Mitcham
Pepys Road, Morden
Woodside, Wimbledon
20 High St, Wimbledon, SW19 5BY
Alley Charminster Ave, Morden
site
NO2
EU Target

1.4 Automatic Monitoring:

The automatic NO_2 analyser, (ME1), was relocated to a new site (ME9) at the Civic Centre Morden in 2017. Unfortunately, it suffered from intermittent faults throughout the year, so was replaced in October 2017. The data is not of a high enough standard to be included in this report. The new analyser is working very well and NO_2 data for 2018 will be reported in the next Annual Status Report.

Table E. Annual Mean PM_{10} Automatic Monitoring Results ($\mu g\ m^{-3}$)

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2017 % [b]	Annual Mean Concentration (μgm^{-3})						
			2011 [c]	2012 [c]	2013 [c]	2014 [c]	2015 [c]	2016 [c]	2017 [c]
ME2	100	80	26[a]	29	31	28	25	24[c]	24

Notes:
[a] data capture for the monitoring period, in cases where monitoring was only carried out for part of the year. ME2 site opened June 2011.
[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%)
[c] Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

Table E 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 Kings College London as part of the London Air Quality Network. BAM particulate analysers are equivalent to the PM_{10} reference method and the applicable correction factor has been applied by Kings College for all data presented in this report. Data capture for the ME2 automatic PM_{10} analyser was 80% for 2017; there was therefore no need to "annualise" the data, as required in earlier years in accordance with the Technical Guidance (see appendix for full calculations). The annual mean concentration for 2017 was 24µg/m^3 indicating that this site met the annual mean objective for 2017. The annual mean concentration remained static when compared to 2016 but indicates a slight overall reduction in the annual mean concentration over the past 7 years.

Table F. PM_{10} Automatic Monitor Results: Comparison with 24-Hour Mean Objective

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2017 % [b]	Number of Daily Means > 50 µgm^{-3}						
			2011 [c]	2012 [c]	2013 [c]	2014 [c]	2015 [c]	2016 [c]	2017 [c]
ME2	100	80	N/A	26	31	17 (44.4)	21	8 (36.6)	10 (37.6)

Notes: Exceedance of the PM_{10} short term AQO of 50 µg m^{-3} over the permitted 35 days per year or where the 90.4th percentile exceeds 50 µg m^{-3} are shown in **bold**. Where the period of valid data is less than 90% of a full year, the 90.4th percentile is shown in brackets after the number of exceedances.
[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%)
[c] Means should be "annualised" in accordance with LLAQM Technical Guidance, if valid data capture is less than 75%

Table F provides a comparison of the 2017 monitoring data with the 24-hour mean objective. The objective of no more than 35 days exceeding 50µg/m^{3}was achieved at the Merton Road (ME2) site in 2017. Given that the data capture rate for the year was less than 90% the 24-hour mean objective has been expressed as a 90.4th percentile value at 37.6µg/m^3. As this value is below 50µg/m^3 it confirms that if there had been 100% data capture the short term objective would not have been exceeded. The results indicate a reduction in number of days exceeding 50µg/m^{3}over the past 7 years with a significant reduction in 2016 and 2017. 2016 recorded slightly fewer days exceeding 50µg/m^3 than 2017 but both are comfortably within the limit of 35 days.

2. Action to Improve Air Quality

Table G. Commitment to Cleaner Air Borough Criteria

Theme	Criteria		Achieved (Y/N)	Evidence
1. Political leadership	***1.a***	Pledged to become a Cleaner Air for London Borough (at cabinet level) by taking significant action to improve local air quality and signing up to specific delivery targets.	*Y*	Cabinet Members signed up to the LB of Merton achieving CAB status since 2013. In 2017 Merton convened a cross-party Air Quality Action Group reporting to the Councils Sustainable Communities Scrutiny Panel. This group reviewed air quality in the borough and made a number of important recommendations, including: • New Monitoring arrangements • The appointing of AQ staff paid through the boroughs Diesel Levy. • Review of the Councils Parking Levy scheme. • Review of funding for a new Air Quality Action Plan 2018-2023 incorporating CIL's LIP and Section 106. • Finalised a new Air Quality Action Plan for the Borough for 2018-2023 • Creation of a working party for Air Quality • Review air quality annually at Scrutiny Committee and work towards compliance with objectives. All reports are available through Merton's Democratic Services Website.
	1.b	Provided an up-to-date Air Quality Action Plan (AQAP), fully incorporated into LIP funding and core strategies.	*Y*	Merton's new Air Quality Action Plan 2018-2023 has been completed and published. This all new and innovative Plan for the borough was strongly influenced by the Air Quality Action Group and written in a way that is educational, informative and accessible.

				This new plan sets out some 70 achievable actions covering all areas of AQ management taking innovative measures to tackle air quality in the borough. As a commitment to ensuring delivery of the Plan these actions will be reviewed annually by Merton's Sustainable Communities Overview and Scrutiny Panel.
2. Taking action	**2.a**	Taken decisive action to address air pollution, especially where human exposure and vulnerability (e.g. schools, older people, hospitals etc) is highest.	*Y*	In 2017 Merton took the difficult decision to implement a diesel levy associated with its parking permits. This is aimed at tackling, where we can, the most polluting vehicles in the borough and shows a firm commitment to tackling air quality. This levy and its impact will be reviewed in November 2018. Merton have a continuing commitment to school travel planning and promoting champions through Transport for London's Stars Accreditation programme. Air quality is a key theme to raise awareness of pollution. In 2017 we provided an Air Quality Information Day at Merton Abbey school where pollution levels are amongst the highest in the borough. We assisted and participated in the Mayor of London schools air quality audit project and committed to delivering the outcomes. We are encouraging schools to be aware of how pollution damages health and the environment and to choose more sustainable ways to travel to school and avoid more heavily polluted routes.
	2.b	Developed plans for business engagement (including optimising deliveries and supply chain), retrofitting public buildings using the RE:FIT framework, integrating no engine idling awareness raising into the work of civil enforcement officers, (etc etc).	Y	Diesel parking levy extended to business parking permits. We are forming close relationships with Business Improvement Districts around opportunities for tackling air quality and enhancing funding. Merton is currently leading on NRMM and working in partnership with the construction industry to deliver cleaner construction.

				Tackling anti-idling is now a key part of the councils commitment to air quality with funding secured for signage and enforcement.
	2.c	Integrated transport and air quality, such as: improving traffic flows on borough roads to reduce stop/start conditions, improving the public realm for walking and cycling, and introducing traffic reduction measures.	Y	We are increasing the number of 20mph zones to assist in creating an environment that is welcoming to cycling and walking. We currently have 21 Electric Vehicle charging points available on the public highway and by July 2018 we will aim to have of 62 available throughout the borough. We have also introduced 2km of shared use path for cyclists and pedestrians in Croydon Rd and a further 580m in Beddington Lane In 2017 we saw the introduction of borough wide ANPR systems to ensure better enforcement around junctions and to ease traffic congestion. This system will also be useful if we move towards Clean Air Zones in the borough. We have also introduced 5 area wide CPZs which stops commuter related parking and traffic Undertook further public consultations on Cycle Quietways between Clapham Common & Wimbledon forming the Merton section of the Wandle trail. (TfL Quietways project) We have remodelled the Colliers Wood junction to ease and assist traffic flow and provide separate areas for bus stands.,
	2.d	Made additional resources available to improve local air quality, including by pooling its collective resources (s106 funding, LIPs, parking revenue, etc).	Y	Merton is the host authority for the Regulatory Services Partnership now consisting of 3 London boroughs. This provides an opportunity to build a strong air quality team working across a large geographical area and merged resources to deliver actions. Merton has also agreed to fund and Air Quality Post and a number of action plan measures through its new diesel levy. Merton have also made available Section 106 and CIL funding to cover air quality action in its new plan and to link these to public and

				business air quality projects.
3. Leading by example	**3.a**	Invested sufficient resources to complement and drive action from others.	Y	Merton has linked its resourcing of Air Quality into a number of key service areas including LIP, Transport, Parking, Planning all with possible funding to support the new AQAP
	3.b	Maintained an appropriate monitoring network so that air quality impacts within the borough can be properly understood	Y	The Merton monitoring network was reviewed and rationalised in 2016/17 with a number of sites relocated to provide better assessment of air quality impacts. The network has also been expanded to 50 sites to provide a more comprehensive assessment of air quality across the borough. Additional resources have been allocated to improve monitoring procedures and achieve better data capture rates from all sites. Following the failure of Merton's NO2 analyser the council made a capital investment in a new monitor and is considering addition automated monitoring in the borough.
	3.c	Reduced emissions from council operations, including from buildings, vehicles and all activities.	Y	Total CO2 equivalent emissions in Merton for 2017-18 were 9,808 tonnes, compared to 13,949 tonnes in 2016-17. This represents a 30% reduction in CO2 emissions from the three key sectors monitored; buildings- corporate, street lighting , buildings – schools (tonnes CO2e) and includes emissions savings from renewable energy generation. No robust data was available for council transport emissions at the time of reporting. CO2 monitoring calculations at Merton are based on financial rather than calendar. Roll out of new LED Lighting in the Borough
	3.d	Adopted a procurement code which reduces emissions from its own and its suppliers activities, including from buildings and vehicles operated by and on their behalf (e.g. rubbish trucks).	Y	New contracts issued during 2017 have outsourced waste collection and Parks contracts under existing procurement criteria. The updated AQAP includes measure to review procurement policies in respect of vehicle emissions and Air Quality.

4. Using the planning system	**4.a**	Fully implemented the Mayor's policies relating to air quality neutral, combined heat and power and biomass.	Y	All approved planning applications must meet the Mayor's requirements relating to AQ neutral and CHPs.
	4.b	Collected s106 from new developments to ensure air quality neutral development, ***where possible***.	Y	Merton is currently consulting on a New Local Plan and AQ has now been introduced as a stand-alone measure with a commitment to a new SPG aimed specifically at controlling development in its impact upon air quality in the borough. In 2017 the borough's Cabinet and Scrutiny Committee agreed that there needs to be access for air quality funding through the Section 106 process.
	4.c	Provided additional enforcement of construction and demolition guidance, with regular checks on medium and high risk building sites.	Y	Merton have been leading on a South London NRMM project in partnership with 14 boroughs and the Mayor of London. This project is aimed at delivering cleaner construction and working towards more general compliance within the construction industry. This project is in its third and final year and has proven to be a great success in delivering the Mayors ambition to control construction emissions. Merton have additional 2 FTE's available to deliver this project and cleaner construction. We also use Construction Logistics Planning as a method of controlling Air quality around construction sites.
5. Integrating air quality into the public health system	**5**	Included air quality in the borough's Health and Wellbeing Strategy and/or the Joint Strategic Needs Assessment.	*Y*	LB of Merton Health and Wellbeing Strategy 2015 – 2018 identifies poor AQ as a significant contributory factor in respiratory diseases within the borough. Target set to increase LBM managed tree canopy cover by 3% by 2018 to reduce pollution.

				Merton Joint Strategic Needs Assessment (2015 Summary document) indicates that 6.4% of mortality in LB Merton was attributable to air pollution. (2013 PHOF 3.01 data). Local recommendations embedded in Merton JSNA include: expanding access to green spaces, improve active travel across social gradient, and integrate planning/transport/housing/environmental and health systems to coordinate improvements in health outcomes. Merton Health & Wellbeing Strategy and JSNA can be accessed via: http://www.merton.gov.uk/health-social-care/publichealth.htm We now work closely with Public Health colleagues with regular meeting and pooling resources to deliver joint projects.
6. Informing the public	**6.a**	Raised awareness about air quality locally.	Y	Merton continue to subscribe to airTEXT and committed to do so for the next two years. In 2017 Merton paid for the maintaining of the Love Clean Air website for a further 5 years and continue to increase membership of the site. The Love Clean Air website also provides general AQ information and advice for public. Local page enables boroughs to update AQ reports, promote events and publicise public consultations. Our updated AQAP commits to optimise website potential by providing regular updates on local AQ initiatives; promote availability of AirText notification service; invite contact from local residents to identify local AQ issues/opportunities; circulate consultations and publicise events.

2.1 Air Quality Action Plan Progress

Table H provides a brief summary of Merton's progress against the Air Quality Action Plan in place throughout 2017.

An updated draft AQAP was produced and went out for public consultation in 2017. It was amended and was finally adopted in March 2018. The new AQAP covers the period from 2018 – 2023 and will reflect changes in air quality policy and identify specific measures to tackle pollution in the AQ Focus Areas and local 'hot-spots' within the borough. It includes measures to incentivise the uptake of low emission transport; encourage modal shift to active travel options and address the council's new $PM_{2.5}$ role. It is supported by the departmental Heads of Service for Environmental Health, Transport, and Planning; the Director of Public Health and Cabinet members. Adopted measures will include Key Performance Indicators wherever possible and will be reported in the 2019 Annual Status Report.

Table H. Delivery of Air Quality Action Plan Measures

Measure	Action	Progress	Further information
Action 3	Identify appropriate sites for introduction of alternative fuelling infrastructure	Provision of electric vehicle charging infrastructure including 21 new charge points with a further 41 currently underway.	
Action 8	Progress the City Car Clubs scheme	Two successful car clubs within borough currently operated by Zipcar and City Car Club	
Action 10	Introduction of Controlled Parking Zones to reduce congestion	We have also introduced 5 area wide CPZs which stops commuter related parking and traffic Undertook further public consultations on Cycle Quietways between Clapham Common &	

		Wimbledon forming the Merton section of the Wandle trail. (TfL Quietways project)	
Action 13	The council will produce updated supplementary planning guidance on air quality.	Draft Supplementary Planning Guidance for Air Quality produced in 2017 currently undergoing review/consultation prior to adoption into Local Plan.	
Action 15	The council will produce a walking strategy for the borough	Signed up to Walkit.com walking strategy	
Action 16	The council will continue to promote and implement the Walking Bus and Safe Routes to School Scheme.	Implemented Safer Routes to School/Walking Bus scheme via School Travel Plans. (Mayor's AQ Fund project 2015 – 2017)	Participated in CleanerAir4Schools – joint project between Croydon, Merton, Richmond and Wandsworth including 'walk once a week campaign', School Travel Plan champions training events held in three schools in each borough.
Action 18	Development of cycle facilities	Provision of on-street cycle parking facilities via Local Implementation Plan	
Action 22	The council will provide guidance and support to businesses on developing Green Transport Plans	AQ project at Willow Lane Industrial Estate, Mitcham. Funded through Mayors AQ Fund	Project increased green infrastructure through planting schemes; enhanced road/gully cleansing to reduce re-suspension of dust; delivered sustainable travel training & support and raised awareness of AQ to approximately 150 local businesses.
Action 32	Continue to monitor NO_2 using passive diffusion tubes.	Monitoring network reviewed in 2017. Automatic PM_{10} site maintained; automatic NO_2 site relocated. Diffusion tube network revised and expanded from 20 to 50 sites.	
2016	Encourage update of low emission vehicles	In 2016 Merton conducted Assessment of AQ benefits of introducing an emissions based parking levy for residential and business parking permits. Levy was approved at the beginning of 2017 for implementation and assessment for a	Diesel levy implemented in 2017.

period of 2 years.

3. Planning Update and Other New Sources of Emissions

Table I. Planning requirements met by planning applications in *London Borough of Merton* in 2017

Condition	Number
Number of planning applications reviewed for air quality impacts	*281*
Number of planning applications required to monitor for construction dust	170
Number of CHPs/Biomass boilers refused on air quality grounds	0/Some ongoing
Number of CHPs/Biomass boilers subject to GLA emissions limits and/or other restrictions to reduce emissions	10
Number of AQ Neutral building and/or transport assessments undertaken	23
Number of AQ Neutral building and/or transport assessments not meeting the benchmark and so required to include additional mitigation	0 (Some still ongoing applications)
Number of planning applications with S106 agreements including other requirements to improve air quality	0
Number of planning applications with CIL payments that include a contribution to improve air quality	0 Funding now available
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 at www.nrmm.london and that all NRMM used on-site is compliant with Stage IIIB of the Directive and/or exemptions to the policy.	*Not applicable*
NRMM: Greater London (excluding 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 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.	During 2017 NRMM conditions were applied at all planning sites. LB Merton undertook NRMM site visits: 15 sites were found to be compliant, 6 sites were working towards compliance.

The current process used to identify relevant planning applications in Merton is based primarily on officers' discretion and experience of impact, considering:

- Size of the site
- Location

- Construction impact
- Local knowledge

In 2017 Merton and Richmond-upon-Thames jointly commissioned preparation of a draft Supplementary Planning Guidance (SPG) to address common air quality issues affecting both boroughs and assist in providing a consistent approach to new development. The SPG will set out the criteria for identifying planning applications which require an air quality assessment; define the information to be submitted and assessed and guide developers on appropriate on-site mitigation and/or S.106 Agreements. The draft SPG is currently subject to internal review and will be incorporated into the borough's Local Plan in due course.

3.1 New or significantly changed industrial or other sources

No new or significantly changed sources have been identified in LB Merton in 2017.

The Beddington Lane waste incineration facility was completed. This facility is not inside the Borough of Merton, however we do share a common border and therefore close sharing of AQ monitoring data with the host borough will be vital throughout 2018.

Appendix A Details of Monitoring Site 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 continuous analyser is manually checked at frequent intervals by the local authority Air Quality Officer when filters are changed and the inlet head cleaned to remove any build-up of dirt. Flow audits and calibrations are carried out six monthly as part of the service contract.

PM_{10} Monitoring Adjustment

The TG09 guidance highlights that BAM instruments (as used at the Merton ME2 site) were shown to be equivalent to the PM_{10} reference method, provided that the results are corrected for slope. The monitoring results have been corrected by a factor of 1.2. Thus the results for the Merton ME2 site are reference equivalent.

Results from 2011 to 2017 (inclusive) are reported. It should be noted that data capture for 2011 was only 16% as the site was commissioned in June of that year. Data capture for 2014 was 77%, for 2016, 71% and for 2017 80%. As the data capture fell below 90% for 2011, 2014, 2016 and 2017, the data has been annualised to provide an annual mean value and the 90.4^{th} percentile of the one hour mean has been included for comparison against the 24-hour mean objective. The "annualisation" calculation for the Merton Road ME2 site for 2017 is provided in Appendix A3 below.

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 data 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.

Merton's NO_2 diffusion tubes are analysed 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 (April 2015 – February 2017)

- Summary of Precision Scores for 2015 - 2017

- UKAS schedule of accreditation (January 2018)

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 NO2 concentrations reported are of a high calibre.

Summary of Laboratory Performance in AIR NO2 Proficiency Testing Scheme (April 2016 – February 2018).

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 for every month in 2017 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 2017 is covered by rounds AR013 to AR024 of the AIR-PT scheme. For 2017 the laboratories results were deemed to be good for 98 participating local authorities, satisfactory for 6 and poor for 9 participating local authorities based upon a z score of ≤ ± 2. In 2017, the tube precision for NO2 Annual Field Inter-Comparison for Gradko International using the 50% TEA in acetone method was 'good' for the results of 20 participating local authorities and poor for two participating local authority. Precision was good for The London Borough of Merton for 2017.

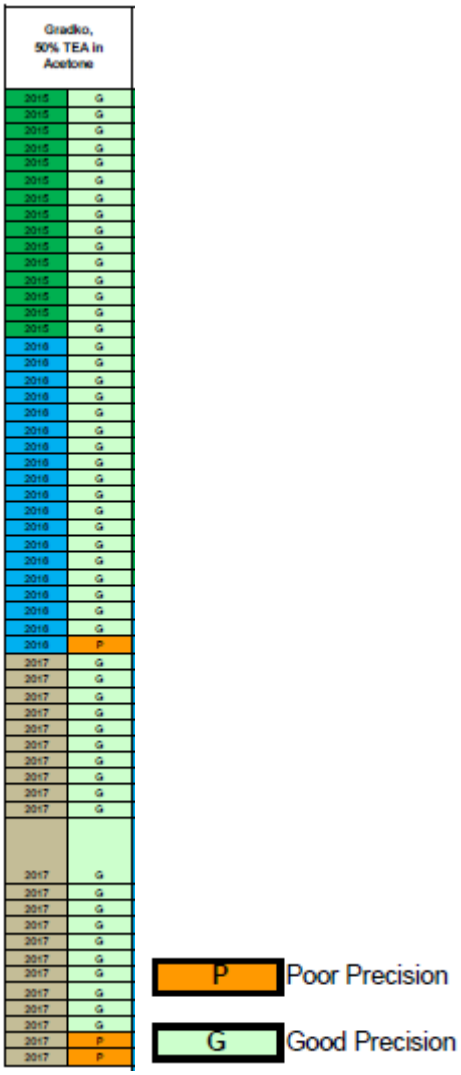
Table 1: Laboratory summary performance for AIR NO_2 PT rounds AR013, 15, 16, 18, 19, 21, 22 and 24

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 $\leq \pm 2$ as defined above.

AIR PT Round	AIR PT AR013	AIR PT AR015	AIR PT AR016	AIR PT AR018	AIR PT AR019	AIR PT AR021	AIR PT AR022	AIR PT AR024
Round conducted in the period	April – May 2016	July – August 2016	September – October 2016	January – February 2017	April – May 2017	July – August 2017	September – October 2017	January – February 2018
Aberdeen Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Cardiff Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Environmental Services Group, Didcot [1]	75 %	75 %	100 %	100 %	100 %	100 %	100 %	100 %
Exova (formerly Clyde Analytical)	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	100 %	0 %	100 %	100 %	50 %	0 %	100 %	100 %
Gradko International [1]	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Kent Scientific Services	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	100 %	100 %	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]	NR [3]
Lambeth Scientific Services	100 %	100 %	75 %	100 %	NR [2]	NR [2]	100 %	NR [2]
Milton Keynes Council	100 %	100 %	75 %	100 %	75 %	0 %	75 %	100 %
Northampton Borough Council	100 %	NR [2]	75 %	0 %	NR [3]	NR [3]	NR [3]	NR [3]
Somerset Scientific Services	100 %	100 %	100 %	100 %	100 %	100 %	75 %	100 %
South Yorkshire Air Quality Samplers	100 %	75 %	100 %	100 %	100 %	100 %	100 %	100 %
Staffordshire County Council	75 %	100 %	NR [2]	100 %	100 %	100 %	100 %	50 %
Tayside Scientific Services (formerly Dundee CC)	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %	NR [2]	100 %
West Yorkshire Analytical Services	100 %	NR [2]	50 %	100 %	100 %	100 %	100 %	50 %

[1] Participant subscribed to two sets of test samples (2 x 4 test samples) in each AIR PT round.
[2] NR No results reported
[3] Northampton Borough Council, Kent Scientific Services, Cardiff Scientific Services, Kirklees MBC and Exova (formerly Clyde Analytical) no longer carry out NO_2 diffusion tube monitoring and therefore did not submit results.

2015 - 2017 Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Collocation Studies for Gradko Laboratory 50% TEA in Acetone



Numerical results for this data are contained in the National Bias Adjustment Spreadsheet version 03/18

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

2187

Accredited to ISO/IEC 17025:2005

Gradko International Ltd
(Trading as Gradko Environmental)

Issue No: 021 **Issue date:** 30 January 2018

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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	GLM 8 by Ion Chromatography
	Benzene Toluene Ethyl benzene Xylene	GLM 4 by Thermal Desorption/ FID Gas Chromatography
	Hydrogen chloride Nitrogen dioxide Sulphur dioxide Hydrogen fluoride	GLM 3 by Ion Chromatography
	Hydrogen sulphide	GLM 5 by Colorimetric determination (UV Spectrophotometry)
	Ozone	GLM 2 by Ion Chromatography
	Nitrogen Dioxide	GLM 7 by Colorimetric determination (UV Spectrophotometry)
	Nitrogen Dioxide (as Nitrite)	GLM 9 by continuous flow colorimetric analyser
	Sulphur dioxide	GLM 1 by Ion Chromatography
	Formaldehyde	GLM 18 by HPLC

2187

Accredited to ISO/IEC 17025:2005

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: 021 **Issue date:** 30 January 2018

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)	
	Volatile Organic Compounds including: Benzene Toluene Ethylbenzene p-Xylene o-Xylene	GLM 13 by Thermal Desorption GC-Mass Spectrometry
	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
	1,3-Butadiene	GLM 13-6 by Thermal Desorption GC-Mass Spectrometry
	1,2-Dichloro(Z)ethene,	GLM 13-3 by Thermal Desorption GC-Mass Spectrometry
	Indane Styrene	GLM 13-4 by Thermal Desorption GC-Mass Spectrometry
	Tetrachloroethylene Trichloroethylene	GLM 13-2 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
	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		

Assessment Manager: LS

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Factor from Local Co-location Studies

No co-location studies were possible in Merton in 2017 due to intermittent faults with the NO2 analyser.

Discussion of Choice of Factor to Use

Due to lack of local co-location studies, the Gradko Laboratories 50% TEA national correction factor has been used to bias adjust all NO_2 diffusion tubes. For 2017 the correction factor was 0.97

A.3 Adjustments to the Ratified Monitoring Data

Short-term to Long-term Data Adjustment

NO2 Adjustment

For monitoring sites where data capture is less than 75% of a full calendar year (less than 9 months), the mean has been "annualised" using the methodology outlined in LLAQM.TG(16) before being compared to annual mean objectives. This was necessary at site 2 only in 2017.

PM_{10} Adjustment

Measured mean PM_{10} concentration for Merton Road ME2 site for 2017 was 24µg/m^3 based on data capture rate of 80%. Since this was above the 75% data capture threshold "annualisation" of data was not necessary. (This is in accordance with the procedure detailed in LLAQM Technical Guidance (TG16)).

Annualisation of NO2 Diffusion Tube Monitoring Data

One diffusion tube , site 2, returned a data capture rate below 75%. The 'raw' concentrations were annualised in accordance with Box 4.9 of the LLAQM Technical Guidance (TG16). The averaged triplicate results of the NO2 diffusion tubes at the background site of the Wetland Centre in the London Borough of Richmond Upon Thames Wetlands compared extremely well with the continuous background analyser at this site producing a bias correction factor of 1.00. This site fulfilled the criteria of TG16 and in 2017 both continuous analyser and NO2 diffusion tubes had a data capture rate of 100%. This has been used to annualise the data. The calculations are reproduced in the table below.

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

Start date dd/mm/yy	End date dd/mm/yy	Tube average B1 Wetlands	D1 (site 2)	B1 when D1 is available
06/01/2017	06/02/2017	36.92		
06/02/2017	02/03/2107	28.87	48.69	28.87
02/03/2107	28/03/2017	21.46		
28/03/2017	25/04/2016	14.48	41.04	14.48
25/04/2016	30/05/2017	19.04	40.34	19.04
30/05/2017	12/07/2017	16.08	36.85	16.08
12/07/2017	31/07/2017	13.24		
31/07/2017	30/08/2017	16.33	36.66	16.33
30/08/2017	02/10/2018	19.79		
02/10/2018	30/10/2018	18.39		
30/10/2018	06/12/2017	27.35	50.03	27.35
06/12/2017	03/01/2018	25.08	44.83	25.08
Average		21.41	42.63	21.03

The ratio of the annual mean to the period mean (A_m/P_m) is 1.01
The measured period mean concentration M is 42.63. Multiply this by the annualisation factor Ra (1.01) to give the estimated annual mean for 2017.
The annualised average of D1=M x Ra = 42.63 x 1.01 = 43.06 ug/m3

A.3 Adjustments to the Ratified Monitoring Data

Distance Adjustment

All NO 2 diffusion tube results have been adjusted to represent exposure at the nearest façade. The concentration at the nearest receptor has been estimated using the LAQM NO2 Fall-off with Distance Calculator (Version 4.1) in line with the procedure detailed in LLAQM.TG(16).

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. The monitored annual mean value used in the calculation is the 'raw' value which has not been bias adjusted and the background concentration is derived from the Wetlands background site in the London Borough of Richmond.

Table K. Distance Adjustment - Monitored Annual Mean NO2 compared to exposure at nearest façade (□g m-3)

Site ID	Address	Background Conc. (Wetlands)	Measured Annual mean Conc.	Distance Corrected Conc.
1	A298 Bushey Rd nr Bushey Ct	20.0	**53**	36
2 (GA)	A24 Jct with Garth Drive Morden, SM3 9HU	20.0	**43**	33
3	Tudor Drive, nr jct with A24, SM4 4PE	20.0	35	28
4 (FA)	154 Grand Drive Raynes Park	20.0	38	33
5 (BA)	Sacred Heart Sch, Burlington Road New Malden	20.0	**43**	33
6 (JC)	17 Grand Drive Raynes Park	20.0	**46**	32
7	A298 Kingston Rd, SW20 8LX	20.0	**45**	36
8	A238 Coombe Lane by Lloyds	20.0	**55**	**47**
9	2 Lambton Rd(nr shops)	20.0	**45**	36
10	A238 nr 251 Coombe Lane	20.0	**40**	30
11	Kingston Rd SW20 1JW	20.0	36	30
12 (RA)	Pepys Road Morden	20.0	31	25
13	B281 4 Cottenham Pk Rd	20.0	**46**	32
14 (AC)	20 The Ridgeway Wimbledon	20.0	**46**	**40**

15	20 High St,Wimbledon, SW19 5BY	20.0	26	24
16	84 High St, Wimbledon, SW19	20.0	**40**	34
17 (WA)	Woodside Wimbledon	20.0	31	26
18	Hand & Racquet, Wimbledon Hill	20.0	**66**	**50**
19	Wimbledon Station	20.0	**54**	**51**
20	Hartfield Rd opp Suburban Bar	20.0	**50**	37
21 (EA)	246 Merton Rd, Sth Wimbledon A219	20.0	**58**	**49**
22	12-16 Upper Green West, CR4 3AA	20.0	**80**	**70**
23	183 Kingston Rd, SW19 1LH	20.0	**63**	**54**
24	75 Hartfield Rd SW19 3TJ	20.0	**40**	33
25	Alexander Rd, SW19 7LE	20.0	**42**	39
26	Gap Rd, SW19 8JG	20.0	**48**	**43**
27	Plough Lane	20.0	**48**	**41**
28 (BC)	11 Haydons Road SW19 1HG	20.0	**47**	**47**
29 (HA)	A24 - 44 High St Colliers Wood, SW19 2AB	20.0	**63**	**52**
30	A24 Christchurch Rd, SW19 2**PB**	20.0	**50**	39
31 (LA)	Alley Charminster Ave Morden	20.0	20	20
32	Merantum Way, SW19 2JY	20.0	**43**	35
33	A24 Morden Rd, SW19 3BP	20.0	**50**	**48**
34 (GC)	Western Rd Colliers Wood	20.0	**61**	**60**
35 (MA)	Lavender Ave Morden	20.0	**31**	26
36 (DC)	35 London Rd Tooting	20.0	**44**	**43**
37 (CC)	107 London Rd Tooting	20.0	**63**	**52**
38 (EC)	BHF, 265 London Rd, Mitcham	20.0	**42**	34
39 (FC)	Church Rd Mitcham	20.0	**46**	38
40	A217 London Rd, CR4 4BF	20.0	**48**	38
41	A239 Morden Rd, nr O, CR4 6AU	20.0	**43**	**43**
42	St Hellier Rd, SM4 6JE	20.0	36	30

43	Morden Hall Rd nr jct, SM4 5JG	20.0	**46**	32
44 (AA)	Oxfam, London Rd, Morden	20.0	**59**	**44**
45 (IC)	HSBC, London Rd Morden	20.0	**47**	**41**
46 (HC)	80 Crown Lane Morden	20.0	**63**	**46**
47	Civic Centre, Morden	20.0	**53**	**53**
48	Aberconway Rd, SM4 5LF	20.0	**42**	33
49	Crown Rd, Jcn Stanley Rd	20.0	**40**	35
50	Martin Way, SM4 4AR	20.0	**47**	34

*Notes: Exceedance of the NO2 annual mean AQO of 40 µgm-3 are shown in **bold (pink).***
*Exceedance of the NO2 annual mean AQO of 60µgm-3 are shown in **bold and underlined** (Dark Red)*

Appendix B Full Monthly Diffusion Tube Results for 2017

Table L. NO_2 Diffusion Tube Results

Site ID	Valid data capture for monitoring period %	valid data capture 2017 %	Annual Mean NO_2													
			Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual mean - raw data	Annual mean - bias adjusted
1	100	100	72.36	64.77	51.19	45.01	48.41	48.89	45.42	50.69	48.94	49.26	55.55	60.31	**53**	**52**
2	100	58		48.69		41.04	40.34	36.85		36.66			50.03	44.83	**43**	**41**[c]
3	100	100	64.36	36.22	36.53	29.55	30.17	28.95	27.14	28.52	29.85	31.29	40.62	36.46	35	34
4	100	100	55.42	39.53	38.04	43.78	30.12	33.62	31.36	36.24	31.54	29.54	44.19	40.12	38	37
5	100	83	51.55		50.75		36.99	37.62	32.99	44.07	39.58	37.52	52.65	47.37	**43**	**42**
6	100	100	62.95	44.05	52.33	43.39	42.00	44.59	40.48	40.44	43.37	45.08	49.76	49.46	**46**	**45**
7	100	100	52.90	53.36	45.88	40.42	38.53	41.20	37.11	41.82	40.72	46.20	55.02	49.68	**45**	**44**
8	100	100	72.70	60.30	64.91	48.95	48.43	54.81	47.28	50.58	51.13	51.49	56.35	53.69	**55**	**53**
9	100	100	63.74	47.80	46.98	40.12	43.90	39.28	39.93	38.23	42.85	38.64	49.74	44.85	**45**	**43**
10	100	100	53.41	43.29	43.18	44.11	35.30	33.70	28.33	34.76	33.80	37.66	43.76	44.09	**40**	38
11	100	100	60.57	32.47	38.16	31.18	32.83	29.12	28.28	28.72	31.27	31.39	46.06	40.96	36	35
12	100	100	54.01	32.35	30.36	24.96	26.48	22.28	23.36	24.18	28.88	30.45	43.77	36.18	31	30
13	100	92	74.32	43.86	45.76		38.72	40.75	38.51	39.27	43.81	42.36	49.85	44.62	**46**	**44**
14	100	92	55.24	45.82		45.52	43.02	42.20	36.70	37.24	43.56	42.38	61.48	50.32	**46**	**44**
15	100	100	43.67	28.12	26.77	22.76	25.24	21.93	20.26	21.05	25.87	23.39	28.76	29.45	26	26
16	100	75	66.46	39.98		39.70		37.14	33.65	29.77	37.07	34.02		43.53	**40**	39
17	100	100	45.97	34.35	31.66	26.19	25.33	24.67	23.77	24.40	30.92	31.63	39.80	34.74	31	30
18	100	100	82.07	62.58	63.89	67.73	65.44	71.46	58.49	67.37	64.70	64.01	68.73	56.62	**66**	**64**
19	100	92	71.30	52.70	57.61	52.82	53.26	50.68	49.52	45.66		44.14	56.56	56.58	**54**	**52**
20	100	100	77.29	50.14	47.99	46.86	53.86	49.91	41.46	24.63	51.94	45.56	56.59	50.29	**50**	**48**
21	100	92		64.84	59.30	58.65	64.55	65.48	60.37	46.99	50.95	49.39	66.29	56.20	**58**	**57**
22	100	92	88.51	83.75	85.48	81.89	71.87	91.47	82.06	84.92		65.76	69.84	69.60	**80**	**77**
23	100	100	66.03	62.26	58.94	76.47	55.15	65.27	54.76	57.10	56.57	57.30	69.81	72.48	**63**	**61**

24	100	100	57.93	43.61	38.47	37.41	34.14	30.90	32.17	37.36	38.00	36.21	43.74	46.30	**40**	38
25	100	100	59.60	48.24	43.86	39.40	37.36	35.39	35.12	39.36	39.96	43.17	46.27	41.05	**42**	**41**
26	100	100	71.90	48.87	48.11	41.41	47.28	44.27	42.82	43.07	48.30	45.78	49.97	44.29	**48**	**47**
27	100	100	64.18	53.97	46.13	47.12	43.25	46.98	40.77	40.62	45.91	39.88	54.45	50.73	**48**	**46**
28	100	100	64.91	42.97	50.68	43.31	54.26	45.87	44.89	39.52	43.68	41.17	43.57	43.70	**47**	**46**
29	100	100	72.54	66.47	60.52	60.83	59.09	60.15	57.01	61.83	67.73	61.46	67.00	64.84	**63**	**61**
30	100	100	59.73	46.75	47.64	57.12	44.01	48.25	45.66	46.04	44.25	47.55	56.57	52.71	**50**	**48**
31	100	100	35.94	21.52	19.27	16.60	15.70	11.84	14.47	15.94	17.31	15.72	29.45	26.34	20	20
32	100	100	58.92	45.13	48.32	40.81	31.68	36.88	34.03	43.36	41.12	41.85	49.95	49.90	**43**	**42**
33	100	75	86.63		55.00	43.37	42.18		40.78		44.08	44.10	49.79	46.65	**50**	**49**
34	100	92	69.87	61.97	67.64	65.71	51.10	58.54	53.15	58.83	61.87	57.07	56.58	64.68	**61**	**59**
35	100	92	49.81	31.14	35.20	29.13	27.37	24.71	25.95	27.61	27.17	30.31		37.77	31	31
36	100	100	69.49	43.06	45.46	40.48	45.52	37.21	37.16	36.86	40.65	37.87	45.98	43.32	**44**	**42**
37	100	100	95.04	63.39	68.04	61.61	73.26	57.46	55.93	56.14	62.58	52.06	56.50	53.40	**63**	**61**
38	100	100	51.57	42.91	38.00	46.81	41.19	41.85	36.46	39.16	38.91	39.66	49.26	43.57	**42**	**41**
39	100	92	63.12	44.15	46.65	50.62	42.38	40.27	37.64	41.38	44.13		54.46	46.34	**46**	**45**
40	100	100	63.31	59.02	55.53	44.56	34.14	41.28	41.57	45.50	35.58	44.48	56.58	51.68	**48**	**46**
41	100	92	59.36	41.41	39.47	41.97	36.68	36.48	34.67	39.89		38.50	54.86	46.51	**43**	**41**
42	100	92		39.69	33.03	35.03	35.04	33.65	29.10	30.88	35.55	36.23	44.98	39.66	36	35
43	100	100	58.27	40.35	52.61	60.85	46.08	44.60	38.78	41.25	40.53	29.99	54.73	41.58	**46**	**44**
44	100	100	80.18	54.20	54.79	51.21	56.15	56.35	54.94	60.07	69.27	54.19	54.78	56.53	**59**	**57**
45	100	100	62.68	48.98	44.07	46.67	44.98	41.13	37.24	41.21	45.62	42.69	57.34	49.32	**47**	**45**
46	100	100	76.49	60.92	59.77	67.04	58.77	67.75	58.25	61.27	63.18	53.33	66.33	57.63	**63**	**61**
47	100	100	68.56	54.12	51.78	46.89	47.02	50.20	42.60	47.92	55.86	46.04	55.49	56.60	**53**	**51**
48	100	100	56.97	43.45	45.57	41.90	38.45	39.32	34.19	39.24	36.47	38.56	48.28	44.05	**42**	**41**
49	100	92	64.51	36.91	41.01	41.62		26.97	32.72	33.45	37.68	38.22	49.78	42.05	**40**	39
50	100	100	59.14	53.43	48.46	52.06	40.45	38.21	38.24	40.98	42.90	43.94	56.60	46.04	**47**	**45**

Exceedance of the NO_2 annual mean AQO of 40 μgm^{-3} are shown in **bold (pink)**.
Exceedance of the NO2 annual mean AQO of 60µgm-3 are shown in ***bold and underlined*** *(Dark Red)*

[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%)
[c] valid data capture is less than 75%, Means to be “annualised” in accordance with LLAQM Technical Guidance.
[d] The bias adjustment factor used for all roadside/kerbside sites is 0.97 which is calculated using the National Gradko 50% TEA in acetone adjustment factor for 2017.