Southwark Air Quality Annual Status Report 2016

April 2017

This report provides a detailed overview of air quality in Southwark during 2016. 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

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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 microns in diameter
$PM_{2.5}$	Particulate Matter less than 2.5 microns 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[2]
Nitrogen Dioxide - NO_2	200 $\mu g.m^{-3}$ not to be exceeded more than 18 times a year	1-hour mean	31 Dec 2005
	40 $\mu g.m^{-3}$	Annual mean	31 Dec 2005
Particulate Matter - PM_{10}	50 $\mu g.m^{-3}$ not to be exceeded more than 35 times a year	24-hour mean	31 Dec 2004
	40 $\mu g\ m^{-3}$	Annual mean	31 Dec 2004
Particulate Matter - $PM_{2.5}$	25 $\mu g.m^{-3}$	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 $\mu g.m^{-3}$ not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005
	350 $\mu g.m^{-3}$ not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125 $\mu g.m^{-3}$ not to be exceeded more than 3 times a year	24 hour mean	31 Dec 2004

[2] Note by which to be achieved by and maintained thereafter.

1. Air Quality Monitoring

Within Southwark, there are two continuous air quality monitor stations. These are supplemented by 86 Nitrogen Dioxide diffusion tubes throughout the Borough in 2016. Some of these diffusion tube monitoring locations are for the evaluation of short term air quality improvement projects including the Mayor's Air Quality Fund (MAQF) Tower Bridge Anti-Idling project, a joint project with Tower Hamlets.

1.1 Locations

Table B **Details of Automatic Monitoring Sites for 2016**

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 (m)	Inlet height (m)	Pollutants monitored	Monitoring technique
SWK 5	Old Kent Road	534844	177515	Roadside	Yes	1	5	2.0	NO_x & NO_2 and PM_{10}	Chemiluminescence and FDMS TEOM
SWK 6	Elephant and Castle	531884	178835	Urban background	Yes	10	25	3.5	NO_x NO_2, O_3 & PM_{10}	Chemiluminescence, UV Absorption & TEOM

Table C **Details of Non-Automatic Monitoring Sites for 2016**

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 (m)	Affixed height (m)	Pollutants monitored	Tube co-located with an automatic monitor?
SDT 1	AQMS Old Kent Road - Tube 1	534849	177512	Roadside	Yes	1	5	2.5	NO_2	Yes
SDT 2	AQMS Old Kent Road - Tube 2	534849	177512	Roadside	Yes	1	5	2.5	NO_2	Yes
SDT 3	AQMS Old Kent Road - Tube 3	534849	177512	Roadside	Yes	1	5	2.5	NO_2	Yes
SDT 4	Rotherhithe Old Road SE16	535675	178796	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 5	Drummond Road SE16	534640	179336	Kerbside	Yes	6	0.5	2.5	NO_2	No
SDT 6	Adjacent to 168 Queens Road SE15	535253	176679	Kerbside	Yes	14	0.5	2.5	NO_2	No
SDT 7	Adjacent to 167A Rye Lane SE5	534333	176155	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 8	Dunstans Road	534553	174263	Kerbside	Yes	8	0.5	2.5	NO_2	No
SDT 9	Dulwich Common	533473	173205	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 10	Adjacent to 2 Village Way SE21	532940	174392	Kerbside	Yes	13	0.5	2.5	NO_2	No
SDT 11	Adjacent to 11 Camberwell Church Street SE5	532663	176740	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 12	AQMS Elephant & Castle - Tube 1	531882	178834	Urban background	Yes	10	25	2.5	NO_2	Yes
SDT 13	AQMS Elephant & Castle - Tube 2	531882	178834	Urban background	Yes	10	25	2.5	NO_2	Yes
SDT 14	AQMS Elephant & Castle - Tube 3	531882	178834	Urban background	Yes	10	25	2.5	NO_2	Yes
SDT 15	Blackfriars Road SE1	531641	180290	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 17	MAQF TBP 1 - Tooley Street	533493	179940	Roadside	Yes	3	0.5	2.5	NO_2	No

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 (m)	Affixed height (m)	Pollutants monitored	Tube co-located with an automatic monitor?
SDT 18	MAQF TBP 2 - Tower Bridge	533599	180062	Roadside	Yes	3	0.5	2.5	NO_2	No
SDT 19	MAQF TBP 3 - Tooley Street / Boss Street	533586	179867	Roadside	Yes	3	0.5	2.5	NO_2	No
SDT 20	MAQF TBP 4 - Tower Bridge School fence	533518	179844	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 21	MAQF TBP 5 - Druid Street	533572	179732	Kerbside	Yes	6	0.5	2.5	NO_2	No
SDT 22	MAQF TBP 6 - Tower Bridge Road	533474	179684	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 23	MAQF TBP 7 - Tanner Street west	533409	179657	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 24	MAQF TBP 8 - Opposite Papa Johns	533444	179620	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 25	MAQF TBP 9 - Abbey Street	533506	179371	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 26	MAQF TBP 10 - Long Lane	533311	179407	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 27	MAQF TBP 11 - Grange Road Triangle	533295	179281	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 28	MAQF TBP 12 - Webb Street	533217	179153	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 29	MAQF TBP 13 - Opposite Haddon Hall	533108	179117	Kerbside	Yes	2	0.5	2.5	NO_2	No
SDT 30	MAQF TBP 14 - Bricklayers Arms north	532984	179072	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 31	MAQF TBP 15 - Bricklayers Arms West	532938	179043	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 37	Wansey Street Lamppost north Reference (1068 / 09)	532340	178711	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 38	Walworth Road opposite junction to Elephant Road west	532074	178825	Kerbside	Yes	2	0.5	2.5	NO_2	No

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 (m)	Affixed height (m)	Pollutants monitored	Tube co-located with an automatic monitor?
SDT 39	New Kent Road Lamppost 3 north (Metro Central)	532053	179070	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 40	New Kent road Lamppost 15 north side (Meadow Road)	532189	179029	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 41	New Kent Road Lamppost 29 north side (Rodney Place)	532390	178974	Kerbside	Yes	20	0.5	2.5	NO_2	No
SDT 42	St Peters Hills Primary School	536047	180343	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 48	Adjacent to Beechwood Court 3 Crystal Palace Parade	535514	178708	Kerbside	No	20	0.5	2.5	NO_2	No
SDT 49	Lamppost 129 / 08 Lynton Road west	535334	173994	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 50	Peckham Nursery Maxted Road	532923	175030	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 51	Harris Girl's School Homestall Road	532212	179765	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 52	Kingsdale Foundation School Alleyn Park SE22	533150	172123	Kerbside	No	10	0.5	2.5	NO_2	No
SDT 53	Lamppost (2074 - 25) Burbage Road	532668	73,998	Kerbside	No	10	0.5	2.5	NO_2	No
SDT 54	Camberwell Grove	532951	176417	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 55	Lamppost 11A St Georges Way South	533350	177603	Kerbside	Yes	3	0.5	2.5	NO_2	No

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 (m)	Affixed height (m)	Pollutants monitored	Tube co-located with an automatic monitor?
SDT 56	Coburg School Coburg Road SE17	533636	177933	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 57	Notre Dame School	531531	179256	Kerbside	Yes	5	0.5	2.5	NO_2	No
SDT 61	Junction of Brunel Road and Rupack Street	535176	179665	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 62	Adjacent to Bosco College Jamaica Road	534918	179571	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 63	Rotherhithe Tunnel Approach	535194	179653	Kerbside	Yes	1	1	2.5	NO_2	No
SDT 64	Adjacent to Blick House Lower Road	535170	179445	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 65	Adjacent to Courthope House Lower Road	535387	179188	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 66	Adjacent to Prince of Orange Lower Road	535384	179161	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 67	Lamppost 31 Adjacent to Selbourne House Great Dover Street / Beckett Street	532633	179451	Kerbside	Yes	15	0.5	2.5	NO_2	No
SDT 68	Lamppost 34 Great Dover Street	532569	179513	Kerbside	Yes	15	0.5	2.5	NO_2	No
SDT 69	Borough High Street Adjacent to Prospero House	532385	179681	Kerbside	Yes	5	0.5	2.5	NO_2	No
SDT 70	Borough High Street Directional Sign Adjacent to Redman House	532351	179672	Kerbside	Yes	30	0.5	2.5	NO_2	No

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 (m)	Affixed height (m)	Pollutants monitored	Tube co-located with an automatic monitor?
SDT 71	Adjacent to 64 - 66 Newington Causeway and Railway Bridge	532055	179333	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 72	91 Newington Causeway	532057	179302	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 73	Junction of Scovell Road & Southwark Bridge Road	532021	179609	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 74	Adjacent to 142 Southwark Bridge Road Lamppost 1569 - 19	532015	179629	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 75	Post at the Junction of Mint St & Marshalsea Rd	532305	179822	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 76	Lamppost 1476 -07 adjacent to 16 - 18 Marshalsea Road	532316	179833	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 77	Adjacent to steps to Park St Southwark Bridge Rd	532294	180406	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 78	Adjacent to Financial Times Southwark Bridge Road	532311	180414	Kerbside	Yes	10	0.5	2.5	NO_2	No
SDT 79	Lamppost No SS22 130 Southwark Street	531859	180290	Kerbside	Yes	5	0.5	2.5	NO_2	No
SDT 80	Lamppost No SS08 99 Southwark Street	531853	180277	Kerbside	Yes	5	0.5	2.5	NO_2	No
SDT 81	Lamppost No 02 Borough High Street	532690	180212	Kerbside	Yes	3	0.5	2.5	NO_2	No

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 (m)	Affixed height (m)	Pollutants monitored	Tube co-located with an automatic monitor?
SDT 82	Lamppost no 01 Adjacent to 125 Borough High St	532572	180029	Kerbside	Yes	3	0.5	2.5	NO_2	No
SDT 83	201 Borough High Street	532500	179847	Kerbside	Yes	5	0.5	2.5	NO_2	No
SDT 84	Little Dorritt Park Entrance Lamppost No 8	532487	179850	Kerbside	Yes	5	0.5	2.5	NO_2	No
SDT 85	Lamppost No147 S4 85 Adjacent to Beormund Primary School Long Lane	532761	179689	Kerbside	Yes	5	0.5	2.5	NO_2	No
SDT 86	Lamppost 147 - 20 Long Lane	532719	179701	Kerbside	Yes	3	1	2.5	NO_2	No

1.2 Comparison of Monitoring Results with AQOs

The results presented are after adjustments for "annualisation" and for "distance to a location of relevant public exposure". The details of the adjustments are described in Appendix A.

Table D **Annual Mean NO_2 Ratified and Bias-adjusted Monitoring Results ($\mu g.m^{-3}$)**

Site ID	Site type	Valid data capture for monitoring period %	Valid data capture 2016 %	Annual Mean Concentration ($\mu g.m^{-3}$)						
				2010	2011	2012	2013	2014	2015	2016
SWK5	Roadside	80%	80%	N / A	**46** (73%)	**52** (80%)	**55** (>90%)	38 (32%)	**42** (69%)	**53** (80%)
SWK6	Urban Background	90%	90%	N / A	N / A	N / A	**42** (85%)	37 (84%)	**41**(80%)	39 (90%)

Note: Exceedance of the NO_2 annual mean AQO of 40$\mu g.m^{-3}$ are shown in **bold**.

Any NO_2 annual means in excess of 60 $\mu g.m^{-3}$, indicating a potential exceedance of the NO_2 hourly mean AQS objective limit, would be shown in **bold** and **underlined**.

The above data shows that at the site on the Old Kent Road, the annual mean concentrations have been exceeding the objective of 40 $\mu g.m^{-3}$ since 2011. The data shows that the annual mean concentration at the Elephant & Castle site was just under the objective this year, there is not yet sufficient data from this site to give a clear trend and thus show if this site could be assessed as compliant with the objective.

No site has breached the 60 $\mu g.m^{-3}$ level to indicate a potential exceedance of the NO_2 hourly mean AQS objective limit.

The trends for the monitoring stations in Southwark can be seen in Figure 1 on the next page.

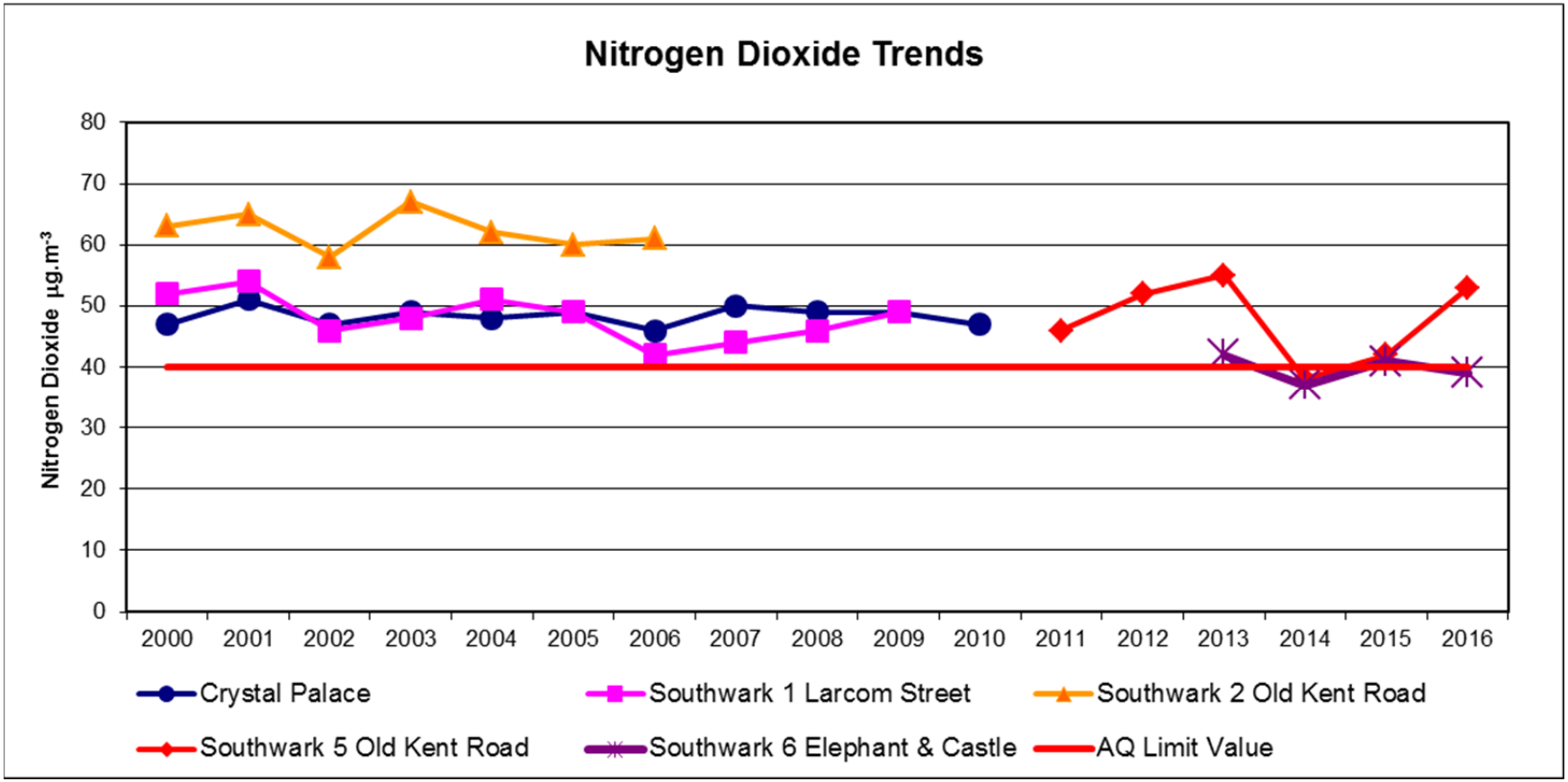

Figure 1 **Trends in Annual Mean NO2 Concentrations Measured at the Borough's Automatic Monitoring Sites**

Figure 2, on the next page, shows the mean results from all roadside and background monitoring stations within the London Air Quality Network[3]. This shows that the trend for the background sites is showing a gradual reduction to below the objective. However, the trend for roadside locations is not noticeably reducing and they generally exceed the NO_2 objective by 7 to 35µg.m^{-3} .

[3] London Datastore - London Average Air Quality Levels accessed at http://data.london.gov.uk/dataset/london-average-air-quality-levels

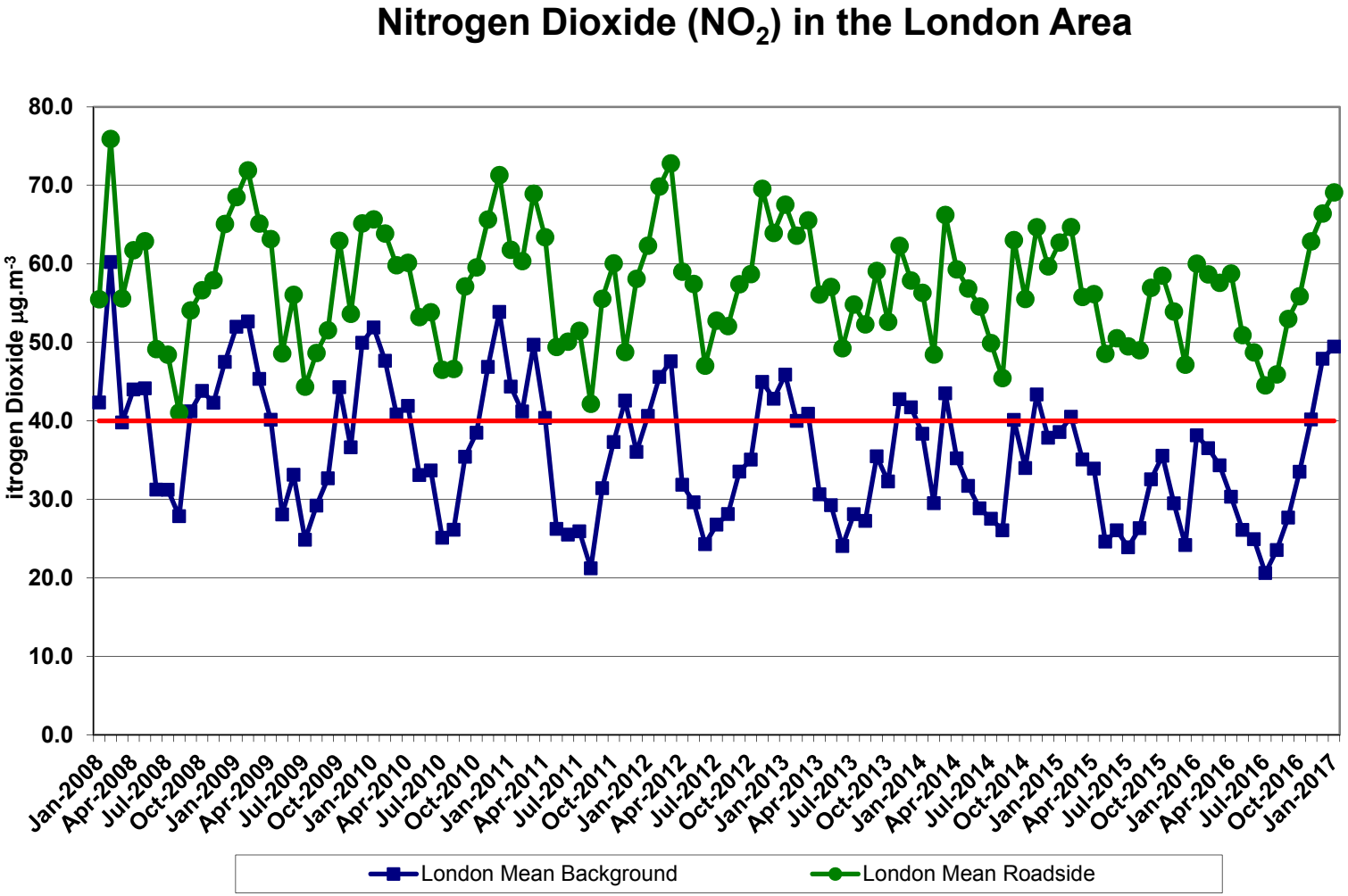

Figure 2 **Trends of the Monthly Mean NO_2 Concentrations at Roadside and Background Sites in the London Area.**
(Source GLA accessed at http://data.london.gov.uk/dataset/london-average-air-quality-levels)

Table E **NO_2 Automatic Monitor Results: Comparison with 1-hour Mean Objective**

Site ID	Valid data capture for monitoring period %	Valid data capture 2016 %	Number of hourly means measured > 200 µg.m^{-3}						
			2010	2011	2012	2013	2014	2015	2016
SWK5	80%	80%	0 (8%)	10 (73%)	6 (80%)	4 (>90%)	1 (32%)	1 (69%)	1
SWK6	90%	90%	N / A	N / A	N / A	0 (85%)	0 (84%)	0 (80%)	0

Note: Any exceedence of the NO_2 short term AQO of 200µg.m^{-3} (over the 18 days per year permitted) would be shown in **bold**.

The number of exceedences of the hourly mean >200µg.m^{-3} objective permitted has not exceeded 18, in Southwark, in 2016.

The valid data capture for SWK5 was affected by a period of equipment failure in June – August 2016.

Table F **Long term NO_2 Diffusion Tube Monitor Results in the Borough ($\mu g.m^{-3}$)**

Site ID	2012	2013	2014	2015	2016
SDT 1 - 3	**50.0**	**56.7**	**57.6**	**48.1**	**47.0**
SDT 4	**52.3**	**61.9**	**63.5**	**57.2**	**54.6**
SDT 5	35.6	38.4	38.2	35.8	34.1
SDT 6	**48.6**	**51.6**	**54.3**	**49.7**	**42.9**
SDT 7	**51.3**	**57.0**	**61.5**	**52.5**	**44.3**
SDT 8	32.6	37.0	33.8	31.6	31.1
SDT 9	**45.6**	**50.5**	**54.0**	**47.0**	**44.8**
SDT 10	33.6	36.6	34.9	33.7	30.1
SDT 11	**72.0**	**80.1**	**78.1**	**70.4**	**60.0**
SDT 12 - 14	**50.7**	**66.3**	**70.6**	**65.7**	**58.9**
SDT 15	**57.2**	**66.0**	**66.4**	**57.3**	**63.5**

Note: The results in **bold** are where there are exceedences of the NO_2 annual mean AQD of 40$\mu g.m^{-3}$.
NO_2 annual means in excess of 60 $\mu g.m^{-3}$, indicating potential exceedance of the NO_2 hourly mean objective limit, are shown in **bold** and **underlined**.

Table F above contains the results from the sites in Southwark where there are results for at least four years. The data has been corrected for distance to a point of relevant exposure, as described in the LLAQM Technical Guidance TG(16). The results at each site have varied due to weather and local conditions, but, the overall assessment is there are many locations that have exceeded the objective value continuously and a few locations which are just above the objective.

The NO_2 diffusion tube survey has been extended due to air quality project work over the last few years and to increase the spatial distribution of monitoring locations. The results of the expanded survey will be included in this table in future years when sufficient (four years) data has been gathered at those locations. The expanded survey ensures all the GLA Air Quality Focus Areas in Southwark will be monitored and reported on in the future.

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

Site ID	Valid data capture for monitoring period %	Valid data capture 2016 %	Annual Mean Concentration ($\mu g.m^{-3}$)						
			2010	2011	2012	2013	2014	2015	2016
SWK5	94%	94%	29 (8%)	27 (80%)	25 (82%)	30 (85%)	23	21	24
SWK6	81%	81%	N / A	N / A	N / A	23 (80%)	19	20	26

Note: Any exceedence of the PM_{10} annual mean AQO of 40μgm^{-3} would be shown in **bold**.

The PM_{10} annual mean concentrations have met the national air quality objectives. There has been a slight upward trend of the PM_{10} annual mean concentrations over the last three years as seen in Figure 3. The trends for the entire London Air Quality Network roadside and background monitoring stations can be seen in Figure 4 and these also show that the concentrations are well below the objective limit.

The data capture at SWK6 was reduced due to the incidence of a water leak in the cabinet housing the monitoring equipment and water ingress that affected the the PM_{10} monitor.

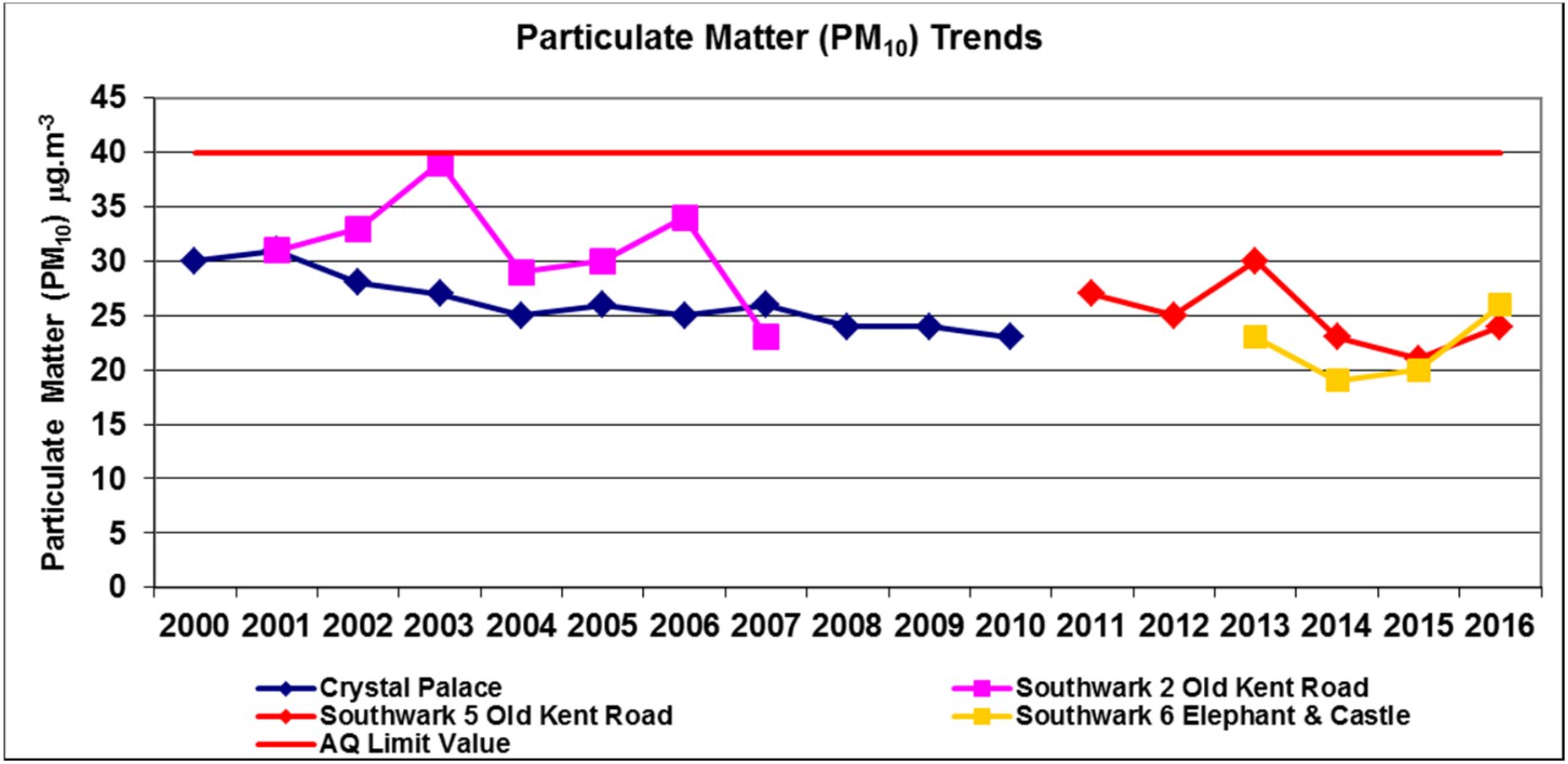

Figure 3 **Trends in Annual Mean PM_{10} Concentrations of the Authority's PM_{10} monitoring stations**

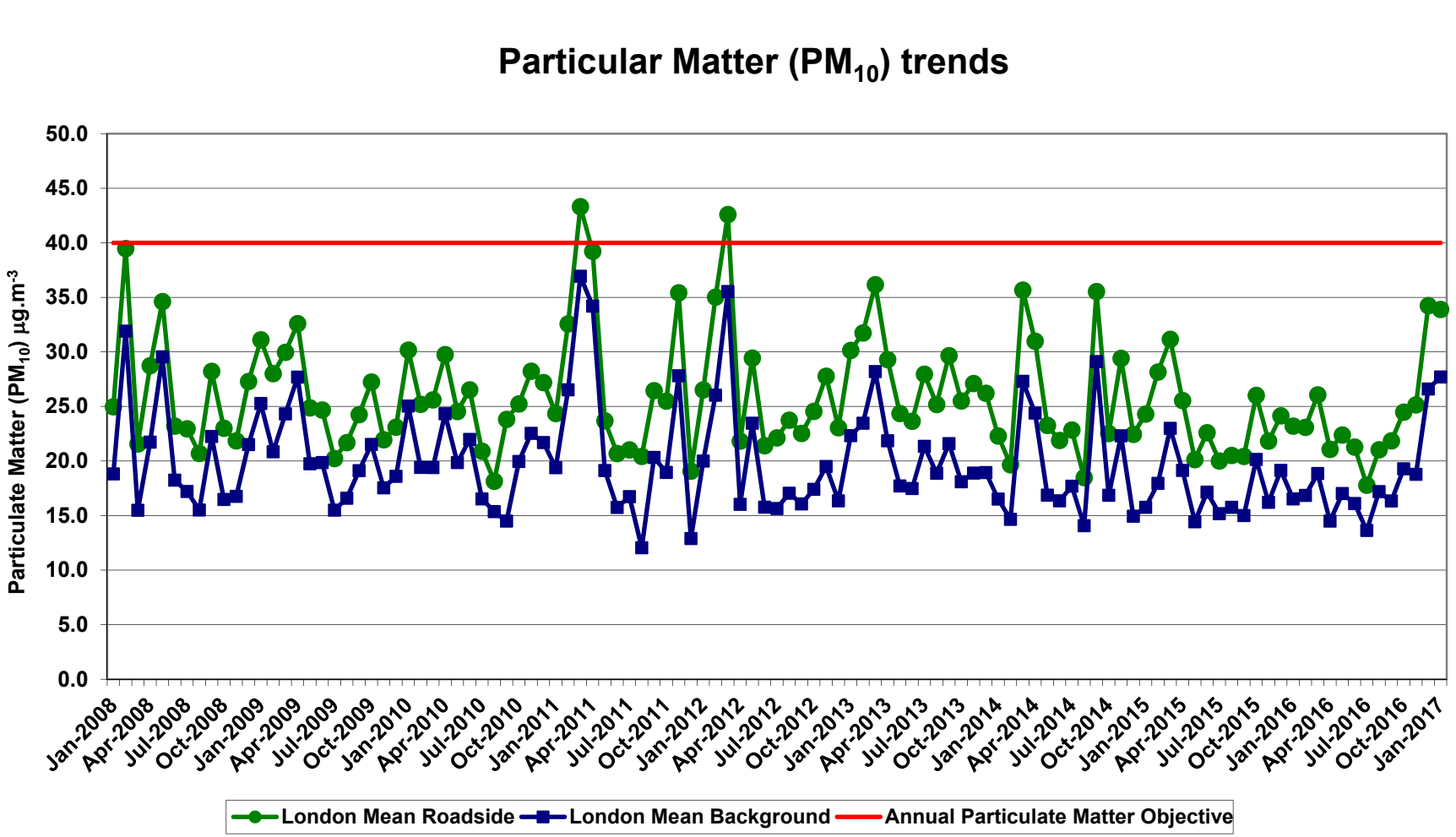

Figure 4 **Trends of the monthly mean Particulate Matter (PM_{10}) concentrations at roadside and background sites in the London area** (Source GLA accessed at http://data.london.gov.uk/dataset/london-average-air-quality-levels)

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

Site ID	Valid data capture for monitoring period %	Valid data capture 2016 %	Number of Daily Means > 50 µg.m^{-3}						
			2010	2011	2012	2013	2014	2015	2016
SWK5	94%	94%	0 (8%)	31 (80%)	19 (82%)	30(85%)	10	4	18
SWK6	81%	81%	N/A	N/A	N/A	3 (80%)	0	1	21

Note: Exceedance of the PM_{10} short term limit of 50µg.m^{-3} (over the permitted 35 days per year or where the 90.4th percentile exceeds 50µg.m^{-3}) would be shown in **bold**.

There has been no exceedance of the objective limit in 2016.

The data capture at SWK6 was reduced due to the incidence of a water leak in the cabinet housing the monitoring equipment and water ingress that affected the the PM10 monitor.

Particulate Matter ($PM_{2.5}$)

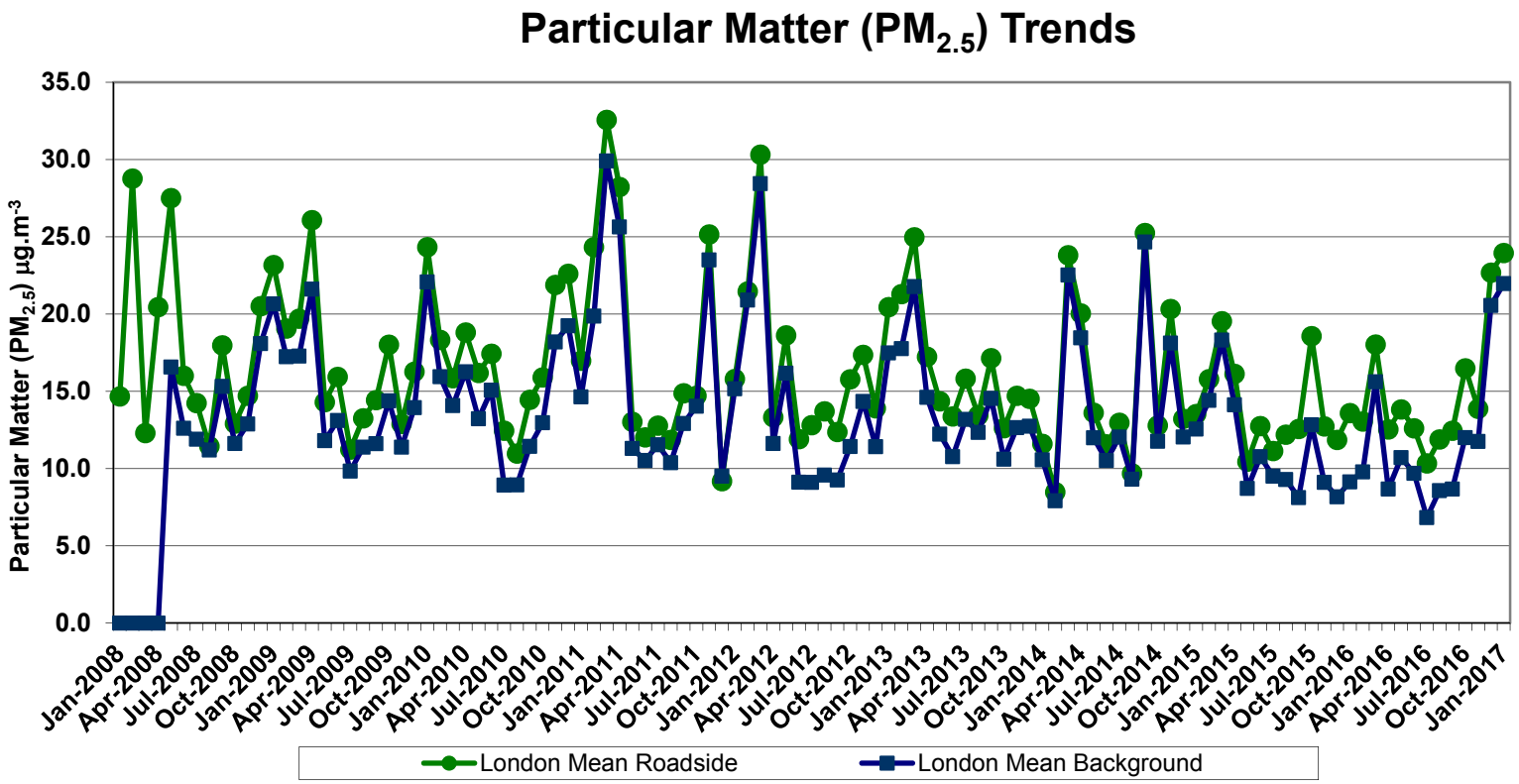

Figure 5 **Trends of the Monthly Mean Particulate Matter ($PM_{2.5}$) Concentrations at Roadside and Background Sites in the London Area**

(Source GLA accessed at http://data.london.gov.uk/dataset/london-average-air-quality-levels

Southwark does not monitor for $PM_{2.5}$ in the Borough. Figure 5 shows the concentrations of all the $PM_{2.5}$ roadside and background monitors in the London Air Quality Network. There is a slow downward trend of the concentrations.

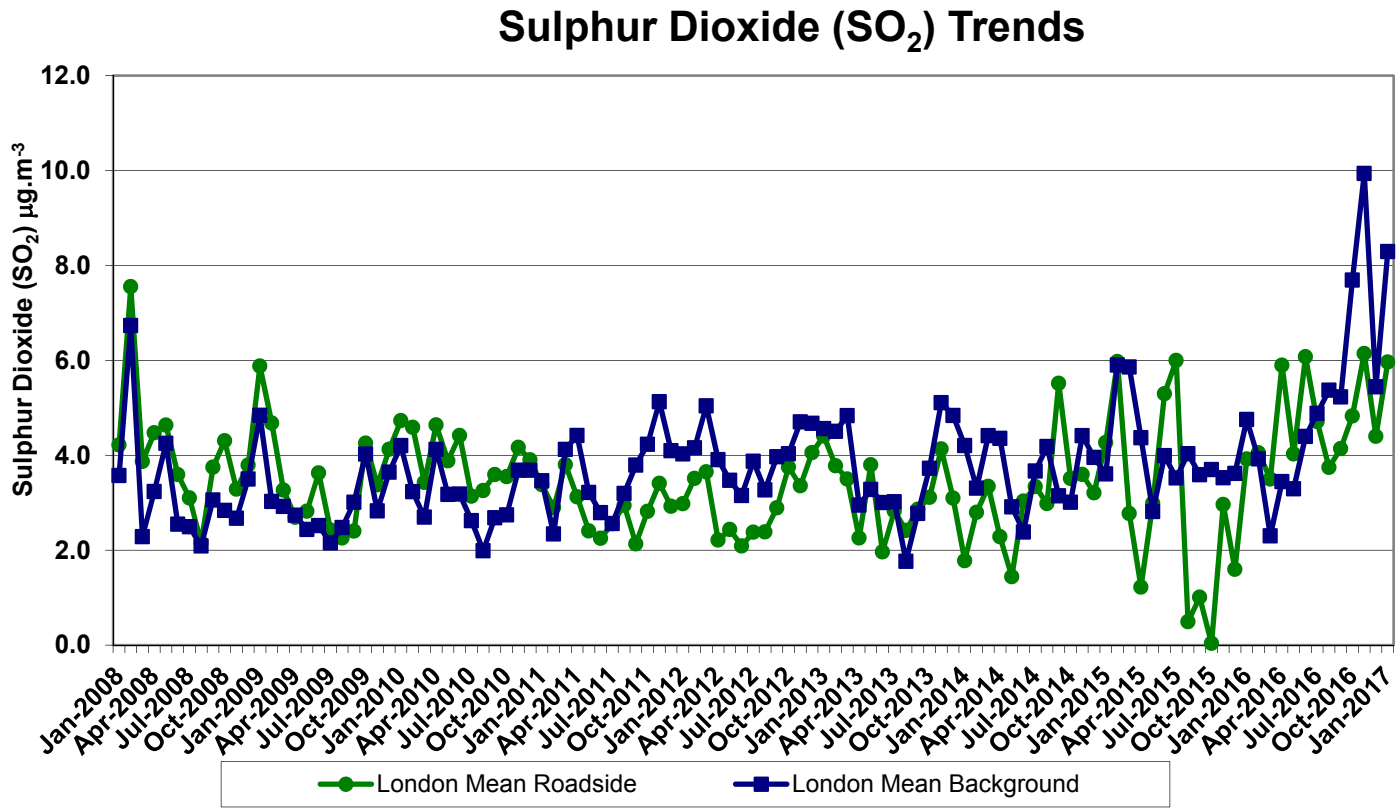

Figure 6 **Trends of the Monthly Mean Sulphur Dioxide (SO_2) Concentrations at Roadside and Background Sites in the London Area**
(Source GLA accessed at http://data.london.gov.uk/dataset/london-average-air-quality-levels)

Southwark does not monitor for SO_2 in the Borough. Figure 6 shows the concentrations of all the SO_2 roadside and background monitors in the London Air Quality Network. The concentrations are well below the various objective limits. The 24 hour mean objective not to be exceeded more than 3 times a year is 125µg.m^{-3}.

2. Actions to Improve Air Quality

2.1 Air Quality Action Plan 2012-2017 Progress

Table I **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	Action plan approved by members. Cleaner Air Borough status achieved
	1.b	Provided an up-to-date Air Quality Action Plan (AQAP), fully incorporated into LIP funding and core strategies.	Y	The Authority's current AQAP is available online at http://www.southwark.gov.uk/air-quality/strategies-plans-and-reports Air quality considerations have been incorporated into LIP process through the Transport Plan and Public Health Framework Objectives
2. Taking action	**2.a**	Taken decisive action to address air pollution, especially where there is human exposure and vulnerability is highest (e.g. schools, older people, hospitals etc.).	Y	The Environmental Protection Team is working with the Public Health Team and Children and Adults Services to provide an air quality alert cascade process to inform carers & those responsible of vulnerable persons of poor air quality episodes. Initial resistance to introduction of an alert cascade from medics delayed implementation. The alert cascade will go live later this year The Clean Air 4 Schools Program has been delivered in 12 schools Local air quality has been made a local public health priority in Southwark The council worked with two LSE M.Sc. students to calculate the

Theme	Criteria		Achieved (Y/N)	Evidence
				cost of the air pollution burden in the Borough
	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.	Y	The Authority is participating with other south London authorities in the Low Emission Logistics project to assess the feasibility of a consolidation centre The Authority was unable to use the RE:FIT framework, due to the size of the contracts, however, the Authority is proceeding using capital funding to introduce energy saving devices/ methods to public buildings The Community Wardens have participated in Vehicle Idling Action events in the Borough. Work has commenced to engage civil enforcement (parking) officers
	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	The Authority has developed a Kerbside Strategy based on the principles of TfL's Healthy Street document Several cycle quiet-ways and cycling parking projects are being implemented in the Borough Several traffic management projects have been implemented in Camberwell, Kennington and Dulwich to improve the public realm for pedestrians
	2.d	Made additional resources available to improve local air quality, including by pooling its collective resources (s106 funding, LIPs, parking revenue, etc.).	Y	Funding for the monitoring of the impact of the Tower Bridge closure was obtained from parking revenues. A School Street Project is being implemented using highway resources
3. Leading by example	**3.a**	Invested sufficient resources to compliment and drive action from others.	Y	In the Borough there is ½ FTE Air Quality officer. There is no specific budget for air quality as it is incorporated in the Environmental Protection Team budget
	3.b	Maintained an appropriate monitoring network so that air quality impacts within the borough can be properly understood	Y	The Authority has 2 continuous air quality monitoring stations, which are regularly calibrated by LSO from King's College London and maintained by Enviro-Technology. These stations are supplemented with an increased network of 86 NO_2 diffusion tubes monitoring sites spatially distributed across the Borough
	3.c	Reduced emissions from council operations, including from buildings, vehicles and all activities.	Y	The Authority continues to reduce the number of operational buildings. The lease fleet is being procured at present, the different department fleet users were surveyed to establish the operational requirements of the users and all fleets have been advised of the need to move away from diesel as much as is partical and this work is progressing as contracts are renewed

Theme	Criteria		Achieved (Y/N)	Evidence
	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	There is a programme to reduce the energy in all the local authority buildings, with regular staff campaigns to "switch off". All commercial vehicles are procured to undergo full sustainability evaluation to determine suitably of low or no emission vehicles. The Authority is participating in the MAQF Low Emission Logistics project with a view to have a freight consolidation solution for deliveries
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 major and strategic planning applications have been reviewed to ensure that the Mayor's policies are being implemented in all relevant new developments in the Borough
	4.b	Collect s106 from new developments to ensure air quality neutral development where possible.	N	No funding has been achieved through this process at present.
	4.c	Provided additional enforcement of construction and demolition guidance, with regular checks on medium and high risk building sites.	Y	The environmental enforcement and emission control of construction is undertaken via the planning process,. We ensure all strategic and major developments have suitable Construction Management Environment Management Plans and all construction sites reported to be causing an environmental problem are investigated. NRMM requirements have been transposed into the Authority's new Technical Guidance for Construction & Demolition and state that compliance with NRMM must be included in site Construction Environmental Management Plans
5. Integrating air quality into the public health system	**5**	Included air quality in the borough's Health and Well-being Strategy and/or the Joint Strategic Needs Assessment.	Y	Air quality reports have been presented to the Health and Well-being Board Local air quality is now a Southwark Public Health priority. Work has commenced to include air quality in the Authority's JSNA.
6. Informing the public	**6.a**	Raise awareness about air quality locally.	Y	The council website has been revised and has new air quality webpages. They went live in Autumn 2016. AirText continues to be promoted through social media and via responses to any query regarding local air quality. The Authority completed a four week media campaign in Autumn 2016 (#do one thing for air quality) with an article in Southwark Life, adverts in Southwark News, street advertising (bus shelters & phone boxes) and on-line advertising. The authority has placed 70 anti-idling railing banners across the

Theme	Criteria		Achieved (Y/N)	Evidence
				borough. 30 at primary schools and at 40 roadside locations.

2.1 Air Quality Action Plan Progress

Table J provides a brief summary of progress against the Air Quality Action Plan, showing progress made this year. New projects which commenced in 2016 are shown at the bottom of the table

Table J Delivery of Air Quality Action Plan Measures

No.	Measure	Action	Progress	Further information
1	Encouragement to use car clubs	Southwark will continue to encourage the use of the car club schemes, monitor and report on uptake and allocate additional spaces should demand warrant	The number of members at the end of 2016 was 9584 in the borough, with 125 car club spaces utilised. No emission savings has been calculated for this measure. A London wide survey of car club members report has stated that a third of round-trip car club members reported that they would have bought a private car if they had not joined a car club meaning a deferred purchase of a further 54,400 cars, or 22 cars for each car club vehicle. Adding in the impact of deferred purchase by flexible car club members, the number of deferred vehicle purchases Londonwide is almost 58,000 cars.	In 2015 the number of car club members was 8364. There has been no increase in car club spaces in the Borough in 2016.
2	Encouraging the use of sustainable travel choices	Southwark will continue to implement, evaluate and publicise progress of measures to encourage sustainable travel choices, within the borough.	The Authority ran a media campaign during the summer and autumn of 2016 to promote cycling and walking in the Borough. The Borough is investing over £30m in cycling over 5 years and including the delivery of the new north-south cycle route, the Southwark Spine, to	

No.	Measure	Action	Progress	Further information
			complement Quietway cycling routes and link to the new north-south Cycle Superhighway on Blackfriars Road. The council is also working towards making Southwark an Age Friendly Borough, enabling older people to access a broad range of affordable and accessible transport options to get around the borough easily	
3	The improvement of air quality in the vicinity of schools.	Southwark will investigate funding opportunities to pilot a scheme to identify and implement local air quality improvements near to schools and publicise the results.	The authority has not been successful to obtain air quality grants to implement further local air quality improvements near schools. However, will implement a "School Streets Programme" in 2017. 30 anti-idling banners (designed by a primary school) have been placed on primary school railings We delivered the GLA Clean Air 4 Schools toolkit in 6 Primary Schools and developed and delivered a toolkit at 5 secondary schools.	
4	Enforcement of engine idling provisions	Southwark investigated the potential to undertake enforcement on idling engines at hotspots within the borough.	The authority is participating in the "Vehicle Idling Action" project with 11 other London authorities and has held 5 vehicle idling awareness events with more planned as the project has been extended	The Authority is progressing the authorisation of vehicle idling enforcement officers.
5	Air quality assessment of highway schemes	Southwark will undertake air quality assessments on all major highway traffic management schemes and initiatives and road safety schemes and initiatives > £1m in value	No assessment has been passed to the Environmental Protection Team for consideration in 2016.	

No.	Measure	Action	Progress	Further information
6	Eco driver training for Southwark staff.	Southwark will deliver 'in house' smarter driver training to all employees that take the council's internal driving test and investigate how to extend this out to all staff who are required to drive for work purposes.	Smarter driver techniques are included in staff driver training.	The authority is exploring the option to install telematics in the new fleet of vehicles to gather data in respect of driver emissions & driving style.
7	Emission strategy for vehicles and plant	Southwark will develop an emissions strategy for all new council and council contractors' vehicles and plant.	The Fleet Services have been surveying the fleet users to establish the types of vehicles that are required for operational use, to lease alternative fuelled or petrol versions of the vehicles and whether the vehicles can be shared or reduce the number of vehicles in the overall fleet.	
8	Establishment of a central London ULEZ	Southwark will work with partner boroughs in the Central London Air Quality Cluster Group and the GLA to establish a Central London Ultra Low Emission Zone.	The borough has worked with other boroughs in respect of the Ultra-Low Emission Zone, and is supporting the Mayor of London proposals to extend the ULEZ boundary to the North and South Circular road, with a view to extend it to the M25 in the longer term.	
9	Energy efficiency measures in authority buildings.	Southwark will continue its implementation of energy efficiency measures in council owned buildings.	The Carbon Schools programme was completed in April 2016 with a carbon saving of 902 tonnes CO_2 per annum.	During 2016 the authority has been devising a project to reduce CO_2 emission from non-school operational buildings, delivery of these projects will be during 2017
10	The local air quality impact of on-site generation.	Southwark will ensure that local energy generation plant will be fitted with suitable abatement and dispersal technologies, and encourage non-polluting renewable generation	All energy generation plant planning applications received by the Authority have assessed to ensure that abatement meets the Mayor's SPG limits and dispersal of fumes is satisfactory	
11	Regulation of industrial processes	Southwark will continue to regulate Part B Processes to	No new processes opened within the Borough this year. Several premises	Considerable investment was put into the Council operated

No.	Measure	Action	Progress	Further information
		ensure that high standards of air pollution control are maintained.	have closed. The inspection programme for 2016 has been completed successfully and all permits are fully up to date	crematorium in 2016 to ensure its emissions are future proofed
12	Air quality and construction	Southwark will require developers to adopt measures included in the Best Practice Guidance on construction and demolition within their Environmental Construction Management Plans (ECMP).	The Environmental Protection Team has assessed all submitted ECMP planning conditions. This includes the London Plan requirements for compliance with NRMM standards	The environmental standards for construction and demolition have been reviewed in 2016 and included in Technical guidance for developers
13	Travel Plan Monitoring	Southwark will monitor all travel plans for compliance received as part of the planning process and take enforcement action where appropriate.	The only travel plans monitored are the school travel plans. 59 schools have an accredited travel plan and 80 schools updated their existing plans.	As of 31st December 2015 45 schools had an accredited travel plan and 68 schools had updated their existing plans.
14	Air quality assessments for developments	Southwark will require developers to submit air quality assessments for all major applications within the Air Quality Management Area and any other development that may have an adverse impact on Air Quality.	During 2016 97 air quality assessments were recorded on the Authority's Planning Register. All were assessed by the Environmental Protection Team	During 2015 92 air quality assessments were assessed by the Environmental Protection Team
15	Information in connection with air quality in the Borough.	Southwark will gather an evidence base to determine present and future concentrations within the borough; this information will be made available to developers and their consultants when needed to conduct air quality assessments.	The Authority's new air quality web pages contain all submitted air quality reports on one page. Links to the London Air Quality Network are included	
16	Air quality and local development policies	Southwark will develop policies within emerging Local Development policies and plans that will require new development to reduce PM_{10} and NO_X emissions when compared to	The Environmental Protection Team are having on-going discussions with planners. A specific policy is proposed for inclusion in the New Southwark Plan (DM60) in respect of air quality	There are further meetings to be held in respect of air quality interventions for the Old Kent Road Area Action Plan and revised Sustainable Design and

No.	Measure	Action	Progress	Further information
		previous site uses.		Construction SPD
17	Promotion of AirText in the Borough	Southwark will continue to promote the AirText service at events and with schools and will support other events relevant to air quality	There are 298 AirText participators in the borough. Between November 2015 and January 2017 there were 28 evening alerts and 33 morning alerts. During this period 2207 emails, 3336 SMS's and 679 voicemails were sent to Southwark subscribers.	There were 265 participators in the borough in October 2015, thus an increase of 33 over the year
18	Air Quality Information	Southwark will provide up to date information on air quality via its website and will respond to and engage with residents to support community efforts to raise awareness and change behaviour	The revised air quality section of the Southwark website went live in Autumn 2017, there is a link to the London Air Quality Network and Southwark's air quality reports are on the top row of the index page. The new air quality web pages were launched with a publicity campaign. This campaign resulted in a very substantial increase in the number of views of the pages	The number of new visitors has reduced with time but further air quality promotions form part of the new air quality action plan and will signpost the web based information repeatedly over 2017
19	Monitoring of air quality in the Borough	Southwark will maintain the operation of two automatic monitoring stations at the Elephant and Castle and Old Kent Road and supplement this with a diffusion tube survey to provide a more comprehensive survey of air quality in the borough.	The Authority operates and maintain two automatic monitoring stations at the Elephant & Castle and Old Kent Road, all the contracts have just been reviewed. The number of diffusion tubes has been increased to 86. This includes those installed to evaluate air quality improvement projects Data from air quality monitoring is reported in section 1.2 and Appendix B of this report.	2015 we had 46 diffusion tubes in the Borough

No.	Measure	Action	Progress	Further information
20	Tree Management Strategy	Southwark will pursue its Tree Management Strategy and investigate opportunities to work together with the Mayor on the commitment to plant new trees in priority locations in accordance with the 'right tree right place' methodology, taking into suitable account the benefits and costs of street trees on air quality	67 street trees were replaced. 276 new trees have been planted. 355 trees have been felled. Reasons for felling include public safety, insurance requirements, dead, diseased or dying and because the tree has become structurally dangerous.	The latest data available shows that in 2013 Southwark Council was responsible for the direct management, maintenance and care of 57,000 trees out of a total of 90,000 in the borough. This was/is divided between several service areas: Housing Estates 17,000 Parks & Open Spaces 22,000 Highways 15,000 Schools 3,000

3. Planning Update and Other New Sources of Emissions

Table K. Planning requirements met by planning applications in Southwark in 2016

Condition	Number
Number of planning applications reviewed for air quality impacts	97
Number of planning applications required to monitor for construction dust	15
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	6
Number of AQ Neutral building and/or transport assessments undertaken	10 [4]
Number of AQ Neutral building and/or transport assessments not meeting the benchmark and so required to include additional mitigation	4
Number of planning applications with S106 agreements including other requirements to improve air quality	4
Number of planning applications with CIL payments that include a contribution to improve air quality	0
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.	15 conditions included 10 registered 5 sites not registered - to be chased
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.	13 conditions included 4 registered 9 not registered - to be chased

This table is a reflection of the best data available, several discrepencies were found in the system, these have been identified and will be improved for the next Annual Status Report. Several sites have approved Construction Management Plans, but have not commenced site operations.

[4] This number relates to approved applications only

3.1 New or significantly changed industrial or other sources

There were no new or significantly changed industrial, or other sources, within the borough in 2016.

The energy plant at the Elephant Park is under construction and is scheduled to be completed in 2017. This plant will consist of 24 boilers and 2 CHPs.

Another large energy plant has been proposed as part of the London College of Communication redevelopment but is still at the planning stage.

Since the last review the only significant changes to the Borough's road layout have been due to TfL projects. These are:

- The completion of works involving the removal of the north roundabout and changes to the road layout at Elephant & Castle
- The completion of the Cycle Superhighway from Elephant & Castle to St Georges Circus and onward to Blackfriars Bridge

Appendix A Details of Monitoring Site QA/QC

A.1 Automatic Monitoring Sites

The authority is a member of the London Air Quality Network and all the data is ratified in accordance with Kings College London QA/QC procedures for the network.

The authority has out-sourced the Local Site operator role to King's College London who are contracted to calibrate the all the analysers in the two monitoring stations fortnightly.

A.2 Diffusion Tube Quality Assurance / Quality Control

Diffusion Tube Bias Adjustment Factors

The Authority incorporates two local co-location diffusion tube studies, by exposing triplicate tubes at the two air quality monitoring sites in the borough at the Elephant & Castle (Urban Background) and on the Old Kent Road (Roadside). The Authority then uses the Local Air Quality Management Helpdesk spreadsheets to calculate the bias factors, which are included in the results presented in section 1.2 of this report.

QA/QC of Diffusion Tube Monitoring

The Authority has appointed Gradko International Ltd to provide and analyse the Nitrogen Dioxide diffusion tubes. The laboratory supplies the Authority 20% TEA in water diffusion tubes. The laboratory has confirmed to the authority that it follows the procedures set out in the Practical Guidance. On the next page are the results for Gradko International from the WASP proficiency testing scheme (Table L) and the new Air Proficiency Testing (AIR PT) scheme (Table M). The Didcot Laboratory of Environmental Services

Group and Gradko International submit two sets of results, whereas the other laboratories in the scheme only submit one set of results.

The AIR PT scheme has up 38 regular different samples and 3 different trial standards for the analytic laboratories to analysed. LGC Ltd has a programme to send out different combinations of the 41 samples in six rounds throughout the year. (The trail samples were only available for one round only.) Sample 11 contains 4x dynamically loaded Palmes type diffusion tubes. For the 2016 – 2017 financial year, sample 11 is available for rounds AR 019, 021, 022 and 024.

The summary of the tube precision from the national database for Gradko International is detailed on page 39 in Table N

Table L **Performance of Gradko Laboratory using the Rolling Performance Scheme for WASP Rounds 79 – 109**[5]

	Rounds	Performance on basis of RPI, OLD CRITERIA, best 4 out of the 5 rounds	Performance on basis of RPI, NEW CRITERIA, best 4 out of the 5 rounds
April 2007 – April 2008	97 - 101	Good	Good
July 2007 – July 2008	98 - 102	Good	Good
October 2007 – October	99 - 103	Good	Good
January 2008 – January	100 -104	Good	Good
April 2008 – April 2009	101 - 105	Good	Good
July 2008 – July 2009	102 - 106	Good	Good
October 2008 – October	103 - 107	Good	Good
January 2009 – January	104 - 108	Good	Good
April 2009 – April 2010	105 - 109	Good	Good

[5] Scheme in operation until April 2010

Table M **Performance of Gradko Laboratory using the New Performance Scheme for WASP Rounds 105 – 124[6] and AIR NO_2 PT rounds AR001, to AR016.**

WASP Round	WASP R105	WASP R106	WASP R107	WASP R108	WASP R109	WASP R110	WASP R111	WASP R112	WASP R113	WASP R114	WASP R115
Round conducted in the period	Apr. – Jun. 2009	Jul. – Sept. 2009	Oct. – Dec. 2009	Jan. – Mar. 2010	Apr – Jun 2010	Jul – Sept. 2010	Oct. – Dec. 2010	Jan. – Mar. 2011	Apr – Jun 2011	Jul. – Sept. 2011	Oct. – Dec. 2011
Gradko International	100%	100%	100%	100%	87.5%	100%	100%	100%	100%	100%	37.5%
WASP Round	WASP R116	WASP R117	WASP R118	WASP R119	WASP R120	WASP R121	WASP R122	WASP R123	WASP R124	AIR PT AR001	AIR PT AR003
Round conducted in the period	Jan. – Mar. 2012	Apr. – Jun. 2012	Jul. – Sept. 2012	Oct. – Dec. 2012	Jan. – Mar. 2013	Apr. – Jun. 2013	Jul. – Sept. 2013	Oct. – Dec. 2013	Jan. – Mar. 2014	Apr. – May 2014	Jul – Aug. 2014
Gradko International	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
WASP Round	AIR PT AR004	AIR PT AR006	AIR PT AR007	AIR PT AR009	AIR PT AR010	AIR PT AR012	AIR PT AR013	AIR PT AR015	AIR PT AR016	AIR PT AR019	AIR PT AR021
Round conducted in the period	Oct. – Nov. 2014	Jan. – Feb. 2015	April – May 2015	Jul – Aug 2015	Oct – Nov 2015	Jan – Feb 2016	Apr – May 2016	Jul – Aug 2016	Sept.– Oct. 2016		
Gradko International	100%	100%	100%	100%	100%	100%	100%	100%	100%		

[6] WASP Scheme in operation from April 2010 with backdated results)

Table N **Laboratory summary performance April 2009 – September 2016**

Summary of Precision Results for the National Nitrogen Dioxide Diffusion Tube Collocation Studies, for Gradko Laboratory (20% TEA in Water)

2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	P	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	P	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	P	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	P	2011	G	2012	G	2013	G	2014	G	2015	G
2008	P	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	P	2010	P	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	P	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	G	2009	P	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
2008	P	2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
		2009	G	2010	G	2011	G	2012	G	2013	G	2014	G	2015	G
		2009	G	2010	G	2011	G	2012	G	2013	G			2015	G
		2009	G	2010	G	2011	G	2012	G	2013	G			2015	G
		2009	G	2010	G	2011	G	2013	G	2013	G			2015	G
		2009	G	2010	P	2011	G	2012	G	2013	G			2015	G
		2009	G	2010	G	2011	G	2012	G	2013	G			2015	G
		2009	G	2010	G	2011	G	2012	G	2013	G			2015	G
		2009	G	2010	G	2011	G	2012	G	2013	G			2015	G
		2009	G	2010	G	2011	G	2012	G	2013	G			2015	G
		2009	G	2010	G	2011	G	2012	G	2013	G			2015	P
				2010	G	2011	G	2012	G	2013	G				
				2010	G	2011	G	2012	G	2013	G				
				2010	G	2011	G	2012	P	2013	G				
				2010	G	2011	G	2012	P	2013	G				
				2010	G	2011	G			2013	P				
P	Poor Precision			2010	G	2011	G			2013	P				
				2010	G	2011	G								
G	Good precision					2011	P								
						2011	P								

Table O Short-Term to Long-Term Monitoring Data Adjustment

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2016 % [b]	Annual Mean NO_2						
			Sept	Oct	Nov	Dec	Annual mean – raw data	R_a	Annualisation data
SDT 61	100.00	33.33	47.53	48.24	62.25	49.66	51.92	1.000167935	51.929
SDT 62	100.00	33.33	84.36	76.30	78.34	59.50	74.63	1.000167935	74.638
SDT 63	100.00	33.33	120.56	113.37	120.97	87.89	110.70	1.000167935	110.716
SDT 64	100.00	33.33	69.63	70.29	77.10	58.70	68.93	1.000167935	68.942
SDT 65	100.00	33.33	74.03	84.71	72.66	56.97	72.09	1.000167935	72.105
SDT 66	100.00	33.33	39.01	54.02	55.21	45.79	48.51	1.000167935	48.516
SDT 67	75.00	25.00	68.39	77.63	83.19		76.40	1.014950883	77.546
SDT 68	100.00	33.33	82.55	58.51	76.67	86.18	75.98	1.000167935	75.990
SDT 69	75.00	25.00	98.53		102.82	122.76	108.04	0.989784353	106.933
SDT 70	100.00	33.33	54.32	56.07	72.06	68.07	62.63	1.000167935	62.641
SDT 71	75.00	25.00	102.91	78.7	11.0.3	118.57	100.06	1.000167935	102.637
SDT 72	75.00	25.00		74.42	123.84	134.48	110.91	0.930260036	103.1782
SDT 73	100.00	33.33	48.37	49.68	64.38	67.71	57.54	1.000167935	57.545
SDT 74	100.00	33.33	74.31	59.74	69.66	67.59	67.83	1.000167935	67.836
SDT 75	100.00	33.33	56.84	72.65	79.68	85.09	73.57	1.000167935	73.577
SDT 76	100.00	33.33	68.54	68.12	76.63	71.72	71.25	1.000167935	71.265
SDT 77	100.00	33.33	68.5	68.42	24.57	79.95	60.36	1.000167935	60.370
SDT 78	100.00	33.33	57.67	72.99	80.14	86.3	74.28	1.000167935	74.287
SDT 79	100.00	33.33	73.29	67.31	84.82	83.6	77.26	1.000167935	77.268
SDT 80	100.00	33.33	93.48	71.66	91.6	88.66	86.35	1.000167935	86.365
SDT 81	100.00	33.33	122.75	98.49	132.22	122.14	118.90	1.000167935	118.920
SDT 82	100.00	33.33		96.07	109.68	108.10	104.62	0.930260036	97.321
SDT 83	100.00	33.33	95.61	90.50	95.05	94.39	93.89	1.000167935	93.903
SDT 84	100.00	33.33	83.57	74.63	82.10	93.07	83.34	1.000167935	83.357
SDT 85	100.00	33.33	75.77	64.43	70.06	71.39	70.41	1.000167935	70.424
SDT86	100.00	33.33	71.29	58.55	81.46	71.93	70.81	1.000167935	70.819

Data Adjustment

The monitoring of the closure of Tower Bridge during the Autumn 2016, has resulted in data with a valid data capture of 33.33%. The Table O on page 40 shows the raw data, the annual mean raw data and ratio value RA of the annual mean to the period mean. The methodlogy used to calculate the ratio value RA is found in Box 4.9 of the LLAQM TG(16)[7]. The annual data was calculated from the Old Kent Road air quality monitoring site.

The Old Kent Road mean value for the period of tube exposure January to August was 52.35$\mu g.m^{-3}$, September tube exposure period was 40.40$\mu g.m^{-3}$, October tube exposure period was 50.66$\mu g.m^{-3}$, November tube exposure period was 57.13$\mu g.m^{-3}$ and december tube exposure period was 61.04$\mu g.m^{-3}$. After the annualisation data has been obtained the values were then factored by the bias value.

Distance Adjustment

The results of the long term diffusion tube monitoring in the borough is shown in Table F. The concentration data for the the various years and location has been calculated using the distance calculator available from the LAQM Support website[8].

[7] London Local Air Quality Management Technical Guidance 2016 (LLAQM.TG (16)) accessed at https://www.london.gov.uk/what-we-do/environment/pollution-and-air-quality/working-london-boroughs

[8] https://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html

Appendix B Full Monthly Diffusion Tube Results for 2016

Table P **NO_2 Diffusion Tube Results**

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2016 % [b]	Annual Mean NO_2													
			Jan	Feb	March	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual mean – raw data	Annual mean – bias adjusted
SDT 1	100	100	52.62	59.27	55.09	53.05	63.37	56.72	40.52	46.32	50.33	65.43	67.80	56.88	55.62	**48.39**
SDT 2	100	100	49.59	59.08	59.67	46.17	63.02	57.24	40.15	39.82	50.44	62.26	62.63	65.27	54.61	**47.51**
SDT 3	100	100	53.34	56.52	55.64	56.71	61.64	55.46	40.31	40.21	48.23	67.39	68.31	53.85	54.80	**47.68**
SDT 4	100	100	75.12	69.41	68.20	73.03	84.15	77.10	66.39	59.29	70.16	71.49	72.43	82.59	72.45	**63.03**
SDT 5	100	100	51.25	49.02	35.19	37.80	39.03	36.25	33.40	32.75	40.96	42.00	54.18	54.46	42.19	36.71
SDT 6	100	100	84.14	73.64	76.38	55.50	82.73	80.24	74.84	64.46	83.25	81.54	90.84	71.40	76.58	**66.62**
SDT 7	91.67	91.67	57.84	62.00	59.48	41.60	63.25	61.74	44.93	38.24	63.63	69.10	69.06		57.35	**49.89**
SDT 8	100	100	47.82	49.46	42.13	40.94	40.56	37.75	27.48	25.21	34.72	46.02	58.75	51.98	41.90	36.45
SDT 9	100	100	57.98	68.72	68.04	64.66	68.63	64.61	54.82	50.83	63.83	68.80	69.36	64.72	63.75	**55.46**
SDT 10	100	100	43.06	48.19	46.49	42.22	45.00	23.61	28.98	22.72	37.73	42.49	50.73	45.54	39.73	34.57
SDT 11	66.67	66.67	67.32			97.08		88.88	68.84	71.74	81.93	85.54	90.30		81.45	**70.86**
SDT 12	75	75	65.96		59.58	55.18	64.09	60.80		37.23	46.88		65.29	68.66	58.19	**50.63**
SDT 13	91.67	91.67	59.84	64.00	54.99	57.81	62.49	53.88		35.69	43.16	54.14	58.58	67.98	55.69	**48.45**
SDT 14	81.33	81.33	67.23	79.00	64.80	51.07	65.01			25.44	49.38	53.97	72.64	70.35	59.89	**52.10**
SDT 15	83.33	83.33		94.01	183.91		73.19	61.58	59.45	48.88	67.88	71.83	86.34	87.45	83.45	**72.60**
SDT 17	100.00	100.00	80.20	74.22	59.27	69.66	55.85	55.68	52.62	44.80	61.90	51.41	66.80	71.74	62.01	**53.95**
SDT 18	91.67	91.67	99.22	92.66	85.56	95.23	89.47	81.41	86.93	98.53		51.88	68.31	75.89	84.10	**73.17**
SDT 19	91.67	91.67	68.92	67.25		65.81	61.10	58.74	60.81	51.01	95.54	137.54	65.86	71.47	73.10	**63.60**
SDT 20	100.00	100.00	74.19	87.19	75.25	84.13	80.65	83.12	73.44	68.20	84.18	59.88	66.26	67.43	75.33	**65.54**
SDT 21	83.33	83.33	69.78	68.93	77.31	65.33	68.97		56.47	53.30	64.19		68.24	69.88	66.24	**57.63**

Site ID	Valid data capture for monitoring period % a	Valid data capture 2016 % b	Annual Mean NO2													
			Jan	Feb	March	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annual mean – raw data	Annual mean – bias adjusted
SDT 22	100.00	100.00	81.94	82.93	63.16	91.64	96.03	93.73	78.00	70.77	94.85	58.41	68.52	70.94	79.24	**68.94**
SDT 23	100.00	100.00	50.12	54.01	46.26	48.09	52.13	46.39	34.67	34.51	45.27	47.72	61.13	64.16	48.71	**42.38**
SDT 24	91.67	91.67	103.23		75.48	95.04	101.28	99.83	121.72	96.68	121.86	66.79	77.71	93.79	95.76	**83.31**
SDT 25	83.33	83.33	71.53	65.01		60.12	62.28	61.85		50.09	71.40	67.11	69.40	80.55	65.93	**57.36**
SDT 26	100.00	100.00	64.63	67.86	62.61	60.39	63.60	67.18	59.88	51.17	70.75	55.37	71.61	75.23	64.19	**55.85**
SDT 27	91.67	91.67		73.30	67.91	72.69	84.43	80.81	71.21	66.34	85.78	65.22	70.29	78.73	74.25	**64.60**
SDT 28	83.33	83.33	58.39	53.50	45.85	46.61	41.73	39.58	41.06			44.49	58.24	54.37	48.38	**42.09**
SDT 29	100.00	100.00	96.72	99.62	78.65	100.70	103.33	115.67	121.18	70.43	62.19	133.09	95.44	113.85	99.24	**86.34**
SDT 30	100.00	100.00	92.51	92.15	74.53	79.55	75.41	74.21	67.06	59.58	44.36	61.93	83.27	95.59	75.01	**65.26**
SDT 31	100.00	100.00	84.28	68.92	65.17	70.96	70.87	70.27	62.75	60.08	38.79	73.67	76.64	78.81	68.43	**59.53**
SDT 37	58.33	58.33		46.74			40.93	35.42	32.31	30.55	38.19	44.90			38.43	33.43
SDT 38	100.00	100.00	143.24	119.64	98.43	126.79	109.51	108.13	130.29	95.39	120.71	102.43	130.17	135.05	118.32	**102.94**
SDT 39	83.33	83.33			65.83	59.68	66.17	61.14	61.49	45.09	65.74	57.7	66.1	81.91	63.09	**54.89**
SDT 40	91.67	91.67	100.13		63.72	92.61	93.03	87.62	44.61	76.3	95.15	80.61	72.18	106.12	82.92	**72.14**
SDT 41	100.00	100.00	94.13	83.5	83.59	94.42	83.9	84.96	84.69	69.79	97.63	81.08	91.83	111.9	88.45	**76.95**
SDT 42	100.00	100.00	59.97	48.55	46.29	40.52	40.22	38.79	37.73	27.60	45.54	46.35	56.89	67.79	46.35	**40.32**
SDT48	100.00	100.00	72.02	70.67	63.08	64.20	74.06	71.26	69.01	61.16	74.24	56.84	76.61	68.07	68.44	**59.54**
SDT 49	100.00	100.00	53.29	48.14	38.80	39.45	36.73	36.53	30.11	29.16	37.08	40.98	56.44	48.54	41.27	35.90
SDT 50	100.00	100.00	38.07	93.09	49.77	73.58	49.59	43.59	34.12	32.47	43.57	47.69	57.88	48.27	50.97	**44.34**
SDT 51	91.67	91.67		39.77	33.94	29.75	28.55	25.19	20.90	22.84	28.17	34.01	45.46	46.87	32.31	28.11
SDT 52	100.00	100.00	43.06	43.90	36.39	30.89	36.19	32.99	29.42	28.96	35.63	40.80	52.09	53.95	38.69	33.66
SDT 53	100.00	100.00	27.14	41.28	26.42	33.26	31.92	42.66	23.77	30.18	27.54	35.74	44.86	41.70	33.87	29.47
SDT 54	91.67	91.67	57.70		92.57	43.12	42.68	35.35	28.92	26.96	38.75	37.71	50.26	48.47	45.68	39.74
SDT 55	100.00	100.00	62.56	54.59	40.37	45.02	50.31	11.14	41.42	35.53	46.77	43.61	61.32	66.83	46.62	**40.56**
SDT 56	100.00	100.00	49.67	45.87	40.21	31.42	35.29	31.09	23.77	25.16	29.65	39.12	46.26	58.27	37.98	33.04
SDT 57	100.00	91.67	62.85	52.47	57.51		60.61	59.83	84.69	44.58	54.69	60.09	77.96	73.16	62.59	**54.45**

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2016 % [b]	Annual Mean NO_2													
			Jan	Feb	March	Apr	May	June	Jul	Aug	Sept	Oct	Nov	Dec	Annualisation data	Annualisation mean – bias adjusted
SDT 61	100.00	33.33									47.53	48.24	62.25	49.66	51.929	**45.178**
SDT 62	100.00	33.33									84.36	76.30	78.34	59.50	74.638	**64.935**
SDT 63	100.00	33.33									120.56	113.37	120.97	87.89	110.716	**96.323**
SDT 64	100.00	33.33									69.63	70.29	77.10	58.70	68.942	**59.980**
SDT 65	100.00	33.33									74.03	84.71	72.66	56.97	72.105	**62.731**
SDT 66	100.00	33.33									39.01	54.02	55.21	45.79	48.516	**42.209**
SDT 67	75.00	25.00									68.39	77.63	83.19		77.546	**67.465**
SDT 68	100.00	33.33									82.55	58.51	76.67	86.18	75.990	**66.111**
SDT 69	75.00	25.00									98.53		102.82	122.76	106.933	**93.032**
SDT 70	100.00	33.33									54.32	56.07	72.06	68.07	62.641	**54.498**
SDT 71	75.00	25.00									102.91	78.7	11.0.3	118.57	102.637	**89.294**
SDT 72	75.00	25.00										74.42	123.84	134.48	103.1782	**89.765**
SDT 73	100.00	33.33									48.37	49.68	64.38	67.71	57.545	**50.064**
SDT 74	100.00	33.33									74.31	59.74	69.66	67.59	67.836	**59.017**
SDT 75	100.00	33.33									56.84	72.65	79.68	85.09	73.577	**64.012**
SDT 76	100.00	33.33									68.54	68.12	76.63	71.72	71.265	**62.001**
SDT 77	100.00	33.33									68.5	68.42	24.57	79.95	60.370	**52.522**
SDT 78	100.00	33.33									57.67	72.99	80.14	86.3	74.287	**64.630**
SDT 79	100.00	33.33									73.29	67.31	84.82	83.6	77.268	**67.223**
SDT 80	100.00	33.33									93.48	71.66	91.6	88.66	86.365	**75.138**
SDT 81	100.00	33.33									122.75	98.49	132.22	122.14	118.920	**103.460**
SDT 82	100.00	33.33										96.07	109.68	108.10	97.321	**84.669**
SDT 83	100.00	33.33									95.61	90.50	95.05	94.39	93.903	**81.696**
SDT 84	100.00	33.33									83.57	74.63	82.10	93.07	83.357	**72.521**
SDT 85	100.00	33.33									75.77	64.43	70.06	71.39	70.424	**61.269**
SDT86	100.00	33.33									71.29	58.55	81.46	71.93	70.819	**61.613**

Exceedances of the NO_2 annual mean AQO of 40µg.m^{-3} are shown in **bold**. Exceedences where there is potential for the hourly mean to be exceeded i.e. over 60µg.m^{-3} are in **bold** and **underlined.**

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