London Borough of Hounslow Air Quality Annual Status Report for 2015
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This report provides a detailed overview of air quality in Hounslow Council during 2015. 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 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 μg m^{-3} not to be exceeded more than 18 times a year	1-hour mean	31 Dec 2005
	40 μg m^{-3}	Annual mean	31 Dec 2005
Particles - PM_{10}	50 μg m^{-3} not to be exceeded more than 35 times a year	24-hour mean	31 Dec 2004
	40 μg m^{-3}	Annual mean	31 Dec 2004
Particles - $PM_{2.5}$	25 μg 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} mot 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

1.1 Locations

Table B. Details of Automatic Monitoring Sites for 2015

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
HS2	Cranford	510370	177195	Background	Y	*40*	*70*	*2.5*	NO_2, PM_{10}, O_3, SO_2	*Chemiluminescent; TEOM*
HS4	Chiswick	521070	178480	Roadside	Y	*9*	*6*	*2.5*	NO_2, PM_{10}	*Chemiluminescent; TEOM*
HS5	Brentford	517425	178074	Roadside	Y	9	6	2.5	NO_2, PM_{10}	*Chemiluminescent; TEOM*
HS6	Heston	513656	176843	Roadside	Y	4	4	2.0	NO_2, PM_{10}	*Chemiluminescent; TEOM*
HS7	Hatton Cross	509355	174989	Urban Background	Y	75	75	2.0	NO_2, PM_{10}	*Chemiluminescent; TEOM*
HS9	Feltham	510683	173259	Roadside	Y	4	4	2.0	NO_2, PM_{10}	*Chemiluminescent; TEOM*

HS8	Gunnersbury	519184	179369	Roadside	Y	4	4	2.0	NO_2, PM_{10}	*Chemiluminescent; TEOM*

Table C. Details of Non-Automatic Monitoring Sites for 2015

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	Tube co-located with an automatic monitor? (Y/N)
HS32	24 Adelaide Terrace	517592	178210	Roadside	Y	Y (0m)	7m	n/a	NO_2	Y
HS33	30 Surrey Crescent	519452	178314	Roadside	Y	Y (0m)	10m	n/a	NO_2	Y
HS34	Chiswick Community School	521028	177321	Intermediate	Y	Y (20m)	10m	n/a	NO_2	Y
HS35	Hogarth Primary School	521174	178069	Intermediate	Y	Y (10m)	2m	n/a	NO_2	Y
HS41	Hanworth Library	512107	172502	Roadside	Y	Y (25m)	4m	n/a	NO_2	Y
HS42	High Street, Hounslow	513986	175761	Background	Y	Y (0m)	25m	n/a	NO_2	Y
HS43	Glenhurst Road	517447	178059	Roadside	Y	Y (5m)	2m	n/a	NO_2	Y
HS51	Marjory Kinnon School	509127	174568	Roadside	Y	Y (20m)	10m	n/a	NO_2	Y
HS52	Bedfont Library	508873	173722	Roadside	Y	Y (30m)	6m	n/a	NO_2	Y
HS53	Church of the good shepherd	510986	176032	Intermediate	Y	Y (25m)	10m	n/a	NO_2	Y
HS54	Cranford lane / High St. Cranford Jct	510810	177667	Roadside	Y	Y (2m)	1m	n/a	NO_2	Y
HS55	Cranford Library	510747	176687	Roadside	Y	Y (2m)	5m	n/a	NO_2	Y
HS61	Twickenham Road	516203	175863	Roadside	Y	Y (2m)	5m	n/a	NO_2	Y
HS62	Sutton Rd & Heston Rd Jct	513630	176938	Roadside	Y	Y (1m)	5m	n/a	NO_2	Y
HS63	Lampton Road	513538	175828	Roadside	Y	Y (1m)	5m	n/a	NO_2	Y
HS64	Junction of Roseheath Road	512860	175013	Roadside	Y	Y (1m)	5m	n/a	NO_2	Y

HS65	Eastbourne Road at	511840	172745	Roadside	Y	Y (5m)	10m	n/a	NO_2	Y
HS66	Brainton Avenue	510975	173646	Roadside	Y	Y (2m)	5m	n/a	NO_2	Y
HS67	Busch Corner	516525	176846	Roadside	Y	Y (0m)	8m	n/a	NO_2	Y
HS68	Junction of Commerce Road	517282	177296	Roadside	Y	Y (0m)	1.5m	n/a	NO_2	Y
HS69	Kew Bridge	519005	178040	Roadside	Y	Y (0m)	1m	n/a	NO_2	Y
HS70	Eastbury Grove (Chiswick Lane)	521438	177980	Roadside	Y	Y (4m)	2m	n/a	NO_2	Y
HS71	Gunnersbury Avenue	519184	179369	Roadside	Y	Y (0m)	4m	n/a	NO_2	Y
HS72	Heston Crossroads	513063	177552	Roadside	Y	Y (0m)	1m	n/a	NO_2	Y
HS73	Browells Lane, Feltham	510578	172857	Roadside	Y	Y (6m)	2m	n/a	NO_2	Y
HS74	Swift Road, Hanworth	512040	171808	Roadside	Y	Y (20m)	4m	n/a	NO_2	Y
HS75	Feltham High St / Hanworth Rd Jct	510678	173247	Roadside	Y	Y (40m)	1m	n/a	NO_2	Y
HS76	Clements Court, Hounslow	511570	175015	Background	Y	Y (15m)	1m	n/a	NO_2	Y
HS77	Beaversfield Park	511990	175973	Background	Y	Y (15m)	25m	n/a	NO_2	Y
HS78	Staines / Wellington Road	512762	175310	Roadside	Y	Y (0m)	2m	n/a	NO_2	Y
HS79	Whitton Road	513384	175482	Roadside	Y	Y (10m)	1m	n/a	NO_2	Y
HS80	Hounslow East	514442	175950	Roadside	Y	Y (0m)	3m	n/a	NO_2	Y
HS81	Woodlands	515045	175934	Background	Y	Y (8m)	1m (cul de sac)	n/a	NO_2	Y
HS82	Church Street	516594	175880	Roadside	Y	Y (0m)	1m	n/a	NO_2	Y
HS83	Osterley Park	514721	177976	Background	Y	Y (0m)	500m	n/a	NO_2	Y
HS84	Apex Corner	512781	172132	Roadside	Y	Y (4m)	1m (not main road)	n/a	NO_2	Y
HS85	Hospital Road	513213	175655	Roadside	Y	Y (4m)	1m	n/a	NO_2	Y
HS86	Jolly Waggoners	510955	176567	Roadside	Y	Y (3m)	1m (not main road)	n/a	NO_2	Y
HS87A	Henleys Roundabout	511545	176430	Roadside	Y	Y (2m)	1m (not main road)	n/a	NO_2	Y
HS90 (HS87B)	The Butts (HS87B)	571539	117572	Background	Y	Y (6m)	2m	n/a	NO_2	Y
HS88	Thames path	521493	176737	Thames path	Y	Y (1m)	3m	n/a	NO_2	Y
HS89	Mogden Sewage Works Gate	515424	174719	Roadside	Y	Y (1m)	1m	n/a	NO_2	Y
BREN A	Brentford, Glenhurst Road	517425	178071	Roadside	Y	Y (10m)	3m	3m	NO_2, PM_{10}	Y

BREN B	Brentford, Glenhurst Road	517425	178071	Roadside	Y	Y (10m)	3m	3m	NO_2, PM_{10}	Y
BREN C	Brentford, Glenhurst Road	517425	178071	Roadside	Y	Y (10m)	3m	3m	NO_2, PM_{10}	Y
CHIS A	Chiswick High Road	521085	178499	Roadside	Y	Y (0m)	2m	3m	NO_2, PM_{10}	Y
CHIS B	Chiswick High Road	521085	178499	Roadside	Y	Y (0m)	2m	3m	NO_2, PM_{10}	Y
CHIS C	Chiswick High Road	521085	178499	Roadside	Y	Y (0m)	2m	3m	NO_2, PM_{10}	Y
CRAN A	Cranford Avenue Park	510370	178198	Background	Y	Y (25m)	70m	3m	NO_2, PM_{10}	Y
CRAN B	Cranford Avenue Park	510370	178198	Background	Y	Y (25m)	70m	3m	NO_2, PM_{10}	Y
CRAN C	Cranford Avenue Park	510370	178198	Background	Y	Y (25m)	70m	3m	NO_2, PM_{10}	Y
FELT A	Feltham High St / Hanworth Rd Jct	510676	173245	Roadside	Y	Y (4m)	2m	2.5m	NO_2, PM_{10}	Y
FELT B	Feltham High St / Hanworth Rd Jct	510676	173245	Roadside	Y	Y (4m)	2m	2.5m	NO_2, PM_{10}	Y
FELT C	Feltham High St / Hanworth Rd Jct	510676	173245	Roadside	Y	Y (4m)	2m	2.5m	NO_2, PM_{10}	Y
HEST A	Heston Road	513676	176844	Roadside	Y	Y (4m)	1m	2.5m	NO_2, PM_{10}	Y
HEST B	Heston Road	513676	176844	Roadside	Y	Y (4m)	1m	2.5m	NO_2, PM_{10}	Y
HEST C	Heston Road	513676	176844	Roadside	Y	Y (4m)	1m	2.5m	NO_2, PM_{10}	Y
MYR A	Myrtle Avenue	509334	174997	Background	Y	Y (10m)	12m (cul de sac)	2.5m	NO_2, PM_{10}	Y
MYR B	Myrtle Avenue	509334	174997	Background	Y	Y (10m)	12m (cul de sac)	2.5m	NO_2, PM_{10}	Y
MYR C	Myrtle Avenue	509334	174997	Background	Y	Y (10m)	12m (cul de sac)	2.5m	NO_2, PM_{10}	Y

n/a – denotes inlet height for diffusion tubes has not been recorded, however the same for continuous monitoring stations has been recorded.

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, where appropriate, the details of which are described in Appendix A.

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

Site ID	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2015 % [b]	Annual Mean Concentration (µgm^{-3})						
				2009[c]	2010[c] BAF=0.93	2011[c] BAF=0.93	2012[c] BAF=1.02	2013[c] BAF=0.87	2014[c] BAF=0.91	2015[c] BAF=0.88
Cranford	Automatic	99.4	99.4	32	21	28	31	30.1	31.4	30.2
Chiswick	Automatic	99.2	99.2	**70**		**58**	**55.5**	**56.4**	**51.7**	**44.8**
Brentford	Automatic	97.4	97.4	**59**	**67**	**53**	**46.1**	**50.3**	**52.6**	**53.3**
Heston	Automatic	86.8	86.8	**57**	**49**	**48**	**56.3**	**50.81**	**47.7**	**40.7**
Hatton Cross	Automatic	99.6	99.6	37	38	33	31.7	37.24	31.1	29.7
Gunnersbury	Automatic	96.9	96.9				**53.7**	**56.62**	**58.4**	**53.0**
Feltham	Automatic	92.5	92.5	59	**46**	**44**	38.4	43.67	43.3	39.7
BREN	Diffusion tube	100.0	100.0	59.3	**60.1**	**51.9**	**56.1**	**58.7**	**66.3**	**62.1**
CHIS	Diffusion tube	100.0	100.0	65.5	**61.1**	**55.8**	**60.9**	**59.3**	**68**	**58.1**
CRAN	Diffusion tube	100.0	100.0	30.1	30.4	28.1	28.2	28.1	29.7	26.8
FELT	Diffusion tube	100.0	100.0		28.1	**40.3**	**42.6**	**41.6**	**45.3**	**41.7**
MYR	Diffusion tube	100.0	100.0	34.2	**41.3**	33.9	35.4	38.9	38.1	35.2
HEST	Diffusion tube	100.0	100.0	50.2	**50.1**	**48.8**	**49.3**	**50.8**	**56.3**	**49.2**
HS32	Diffusion tube	100.0	100.0	60.3	**52**	**52.8**	**55.4**	**55.9**	**63.5**	**58.8**
HS33	Diffusion tube	100.0	100.0	55.6	**57.4**	**51.5**	**54.4**	**55.6**	**61.4**	**59.4**
HS34	Diffusion tube	100.0	100.0	33.8	36.3	29.7	32.5	33.4	39.2	32.8

HS35	Diffusion tube	100.0	100.0	34.1	38.6	28.8	32	33.9	37.3	34.6
HS41	Diffusion tube	83.3	83.3	37.9	**40.4**	32.5	32.6	34.4	38.2	35.6
HS42	Diffusion tube	91.7	91.7	35.6	**46.8**	39.1	32.1	32.3	35.2	30.1
HS43	Diffusion tube	100.0	100.0	42.3	**43.1**	37.3	39.3	**43.3**	**43.9**	**41.2**
HS51	Diffusion tube	100.0	100.0	29.1	34	26.7	27.7	28.8	31.5	26.9
HS52	Diffusion tube	100.0	100.0	30.5	31.1	24.4	29	27.5	29.8	27.4
HS53	Diffusion tube	100.0	100.0	34.6	35.9	31.9	32.7	33.6	33.7	34.1
HS54	Diffusion tube	100.0	100.0	45.5	**49.4**	**44.5**	**45.5**	**42.8**	**48.6**	**48.4**
HS55	Diffusion tube	100.0	100.0	49.5	**51.7**	**40.4**	**43.8**	**45.1**	**49.6**	**44.5**
HS61	Diffusion tube	75.0	75.0	66.9	**42.6**	30	**40.2**	38.4	**41.1**	**42.4**
HS62	Diffusion tube	100.0	100.0	41.3	**42.6**	38.1	35.5	**40.3**	**43.5**	38.9
HS63	Diffusion tube	75.0	75.0	46.0	**40.7**	32.2	**44.9**	**48.6**	**52.2**	**48.3**
HS64	Diffusion tube	91.7	91.7	37.2	**40.3**	32.6	33.5	34	35.9	33.3
HS65	Diffusion tube	91.7	91.7	34.2	37.8	30.1	33.3	33.9	36.9	30.8
HS66	Diffusion tube	100.0	100.0	40.5	**46.5**	36.9	**40.8**	39.1	**48.6**	**43.3**
HS67	Diffusion tube	100.0	100.0	49.4	**61.8**	**63.5**	**66.5**	**64.7**	**74.9**	**74.2**
HS68	Diffusion tube	100.0	100.0	51.1	**49.1**	**43.3**	**43.4**	**48.8**	**51.7**	**52.1**
HS69	Diffusion tube	100.0	100.0	51.8	**52.7**	**48**	**50.7**	**58.9**	**59.2**	**60.1**
HS70	Diffusion tube	100.0	100.0	54.4	**52.3**	**51.8**	**51.1**	**54.3**	**63**	**61.9**
HS71 (Gunn)	Diffusion tube	91.7	91.7	53.6	**54.9**	**47.4**	**50.3**	**47.8**	**59**	**57.3**
HS72	Diffusion tube	91.7	91.7	47.6	**48.4**	**42.2**	**43.9**	**41.1**	**47.1**	**46.6**
HS73	Diffusion tube	100.0	100.0	33.3	37.3	33.1	34.8	31.7	36.4	33.0
HS74	Diffusion tube	100.0	100.0	40.0	36.9	37	36.6	35.7	**40.1**	37.3
HS75	Diffusion tube	100.0	100.0	44.6	**43.1**	**40.1**	**41.7**	**45**	**48.2**	**43.3**
HS76	Diffusion tube	100.0	100.0	29.8	36.3	27.3	31.8	34.7	36.7	35.7
HS77	Diffusion tube	83.3	83.3	28.2	29.1	27.6	26.4	29.2	30.4	26.9
HS78	Diffusion tube	100.0	100.0	51.7	**45.7**	**48.4**	**51.4**	**47.2**	**59.3**	**56.1**
HS79	Diffusion tube	100.0	100.0	55.3	34.9	34.7	37.9	37.8	**41.8**	35.7
HS80	Diffusion tube	66.7	66.7	48.6	**64.6**	**49.9**	**56.4**	**57.7**	**65.1**	**67.7**
HS81	Diffusion tube	100.0	100.0	26.4	30.8	26.8	25.9	29	26.9	24.8
HS82	Diffusion tube	100.0	100.0	35.6	32.4	34.5	34.2	31.9	35.2	32.5
HS83	Diffusion tube	91.7	91.7	23.3	19.5	27.9	20.4	27.8	22.4	22.0

HS84	Diffusion tube	100.0	100.0	45.9	38.4	38.4	39.6	**40.5**	**47.6**	**43.7**
HS85	Diffusion tube	100.0	100.0	48.9	**44.5**	**42.4**	**45.7**	**43.9**	**51.3**	**49.3**
HS86	Diffusion tube	100.0	100.0	46.6	**42**	**51.5**	**48**	**49.5**	**54.2**	**50.8**
HS87A	Diffusion tube	91.7	91.7	56.9	**55.9**	**46.7**	**47.2**	**50.7**	**59.1**	**56.0**
HS90 (HS87B)	Diffusion tube	100.0	100.0		–	31.8	31.1	31.5	32.7	30.1
HS88	Diffusion tube	100.0	100.0	33.1	19.9	24.1	24.7	26.4	27.3	25.4
HS89	Diffusion tube	100.0	100.0	27.6	39.5	34.8	34.9	39.3	39.7	**41.3**

Notes: Exceedance of the NO_2 annual mean AQO of 40 μgm^{-3} are shown in **bold**.

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

[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, if valid data capture is less than 75%

Following recommendations of Hounslow's Updating and Screening Report 2015, the Council has amended its existing AQMA Order to include the 1-hour objective for NO_2. At the same time however, assessment of our monitoring during 2015 shows that there were no concentration level measured at 200µg/m³, let alone exceeding of threshold limit of 18 times per year, at any of our continuous monitoring sites and this has been confirmed by annual mean concentration levels being below 60µg/m³ at those sites. Furthermore, the number of diffusion tube sites that exceeded the NO_2 annual mean EU limit value has dropped from 28 in 2014 to 25 in 2015, despite using the national bias (same as local bias) adjustment factor. Whilst the 2015 diffusion tube data suggests there are five locations that exceed threshold of 60µg/m³, two of these locations are collocated with the continuous monitoring stations at Brentford and Chiswick, with both sites measuring NO_2 concentration levels that are significantly below 60µg/m³. This leaves three remaining sites that are above 60µg/m³, two of which are just marginally above 60µg/m³, hence leaving just one site, Busch Corner, which had been recommended a detailed assessment in the 2015 USA report. Having carried out a preliminary survey at this site, we would suggest that there is no relevant public exposure (except a bus stop), where members of public are not expected to spend at least an hour. Just a single diffusion tube (HS80) recorded data capture less than 85% (8 months data), where annualisation factor, Ra (Ra=0.98), was derived in accordance with Box 7.10 of TG16, and applied to derive the annualised mean for diffusion tube HS80.

The above findings are consistent with our analysis at deeper level, which suggest that many continuous monitoring sites experienced significant reductions in NO_2 concentration level, for instance, Chiswick experienced a reduction of over 13% in NO_2 annual mean value and a reduction of almost 25% reduction in PM_{10} annual mean value; and reductions of almost 15% and 11% in NO_2 and PM_{10} concentration values respectively, at

Heston. Therefore air quality data for 2015 looks better than immediate past, however, I would stress that reductions in NO_2 and PM_{10} concentration levels at Chiswick High Road are likely to have been achieved following the implementation of SCOOT systems (enhanced traffic signal systems) and the introduction of a hybrid bus (on one of the seven routes) .

Graph showing long-term trend in NO_2 annual Mean concentration level at continuous monitoring sites

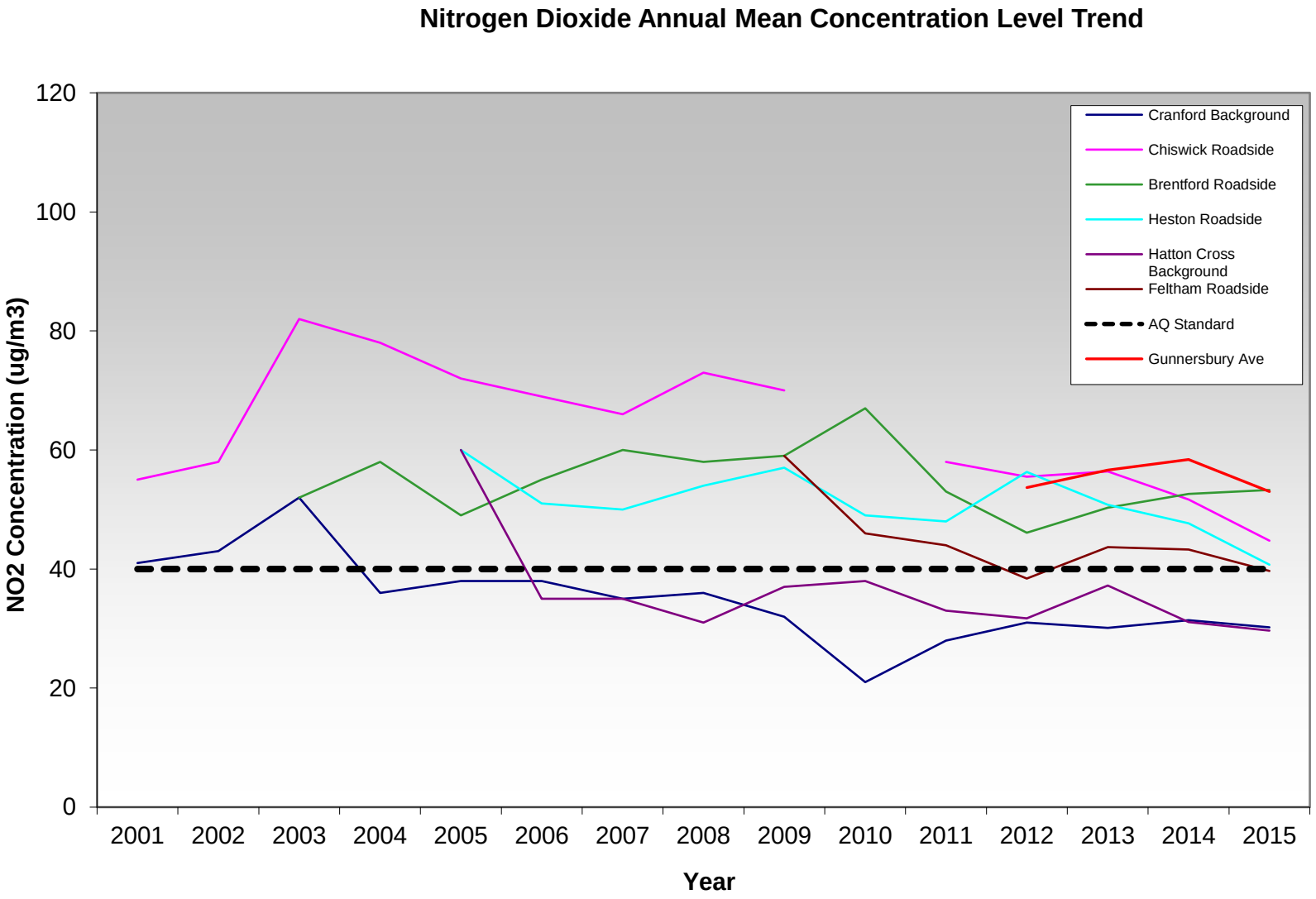


Table E. NO_2 Automatic Monitor Results: Comparison with 1-hour Mean Objective

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2015 % [b]	Number of Hourly Means > 200 µgm^{-3}						
			2009[c]	2010 [c]	2011[c]	2012 [c]	2013[c]	2014 [c]	2015 [c]
Cranford	*99.4*	*99.4*	-	0 (86)	0	0 (107)	0 (113)	0	0
Chiswick	*99.2*	*99.2*	-	-	0 (155)	0	1 (147)	0	0
Brentford	*97.4*	*97.4*	-	1 (100)	0	0	0 (140)	4	0
Heston	*86.8*	*86.8*	-	3 (153)	1	4	1	4 (168)	0 (120)
Hatton Cross	*99.6*	*99.6*	-	0 (128)	0	0 (111)	0 (131)	0	0
Gunnersbury	*96.9*	*96.9*	-	-	-	9 (191)	4	**36**	0
Feltham	*92.5*	*92.5*	-	0 (116)	0 (146)	0 (131)	17 (134)	0	0

Notes: Exceedance of the NO_2 short term AQO of 200 µgm^{-3} over the permitted 18 days per year are shown in **bold**.

[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%

As stated above, none of the continuous monitoring sites recorded NO_2 concentration level of 200µg/m³ even once during 2015, let alone exceeding the EU AQO. Though there appears to be a significant improvement in the short term AQO in Brentford, however there is little reduction in the annual mean unlike at other sites, therefore I presume there are likely to be local issues at play, including fugitive emissions from major constructions nearby and possibly a change in vehicle fleet numbers as well as make up.

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

Site ID the	Valid data capture for monitoring period % [a]	Valid data capture 2015 % [b]	Annual Mean Concentration (µgm^{-3})						
			2009[c]	2010 [c]	2011[c]	2012 [c]	2013[c]	2014 [c]	2015 [c]
Cranford	n/a	97.7	21.0	21.0	20.0	18.0	19.0	18.1	17.0
Chiswick	n/a	91.8	26.0	26.0	–	27.0	26.0	25.5	22.1
Brentford	n/a	96.2	32.0	32.0	33.0	31.0	30.0	31.9	31.1
Heston	n/a	86.2	24.0	24.0	24.0	27.0	28.0	24.5	24.9
Hatton Cross	n/a	99.2	19.0	19.0	19.0	21.0	20.0	20.4	18.1
Feltham	n/a	98.3	–	–	23.0	20.0	23.0	20.0	18.7
Gunnersbury	n/a	98.5	–	–	–	–	31.0	28.7	25.6

Notes: Exceedance of the PM_{10} annual mean AQO of 40 µgm^{-3} are shown in **bold**.

[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%

None of the continuous monitoring sites in the borough exceeded the PM_{10} annual mean AQO during 2015. In fact all the sites show marginal reduction in annual mean concentration level.

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

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2015 % [b]	Number of Daily Means > 50 µgm^{-3}						
			2009[c]	2010 [c]	2011[c]	2012 [c]	2013[c]	2014 [c]	2015 [c]
Cranford	n/a	97.7	4 (51)	1 (34)	1 29)	15 (39)	1 (19)	5	4
Chiswick	n/a	91.8	12 (57)	-	15 (49)	15 (47)	15	15	5
Brentford	n/a	96.2	20 (86)	10 (61)	35	31 (52)	28	**42**	30
Heston	n/a	86.2	10 (62)	7 (34)	31	26	9	18	10
Hatton Cross	n/a	99.2	2 (37)	1 (26)	12	8	1 (21)	6	4
Feltham	n/a	98.3	-	1 (36)	0 (30)	13	1 (22)	7	15
Gunnersbury	n/a	98.5	-	-	-	28 (54)	16	17	4

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%

It's encouraging to note that whilst the 2015 USA report had indicated that a detailed assessment should be considered in 2017 to determine if the 24-hour mean PM10 objective is likely to be exceeded at relevant locations in the area around the Brentford monitoring site, however Brentford has shown significant reduction (29%) in the number of days exhibiting daily mean values greater than 50µg/m³ in 2015 over 2014. However, this trend is being closely monitored during 2016, before we review and consider what action might be appropriate, given there is little relevant exposure.

Table I. SO_2 Automatic Monitor Results for 2015: Comparison with Objectives

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2015 % [b]	Number of: [c]		
			15-minute means > 266 µgm^{-3}	1-hour mean > 350 µgm^{-3}	24-hour mean > 125 µgm^{-3}
Cranford	99	99	0	0	0

Exceedances of the SO_2 AQOs are shown in **bold** (15-min mean = 35 allowed a year, 1-hour mean = 24 allowed a year, 24-hour mean = 3 allowed / year)

[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" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if valid data capture is less than 75%

There were no exceedances of SO_2 mean concentration level for the 1-hour and the 24-hour limits (AQO), though no tables are provided.

Benzene

Non-automatic monitoring of benzene concentrations took place at five diffusion tube sites within Hounslow. The results are summarised in table below. Only a single set of BTEX diffusion tubes, which are exposed for two weeks, were used in each month which means that the data capture for the year is very low. The recorded concentrations at each site did remain stable over the year. There have been no exceedences of the annual mean benzene objective between 2007 and 2014 (the early data are not shown here).

Table I (i) Results of Automatic Monitoring of Benzene: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2014 %[a]	Annual Mean Concentrations (µg/m3)		
				2012	2013	2014
HS BTEX 1	Roadside	Y	43	2.0	0.6	0.7
HS BTEX 2	Roadside	Y	43	1.6	0.7	0.7
HS BTEX 3	Roadside	Y	42	2.2	0.7	0.7
HS BTEX 5	Background	Y	42	2.1	0.7	0.6
HS BTEX 9	Roadside	Y	41	2.1	0.7	0.7
Objective				5		

a - data capture for the full calendar year (2 week exposure per month is equivalent to monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

2. Action to Improve Air Quality

Table J. 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	The political Leadership signed to the Clear Air Borough Agreement in 2013
	1.b	Provided an up-to-date Air Quality Action Plan (AQAP), fully incorporated into LIP funding and core strategies.	N	The existing Draft AQAP is under preparation with assistance from externally commissioned services on the due LLAQM process that needs to be followed, including engagement and consultation exercise. Outcomes of the above exercise shall be incorporated into LIP process/public health, using mechanisms to be suggested.
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.	N	There is intent to implement anti-idling campaign in schools and review and find ways on how to of school travel plans more effective.
	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	Road layout improvements and implementation of split-cycle offset optimisation technique (SCOOT) system at Chiswick High Road, using Defra funding and in conjunction with external stakeholders, TfL
	2.c	Integrated transport and air quality, including by improving traffic flows on borough roads to reduce stop/start conditions	Y	Hounslow is implementing an infrastructure project for cycle path on Hounslow Road that has been partly funded by the MAQF phase 1 grant, designed to achieve modal shift target in LIP.
	2.d	Made additional resources available to improve local air quality, including by pooling its collective resources (s106 funding, LIPs, parking revenue, etc).	Y	Public Health has committed some funding to support $PM_{2.5}$ monitoring programme, in order to improve health outcomes generally and identify areas of exposure to $PM_{2.5}$.

3. Leading by example	**3.a**	Invested sufficient resources to complement and drive action from others	Y	Hounslow Council has committed additional resource of one member of staff for air quality, climate change strategy, using Environmental/S106 funding stream.
	3.b	Maintained an appropriate monitoring network so that air quality impacts within the borough can be properly understood	Y	All existing AQ monitors stations are well maintained, including a comprehensive diffusion tube monitoring network.
	3.c	Reduced emissions from council operations, including from buildings, vehicles and all activities.	Y	Under Scope 1 and Scope 2 CO2 emission reductions from corporate buildings and street lighting, CO2 emission reductions of 11.2% (9979 tonnes in 2013/14 to 8858 tonnes in 2014/15). Data on vehicle fleet use and management is poor to derive any reductions.
	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	Though not certain about corporate procurement code adopted to reduce emissions, however Hounslow's 90% waste collection vehicle fleet will be Euro VI compliant by Nov. 2016, which is expected to deliver significant NOx reductions in NOx (anecdotal).
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	Work closely with our Planning division and use suitable planning conditions to ensure that all approved planning applications meet the Mayor's requirements relating to AQ neutral, CHPs, quantification of cumulative impacts and achieve commensurate level of protection through mitigation measures.
	4.b	Collected s106 from new developments to ensure air quality neutral development, ***where possible***	Y	Amounts agreed/collected, in conjunction with planning.
	4.c	Provided additional enforcement of construction and demolition guidance, with regular checks on medium and high risk building sites.	N	Planners occasionally visit construction sites, however it appears they are not trained to carry out enforcement of any kind. However, the Air quality Officer has approached planning to encourage sign-up to NRMM group in south west London.
5. Integrating air quality into the	**5**	Included air quality in the borough's Health and Wellbeing Strategy and/or the Joint Strategic Needs Assessment	Y	Environment Strategy (Air Quality) is engaged with Public Health, in devising suitable air quality context within the Hounslow JSNA. Further Public Health has made financial

public health system				commitment towards improving air quality by virtue of helping us monitor $PM_{2.5}$ and gather associated intelligence that can help us establish a baseline.
6. Informing the public	**6.a**	Raised awareness about air quality locally	Y	We have engaged with our local clinical commissioning group (CCG)/ Public Health to raise awareness of health impact of poor air quality, sharing airTEXT membership data and promotion thereof. We continue to raise awareness of air quality in the borough using Area Forums' meetings.

2.1 Air Quality Action Plan Progress

Table K provides a brief summary of Hounslow Council progress against the Air Quality Action Plan, showing progress made this year. New projects which commenced in 2015 are shown at the bottom of the table

Table K. Delivery of Air Quality Action Plan Measures

As the borough's existing air quality action plan (AQAP) is only a working draft and not been formally adopted, Hounslow is embarking on a path to commission external services to develop, consult and implement a suitable AQAP, in line with Defra reporting requirements. However, the existing AQAP has enabled us to implement to date the measures listed below and consequently make the following progress. Therefore, Table K will be updated once the AQAP has been revised and adopted.

Measure	Action	Progress • Emissions/Concentration data • Benefits • Negative impacts / Complaint	Further information
1	Implemented Enhanced traffic signals (SCOOT systems), coupled with road layout improvements at Chiswick High Road (in conjunction with Traffic/Defra/TfL), in order to reduce peak time congestion due to queuing, thereby improve air quality	• Pre and post implementation survey results indicate queue length reductions at several junctions, as well as increases in queue at other junctions/directions. Whilst the mean NO_2 concentration level across the borough fell by 7.5%, reduction at Chiswick site was 13.4% • Benefits might include reduced peak-time congestion and exposure to reduced pollutant concentration level.	Both pre and post traffic surveys were conducted using the same methodology and service provider.
2	Hounslow Road cycle path infrastructure project (2015/16) and road layout improvements to encourage cycling to work/schools, in order to bring about modal shift in travel and healthier life styles. This project part funded by LIP and Mayor's Air Quality Fund (MAQF) Phase 1.	• Project well underway and is scheduled for completion in Sumer 2017 • Benefits might include in existing car journeys being replaced through uptake of cycling. Therefore, this is expected to lead in reduction in emissions and healthier life styles, both by reducing exposure to harmful pollutants and increased exercise.	Post completion survey will be undertaken to determine uptake of cycling and emission reductions.
3	Road layout improvements at Twickenham Road junction with South Street	• This project was completed in 2014 and pre and post enhanced air quality monitoring was commissioned to analyse the impact. Whilst the overall traffic flow seems to have	Enhanced air quality monitoring at this site is being continued in order to assess the

		improved, however peak-time congestion still remains and there have been only marginal reductions in NO_2 annual mean concentration level.	impact of road closure at Church Road nearby
4	Hounslow Council has plans to install a $PM_{2.5}$ monitoring at Brentford site, in order to establish a baseline of its impact on public health and deliver our obligations under LLAQM to seek successive reductions in the background concentration level.	• This project is expected to be implemented in 2017/18	

3. Planning Update and Other New Sources of Emissions

Hounslow Council has not yet embraced NRMM into planning/Development Management, however we are in discussions with a south west London group, in order to become a group member that is capable of implementing NRMM when processing planning applications.

3.1 New or significantly changed industrial or other sources

Having checked the relevant inventory within the Council, the Officer can confirm that there no new significant sources (petrol stations, fuel storage depots, poultry farms, biogas 20kW-50MW and CHPs above 50MW) of emissions in the borough.

Report End

This report has been approved by the directors of Public Health and Environment

Mr. Imran Choudhury, Director of Leisure & Public Health;

Signature……

Mr. Peter Lerner, Interim Director of Economy, Environment & Enforcement;

Signature……

Appendix A Details of Monitoring Site QA/QC

A.1 Automatic Monitoring Sites

Air quality analysers are calibrated overnight using permeation tubes and are manually calibrated once every fortnightly by a local site operator (LSO) in the Local Authority. However, this frequency of calibrations may sometimes be reduced, in order to align calibration with filter change that justifies a calibration at a later date.
In regards to the AQMA, the London Borough of Hounslow Air Quality Order 2015 came into operation on the 12th day of November 2015, which was made as an amendment to the existing order (Air Quality Order 2005) and it specifically includes the hourly objective of nitrogen dioxide of the national Air Quality Regulations. This designation applies to the entire borough.

PM_{10} Monitoring Adjustment

Particulate matter data monitored using TEOM is VCM corrected, in accordance with LAQM Defra Guidelines, TG16, Section 7.143

A.2 Diffusion Tube Quality Assurance / Quality Control

- Hounslow's continuous monitoring stations are audited by Ricardo-AEA twice a year in order to provide QA/QC, which are followed up by service and maintenance obligations of ESU organisation.
- Gradko International Limited;
- 20% Tea/Water;
- UKAS approved Laboratory (2187) Quality Management System
- Results of laboratory precision (tube precision and WASP results:
  http://laqm.defra.gov.uk/diffusion-tubes/precision.html for precision
  http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html for WASP results)
- Bias adjustment factor from the database (available on the LAQM Support Website at: http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html) was applied. The version of the database spreadsheet used was 06/16.
- The Local Authority has compared the diffusion tubes with the reference method in a co-location study. Details of two co-location sites at Chiswick and Brentford are given below.
- The national bias adjustment factor (BAF) of 0.88, associated with the above method used by the analysing Gradko Laboratory has been applied to the annual mean values of the diffusion tubes.
- Gradko laboratory, with good precision and accuracy in 2015.

Bias adjustment factors for the previous years have been given in Table D above.

Calculation of local bias adjustment factors is as follows:

Site ID	Ann Mean from Continuous Monitor (Cm)	Annual Mean from Diffusion Tubes (Cd)	Bias Adjustment Factor
Cranford (HS2)	30.2	26.8	1.13
Chiswick (HS4)	**44.8**	**58.1**	0.77
Brentford (HS5)	**53.3**	**62.1**	0.86
Heston (HS6)	**40.7**	**49.2**	0.83
Hatton Cross (HS7)	29.7	35.2	0.84
Gunnersbury (HS8)	**53.0**	**55.5**	0.96
Feltham (HS9)	39.7	**41.7**	0.95
Average BAF (all sites)			**0.91**
Average BAF (excluding all sites with low data capture)			**0.93**
National BAF for Gradko 20% TEA/Water (2015)			0.88
Difference between Local and National BAFs ref. to National			-2.9%

Factor from Local Co-location Studies (if available)

Results from two collocation studies at Chiswick High Road and Brentford sites were used to calculate the bias adjustment factor as follows, in accordance with guidance/Tool given in section 7.192 in TG16.

Using B values of 47% for Chiswick and 31% for Brentford gives an average value of B 39%, which is a factor of 0.39; adding 1 gives 1.39; and taking inverse of 1.39 gives the bias adjustment factor of 0.72. Whilst the precision between triplicate diffusion tubes is good, however as the BAF from collocation studies under reads with reference to the chemiluminescence analyser, therefore the national bias has been applied in preference to the local BAF.

Co-location questionnaire for the above studies are being submitted to the LAQM Helpdesk, albeit a little late.

A.3 Chiswick High Road Collocation Site

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	08/01/2015	05/02/2015	65.69	62.72	69.96	66	3.6	6	9.0	45.9	95.3	Good	Good
2	05/02/2015	10/03/2015	73.60	67.48	71.15	71	3.1	4	7.6	51.2	98.8	Good	Good
3	10/03/2015	02/04/2015	63.77	60.91	65.65	63	2.4	4	5.9	42.8	99.7	Good	Good
4	02/04/2015	29/04/2015	71.54	69.66	69.59	70	1.1	2	2.8	47.7	99.7	Good	Good
5	29/04/2015	29/05/2015	60.01	60.97	62.37	61	1.2	2	2.9	39.9	99.5	Good	Good
6	29/05/2015	01/07/2015	66.65	63.50	64.92	65	1.6	2	3.9	41.0	99.9	Good	Good
7	01/07/2015	29/07/2015	63.79	67.63	67.96	66	2.3	3	5.8	40.5	100	Good	Good
8	29/07/2015	26/08/2015	73.85	72.09	71.02	72	1.4	2	3.5	46.4	99.9	Good	Good
9	26/08/2015	30/09/2015	60.60	58.44	59.85	60	1.1	2	2.7	47.9	99.4	Good	Good
10	30/09/2015	29/10/2015	71.13	76.62	75.16	74	2.8	4	7.1	50.6	99.7	Good	Good
11	29/10/2015	02/12/2015	62.81	60.14	50.35	58	6.6	11	16.3	42.9	99.2	Good	Good
12	02/12/2015	07/01/2016	63.76	65.60	65.91	65	1.2	2	2.9	41.9	99.9	Good	Good
13													
										Overall survey -->		Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

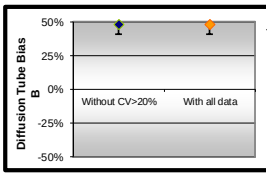
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Chiswick (High Road)

Accuracy	(with 95% confidence interval)
without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.68 (0.65 - 0.71)
Bias B	47% (40% - 54%)
Diffusion Tubes Mean:	66 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	45 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	45 (43 - 47) μgm^{-3}

Precision	12 out of 12 periods have a CV smaller than 20%

Accuracy	(with 95% confidence interval)
WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.68 (0.65 - 0.71)
Bias B	47% (40% - 54%)
Diffusion Tubes Mean:	66 μgm^{-3}
Mean CV (Precision):	4
Automatic Mean:	45 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	45 (43 - 47) μgm^{-3}



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Version 04 - February 2011

A.4 Brentford Collocation Site

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	08/01/2015	05/02/2015	72.15	76.79	77.48	75	2.9	4	7.2	57.2	99.7	Good	Good
2	05/02/2015	10/03/2015	74.68	78.83	77.23	77	2.1	3	5.2	57.4	99.6	Good	Good
3	10/03/2015	02/04/2015	75.63	75.07	79.08	77	2.2	3	5.4	59.7	99.7	Good	Good
4	02/04/2015	29/04/2015	72.07	81.55	71.25	75	5.7	8	14.2	60.1	98.7	Good	Good
5	29/04/2015	29/05/2015	69.70	70.12	66.09	69	2.2	3	5.5	50.9	99.5	Good	Good
6	29/05/2015	01/07/2015	74.14	75.71	78.17	76	2.0	3	5.0	53.3	98.2	Good	Good
7	01/07/2015	29/07/2015	71.42	74.14	68.03	71	3.1	4	7.6	49.5	99.6	Good	Good
8	29/07/2015	26/08/2015	71.05	65.28	66.92	68	3.0	4	7.4	51.7	100	Good	Good
9	26/08/2015	30/09/2015	67.67	63.17	70.30	67	3.6	5	9.0	61.1	99.2	Good	Good
10	30/09/2015	29/10/2015	81.25	89.57	83.19	85	4.4	5	10.8	63.9	99.4	Good	Good
11	29/10/2015	02/12/2015	57.79	59.42	57.67	58	1.0	2	2.4	44.0	79.8	Good	Good
12	02/12/2015	07/01/2016	45.18	49.88	51.77	49	3.4	7	8.4	35.0	99.9	Good	Good
13													

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Overall survey --> Good precision | Good Overall DC

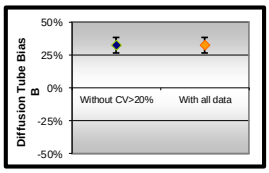
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Btrentford (BREN)

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%
Bias calculated using 12 periods of data
Bias factor A 0.76 (0.73 - 0.8)
Bias B 31% (26% - 37%)
Diffusion Tubes Mean: 71 μgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 54 μgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 54 (51 - 56) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 12 periods of data
Bias factor A 0.76 (0.73 - 0.8)
Bias B 31% (26% - 37%)
Diffusion Tubes Mean: 71 μgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 54 μgm^{-3}
Data Capture for periods used: 98%
Adjusted Tubes Mean: 54 (51 - 56) μgm^{-3}



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Discussion of Choice of Factor to Use

Although the national bias adjustment factor (0.88) used is lower and therefore less conservative than the mean local bias adjustment factor (0.91), however we'd prefer to adopt a consistent approach in applying the national bias adjustment factor, as in previous years, because this is likely to be more accurate due to it being an average value of many collocation studies. Nonetheless, the difference between the local and national bias adjustment factors is marginal.

A.5 Adjustments to the Ratified Monitoring Data

Short-term to Long-term Data Adjustment

There was just a single diffusion tube, HS80, with the data capture rate less than 75%. The annualisation factor was calculated using a single background site (Cranford) only due to a lack of data from neighbouring background sites.

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

Start date	End date	B1 (HS2 BG site)	D1 - diff tube site	B1 when D1 is avail.
08/01/2015	05/02/2015	38.4	80.72	38.4
05/02/2015	10/03/2015	36.5		
10/03/2015	02/04/2015	33.5	64.80	33.5
02/04/2015	29/04/2015	34.8	68.47	34.8
29/04/2015	29/05/2015	23.8		
29/05/2015	01/07/2015	23.2	67.31	23.2
01/07/2015	29/07/2015	23.4		

29/07/2015	26/08/2015	26.7	65.13	26.7
26/08/2015	30/09/2015	30.9		
30/09/2015	29/10/2015	35.1	80.92	35.1
29/10/2015	02/12/2015	31.2	60.62	31.2
02/12/2015	07/01/2016	24.5	67.48	24.5
Average		**30.2**	**69.4**	**30.9**

Annual Mean, Am	**30.2**
Period Mean, Pm	**30.9**
Ratio (Ra), Am/Pm	**0.98**

Annualisation factor

Appendix B Full Monthly Diffusion Tube Results for 2015

Table N. NO_2 Diffusion Tube Results

Site ID	*Valid data capture for monitoring period %* [a]	*Valid data capture 2015 %* [b]	*Annual Mean NO_2*												
			Jan	*Feb*	*March*	*Apr*	*May*	*June*	*Jul*	*Aug*	*Sept*	*Oct*	*Nov*	*Dec*	*Annual mean – raw data* [c]	*Annual mean – bias adjusted* [c]
BREN A		100.0%	72.15	74.68	75.63	72.07	69.70	74.14	71.42	71.05	67.67	81.25	57.79	45.18	**69.4**	**61.1**
BREN B		100.0%	76.79	78.83	75.07	81.55	70.12	75.71	74.14	65.28	63.17	89.57	59.42	49.88	**71.6**	**63.0**
BREN C		100.0%	77.48	77.23	79.08	71.25	66.09	78.17	68.03	66.92	70.30	83.19	57.67	51.77	**70.6**	**62.1**
CHIS A		100.0%	65.69	73.60	63.77	71.54	60.01	66.65	63.79	73.85	60.60	71.13	62.81	63.76	**66.4**	**58.5**
CHIS B		100.0%	62.72	67.48	60.91	69.66	60.97	63.50	67.63	72.09	58.44	76.62	60.14	65.60	**65.5**	**57.6**
CHIS C		100.0%	69.96	71.15	65.65	69.59	62.37	64.92	67.96	71.02	59.85	75.16	50.35	65.91	**66.2**	**58.2**
CRAN A		100.0%	37.81	37.22	32.83	32.23	24.95	23.40	27.46	28.20	28.88	44.57	28.67	28.12	31.2	27.5
CRAN B		100.0%	39.02	37.31	33.71	31.04	25.12	25.34	23.81	14.85	29.95	35.64	31.32	26.87	29.5	26.0
CRAN C		100.0%	38.26	36.84	32.66	34.80	23.80	22.90	25.01	28.06	28.17	35.90	29.36	30.51	30.5	26.9
FELT A		100.0%	55.14	54.20	49.11	51.74	41.55	45.85	44.84	51.71	53.25	59.90	41.04	35.11	**48.6**	**42.8**
FELT B		100.0%	58.25	55.00	40.54	47.32	42.51	42.99	36.79	46.36	47.52	52.43	38.86	39.91	**45.7**	**40.2**
FELT C		100.0%	55.38	58.20	52.89	51.95	49.12	47.44	41.75	45.03	42.82	57.03	29.26	42.44	**47.8**	**42.0**
HAT A		100.0%	74.54	45.83	44.61	44.16	47.02	33.38	34.00	34.27	39.15	48.65	30.49	26.33	**41.9**	36.8

HAT B		100.0%	49.17	49.06	43.28	41.17	35.40	32.32	28.81	34.45	40.33	48.02	36.33	24.54	38.6	33.9
HAT C		100.0%	52.46	49.64	55.66	39.76	32.34	34.93	28.04	35.83	39.08	49.32	30.67	25.50	39.4	34.7
HEST A		100.0%	62.01	58.87	56.84	60.19	49.99	53.95	48.96	55.56	54.80	65.49	53.00	49.77	**55.8**	**49.1**
HEST B		100.0%	62.70	60.99	58.97	61.61	48.86	58.83	47.32	55.52	57.46	66.29	52.49	49.78	**56.7**	**49.9**
HEST C		100.0%	56.00	66.36	61.27	64.37	51.64	56.42	50.74	54.30	52.83	67.04	35.08	46.43	**55.2**	**48.6**
HS32		100.0%	69.86	67.87	57.64	64.26	66.51	63.34	71.04	70.79	61.04	66.74	62.07	54.70	**64.7**	**56.9**
HS33		100.0%	73.79	73.85	61.57	57.45	64.14	66.14	68.03	62.30	61.29	64.19	81.74	49.22	**65.3**	**57.5**
HS34		100.0%	42.17	39.63	41.63	35.84	26.72	30.52	29.96	34.62	36.56	45.20	33.28	36.42	36.0	31.7
HS35		100.0%	50.03	51.04	42.17	37.37	30.38	30.43	32.14	33.16	34.45	43.71	39.47	32.13	38.0	33.5
HS41		83.3%	45.18	40.42	39.84	40.92	33.86	36.66	35.30	41.33		44.76	33.48		39.2	34.5
HS42		91.7%	40.80	42.30	36.78	33.37	24.02	24.93	25.70	32.89		38.60	31.30	33.53	33.1	29.1
HS43		100.0%	56.94	52.22	59.46	46.38	38.92	41.65	33.72	39.30	45.69	57.94	36.85	34.64	**45.3**	39.9
HS51		100.0%	41.51	38.38	33.76	29.08	23.47	23.30	22.49	26.74	30.71	37.62	24.53	23.67	29.6	26.1
HS52		100.0%	41.89	36.80	36.86	32.92	24.09	24.43	21.60	27.09	30.65	37.41	24.54	22.99	30.1	26.5
HS53		100.0%	48.91	45.60	43.88	39.62	31.44	32.41	34.06	30.68	36.12	44.06	34.70	27.82	37.4	32.9
HS54		100.0%	60.61	61.71	56.98	58.33	46.87	49.41	47.40	54.99	47.31	51.90	49.93	52.87	**53.2**	**46.8**
HS55		100.0%	67.06	56.44	59.43	56.76	40.49	29.70	39.69	48.45	46.22	61.58	43.60	37.41	**48.9**	**43.0**
HS61		75.0%	61.56	54.78	42.99	44.25	49.42	39.93	42.35	43.94	40.10				**46.6**	**41.0**
HS62		100.0%	49.40	53.15	47.30	45.99	34.09	37.21	35.07	45.02	39.25	57.69	34.13	34.56	**42.7**	**37.6**
HS63		75.0%	62.92	61.04	59.52	57.32	49.17	53.05	49.46		41.71			43.91	**53.1**	**46.7**
HS64		91.7%	45.04	48.47	42.62	35.02	25.40	31.10	26.67	36.14	37.92	44.92		29.79	36.6	32.2
HS65		91.7%	45.29	40.40	<0.50	41.83	30.66	30.38	26.39	34.40	45.97	41.71	29.24	39.01	33.8	29.8
HS66		100.0%	69.88	50.87	56.02	45.52	38.27	45.33	43.75	49.21	33.66	59.51	42.95	36.31	**47.6**	**41.9**
HS67		100.0%	97.84	82.01	75.43	83.88	85.97	74.38	81.75	80.60	68.13	64.96	85.29	97.96	**81.5**	**71.7**
HS68		100.0%	64.82	63.38	52.95	51.74	56.35	51.25	54.27	60.35	56.19	63.36	60.60	52.27	**57.3**	**50.4**

HS69		100.0%	82.33	64.32	72.79	68.96	56.04	66.96	61.35	64.43	70.63	90.34	52.64	41.44	**66.0**	**58.1**
HS70		100.0%	67.25	79.28	58.80	63.82	62.56	67.50	69.45	67.08	65.89	67.95	75.77	70.64	**68.0**	**59.8**
HS71		91.7%	82.65	85.12	63.61	53.59	57.47	58.87	66.45	59.53	52.79	59.28	53.77		**63.0**	**55.5**
HS72		91.7%	65.93	63.12	52.69	26.45	51.45	49.63	51.70	52.55	42.31	54.13		53.40	**51.2**	**45.1**
HS73		100.0%	47.83	44.08	39.59	34.80	31.14	33.51	34.89	30.53	33.07	39.94	34.55	31.45	36.3	31.9
HS74		100.0%	45.25	45.92	37.65	46.72	34.33	34.85	31.39	40.02	37.07	47.65	42.90	47.63	**40.9**	36.0
HS75		100.0%	57.19	53.54	54.74	53.16	39.27	46.83	48.00	44.26	46.76	51.22	41.10	34.42	**47.5**	**41.8**
HS76		100.0%	49.23	50.26	41.46	38.06	30.52	30.73	28.00	36.87	39.09	55.30	37.84	32.78	39.2	34.5
HS77		83.3%	42.07	40.09	36.13	30.23	23.61	22.66	22.63	22.55	29.47		25.86		29.5	26.0
HS78		100.0%	66.21	68.12	66.25	69.92	58.41	59.96	57.46	62.57	55.50	69.71	54.33	50.72	**61.6**	**54.2**
HS79		100.0%	44.71	53.57	43.29	38.66	31.41	28.31	35.39	37.71	34.54	44.72	39.30	39.47	39.3	**34.5**
HS80		66.7%	80.72		64.80	68.47		67.31		65.13		80.92	60.62	67.48	**69.4**	**0.0**
HS81		100.0%	37.20	36.90	30.41	28.67	20.72	19.48	19.98	24.18	25.81	30.32	26.78	26.90	27.3	24.0
HS82		100.0%	46.03	39.40	37.62	36.86	29.72	29.05	29.84	33.43	36.93	41.61	38.40	29.13	35.7	31.4
HS83		91.7%	28.66	29.25	28.34	47.40	19.62	18.56	18.50	25.84	19.26	30.36	<0.34		24.2	21.3
HS84		100.0%	59.01	58.41	47.69	48.85	41.74	39.81	45.71	46.65	43.41	51.64	48.10	45.19	**48.0**	**42.3**
HS85		100.0%	69.02	60.91	54.71	54.09	48.94	51.05	51.50	52.89	46.96	57.64	57.16	45.68	**54.2**	**47.7**
HS86		100.0%	71.58	63.54	34.46	52.57	52.72	48.83	55.54	59.59	56.67	62.47	56.65	55.26	**55.8**	**49.1**
HS87A		91.7%	67.32	67.77	53.24	56.18		60.35	63.27	63.69	54.34	59.07	69.73	61.57	**61.5**	**54.1**
HS88		100.0%	39.90	36.19	31.54	32.91	20.78	21.00	20.92	23.70	29.60	36.57	20.49	21.70	27.9	24.6
HS89		100.0%	44.78	52.82	62.22	57.16	35.66	42.29	35.99	41.79	41.43	51.51	38.53	40.73	**45.4**	40.0
HS90		100.0%	44.16	41.26	36.91	37.29	25.34	28.57	26.24	30.08	33.61	40.53	29.00	23.84	33.1	29.1

Exceedance of the NO_2 annual mean AQO of 40 μgm^{-3} are shown in **bold**.

[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%