London Borough of Hounslow Air Quality Annual Status Report for 2016
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This report provides a detailed overview of air quality in Hounslow Council 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 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 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 (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 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 (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.

Nitrogen Dioxide

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

Site ID	Site type	Valid data capture for monitoring period % [a]	Valid data capture 2016 % [b]	Annual Mean Concentration (µgm-3)							
				2009c	2010 [c]	2011c	2012 [c]	2013c	2014 [c]	2015 [c]	2016 [c]
Cranford	Automatic	99.6%	99.6%	32	21	28	31	30.1	31.4	30.2	30.8
Chiswick	Automatic	99.6%	99.6%	**70**		**58**	**55.5**	**56.4**	**51.7**	**44.8**	**49.8**
Brentford	Automatic	99.6%	99.6%	**59**	**67**	**53**	**46.1**	**50.3**	**52.6**	**53.3**	**56.9**
Heston	Automatic	74.6%	74.6%	**57**	**49**	**48**	**56.3**	**50.81**	**47.7**	**40.7**	**42.2**
Hatton Cross	Automatic	84.5%	84.5%	37	38	33	31.7	37.24	31.1	29.7	31.6
Gunnersbury	Automatic	90.3%	90.3%				**53.7**	**56.62**	**58.4**	**53.0**	**59.1**
Feltham	Automatic	99.0%	99.0%	59	**46**	**44**	38.4	43.67	43.3	39.7	38.4
BREN	Diffusion tube	100.0%	100.0%	59.3	**60.1**	**51.9**	**56.1**	**58.7**	**66.3**	**62.1**	**64.7**
CHIS	Diffusion tube	83.3%	83.3%	65.5	**61.1**	**55.8**	**60.9**	**59.3**	**68**	**58.1**	**55.5**
CRAN	Diffusion tube	100.0%	100.0%	30.1	30.4	28.1	28.2	28.1	29.7	26.8	28.4
FELT	Diffusion tube	100.0%	100.0%		28.1	**40.3**	**42.6**	**41.6**	**45.3**	**41.7**	**45.2**
MYR	Diffusion tube	100.0%	100.0%	34.2	**41.3**	33.9	35.4	38.9	38.1	35.2	38.4
HEST	Diffusion tube	100.0%	100.0%	50.2	**50.1**	**48.8**	**49.3**	**50.8**	**56.3**	**49.2**	**55.9**

HS32	Diffusion tube	91.7%	91.7%	60.3	**52**	**52.8**	**55.4**	**55.9**	**63.5**	**58.8**	**59.4**
HS33	Diffusion tube	100.0%	100.0%	55.6	**57.4**	**51.5**	**54.4**	**55.6**	**61.4**	**59.4**	**57.6**
HS34	Diffusion tube	91.7%	91.7%	33.8	36.3	29.7	32.5	33.4	39.2	32.8	34.0
HS35	Diffusion tube	91.7%	91.7%	34.1	38.6	28.8	32	33.9	37.3	34.6	37.2
HS41	Diffusion tube	91.7%	91.7%	37.9	**40.4**	32.5	32.6	34.4	38.2	35.6	**55.5**
HS42	Diffusion tube	91.7%	91.7%	35.6	**46.8**	39.1	32.1	32.3	35.2	30.1	36.5
HS43	Diffusion tube	100.0%	100.0%	42.3	**43.1**	37.3	39.3	**43.3**	**43.9**	**41.2**	**43.1**
HS51	Diffusion tube	91.7%	91.7%	29.1	34	26.7	27.7	28.8	31.5	26.9	31.8
HS52	Diffusion tube	100.0%	100.0%	30.5	31.1	24.4	29	27.5	29.8	27.4	29.7
HS53	Diffusion tube	91.7%	91.7%	34.6	35.9	31.9	32.7	33.6	33.7	34.1	34.0
HS54	Diffusion tube	100.0%	100.0%	45.5	**49.4**	**44.5**	**45.5**	**42.8**	**48.6**	**48.4**	**45.9**
HS55	Diffusion tube	75.0%	75.0%	49.5	**51.7**	**40.4**	**43.8**	**45.1**	**49.6**	**44.5**	**50.7**
HS61	Diffusion tube	58.3%	58.3%	66.9	**42.6**	30	**40.2**	38.4	**41.1**	**42.4**	**40.0**
HS62	Diffusion tube	91.7%	91.7%	41.3	**42.6**	38.1	35.5	**40.3**	**43.5**	38.9	**43.6**
HS63	Diffusion tube	75.0%	75.0%	46.0	**40.7**	32.2	**44.9**	**48.6**	**52.2**	**48.3**	**48.2**
HS64	Diffusion tube	100.0%	100.0%	37.2	**40.3**	32.6	33.5	34	35.9	33.3	35.3
HS65	Diffusion tube	100.0%	100.0%	34.2	37.8	30.1	33.3	33.9	36.9	30.8	35.4
HS66	Diffusion tube	91.7%	91.7%	40.5	**46.5**	36.9	**40.8**	39.1	**48.6**	**43.3**	**46.6**
HS67	Diffusion tube	100.0%	100.0%	49.4	**61.8**	**63.5**	**66.5**	**64.7**	**74.9**	**74.2**	**67.8**
HS68	Diffusion tube	100.0%	100.0%	51.1	**49.1**	**43.3**	**43.4**	**48.8**	**51.7**	**52.1**	**52.2**
HS69	Diffusion tube	100.0%	100.0%	51.8	**52.7**	**48**	**50.7**	**58.9**	**59.2**	**60.1**	**55.4**
HS70	Diffusion tube	91.7%	91.7%	54.4	**52.3**	**51.8**	**51.1**	**54.3**	**63**	**61.9**	**64.9**
HS71 (Gunn)	Diffusion tube	100.0%	100.0%	53.6	**54.9**	**47.4**	**50.3**	**47.8**	**59**	**57.3**	**54.1**
HS72	Diffusion tube	100.0%	100.0%	47.6	**48.4**	**42.2**	**43.9**	**41.1**	**47.1**	**46.6**	**51.7**
HS73	Diffusion tube	100.0%	100.0%	33.3	37.3	33.1	34.8	31.7	36.4	33.0	33.2
HS74	Diffusion tube	100.0%	100.0%	40.0	36.9	37	36.6	35.7	**40.1**	37.3	**41.8**
HS75	Diffusion tube	100.0%	100.0%	44.6	**43.1**	**40.1**	**41.7**	**45**	**48.2**	**43.3**	**42.4**
HS76	Diffusion tube	91.7%	91.7%	29.8	36.3	27.3	31.8	34.7	36.7	35.7	**40.6**
HS77	Diffusion tube	91.7%	91.7%	28.2	29.1	27.6	26.4	29.2	30.4	26.9	33.8
HS78	Diffusion tube	100.0%	100.0%	51.7	**45.7**	**48.4**	**51.4**	**47.2**	**59.3**	**56.1**	**57.7**
HS79	Diffusion tube	91.7%	191.7%	55.3	34.9	34.7	37.9	37.8	**41.8**	35.7	**42.3**
HS80	Diffusion tube	58.3%	58.3%	48.6	**64.6**	**49.9**	**56.4**	**57.7**	**65.1**	**61.1**	**71.1**

HS81	Diffusion tube	100.0%	100.0%	26.4	30.8	26.8	25.9	29	26.9	24.8	26.8
HS82	Diffusion tube	91.7%	91.7%	35.6	32.4	34.5	34.2	31.9	35.2	32.5	31.2
HS83	Diffusion tube	58.3%	58.3%	23.3	19.5	27.9	20.4	27.8	22.4	22.0	24.8
HS84	Diffusion tube	100.0%	100.0%	45.9	38.4	38.4	39.6	**40.5**	**47.6**	**43.7**	**45.3**
HS85	Diffusion tube	100.0%	100.0%	48.9	**44.5**	**42.4**	**45.7**	**43.9**	**51.3**	**49.3**	**50.4**
HS86	Diffusion tube	100.0%	100.0%	46.6	**42**	**51.5**	**48**	**49.5**	**54.2**	**50.8**	**54.7**
HS87A	Diffusion tube	58.3%	58.3%	56.9	**55.9**	**46.7**	**47.2**	**50.7**	**59.1**	**56.0**	**62.7**
HS88	Diffusion tube	100.0%	100.0%	33.1	19.9	24.1	24.7	26.4	27.3	25.4	26.8
HS89	Diffusion tube	100.0%	100.0%	27.6	39.5	34.8	34.9	39.3	39.7	**41.3**	**42.0**
HS90 (HS87B)	Diffusion tube	75.0%	75.0%		–	31.8	31.1	31.5	32.7	30.1	33.7

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 $\mu g\ m^{-3}$ (underlined), 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%

The Council acknowledges that air quality locally in 2016 was worse than that in the preceding year. Our assessment shows that the NO_2 annual mean concentrations at six of the seven continuous monitoring stations have increased by 5.5% on average, although Feltham site shows a small reduction. However, the increase in the NO_2 concentration level at Chiswick and Gunnersbury sites is slightly more than twice (~11%) the average and this site has exceeded the short-term hourly AQO for NO_2, following a similar exceedance in 2014. It should be noted that as Gunnersbury Avenue is a TfL route, it requires further engagement and greater degree of commitment from TfL, in addition to commitment made by the London Mayor to introduce suitable boundary for the proposed ultra-low emission zone (ULEZ).

We have assessed the impact of above exceedances at sensitive receptors in areas of air quality hot spots within Hounslow, using the Defra Tool, which indicates the extent to which some of these receptors are likely to experience the NO_2 annual mean concentration level above the AQO of 40$\mu g/m^3$ (see Tables 1-4 at Appendix A6). In this context, there are sensitive receptors at Gunnersbury Brentford and Chiswick sites, where the first two sites are TfL routes and exceedances are significant at Gunnersbury but marginal at Brentford, and Chiswick is under the jurisdiction of LA, which has implemented a number of mitigation measures, including the implementation of SCOOT systems in conjunction with TfL and Defra, delivering significant reductions in traffic queue lengths at peak times.

Whilst analysis of NO_2 diffusion tube monitoring method shows that the annual mean concentration level at Chiswick, Brentford and Gunnersbury are above 60µg/m₃, however the collocated continuous monitoring method that is inherently more accurate show that NO_2 concentration are below 60µg/m₃. Therefore, we consider it prudent to apply the locally derived bias adjustment factor (BAF) of 0.87 as there is significant difference between locally and nationally derived BAFs.
The number of diffusion tube sites that exceeded the NO_2 annual mean AQO (EU limit value) has increased from 25 in 2015 to 31 in 2016, which is indicative of slight worsening of air quality locally, which is in line with the general trend in Greater London. The number of diffusion tubes that exceeded the threshold of 60µg/m³ remains at five, one of which is collocated with the continuous monitoring stations at Brentford, site where the measured annual mean is below 60µg/m³. This leaves four remaining sites at Busch Corner (HS67), Eastbury Grove (HS70), London Road (HS80) and Henlys Roundabout (HS87A). Following a survey of Busch Corner in 2015, 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. At sites HS70, HS80 and HS87A, there are sensitive receptors with facades that might experience NO_2 exceedances, however people are not expected to spend at least on-hour as all these sites represent kerbsides of busy roads, with site HS80 near a bus depot at the junction of London Road/Kingsley Road.

The above findings are consistent with our analysis at deeper level, which suggest that our continuous monitoring sites experienced an increase 5.5%, on average, in NO_2 annual mean values in 2016 over 2015, the exception being Feltham site which indicates a marginal reduction in the same over the same period.

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

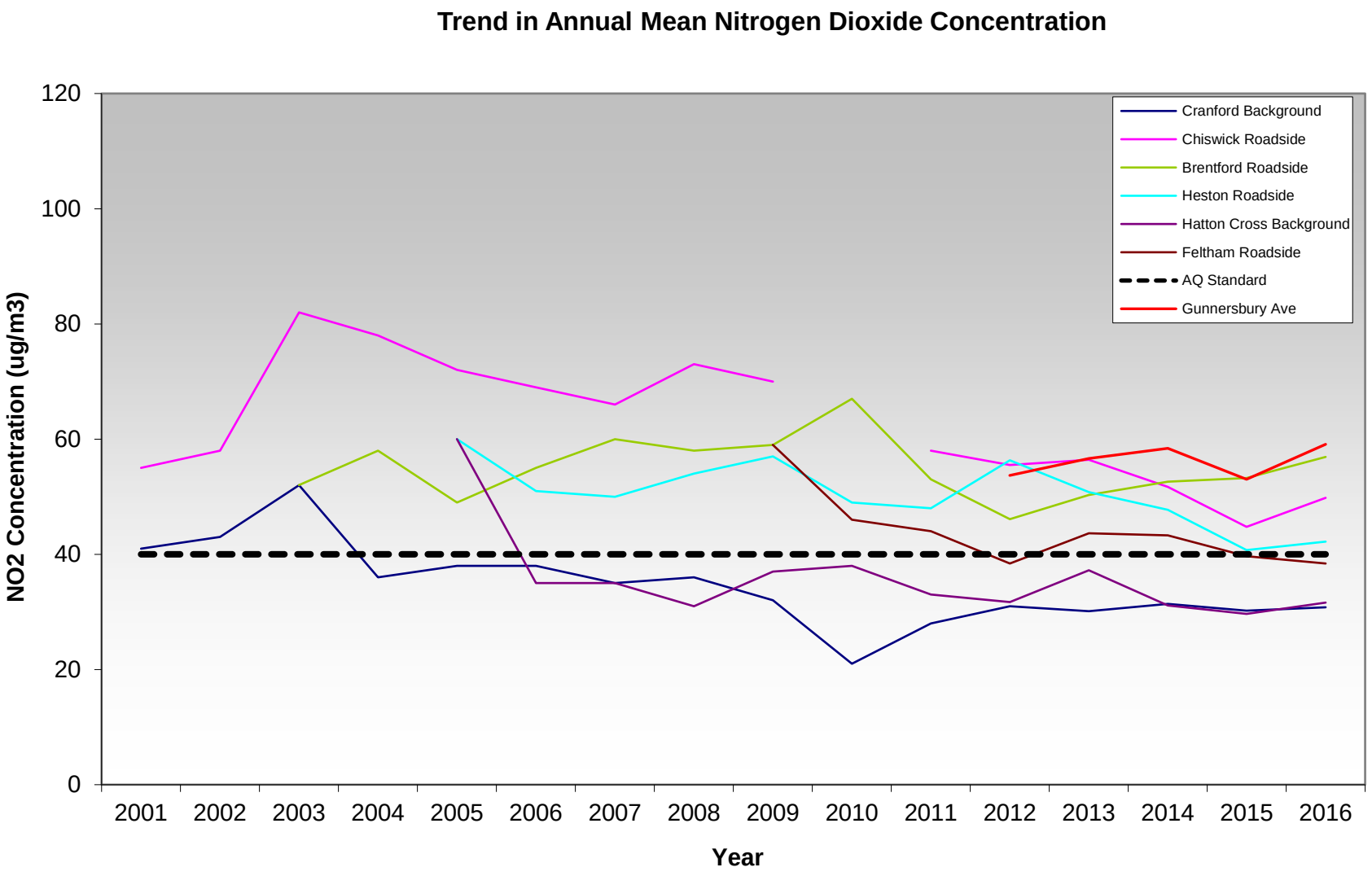


Table E. NO_2 Automatic Monitor Results: Comparison with 1-hour Mean Objective

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2016 % [b]	Number of Hourly Means > 200 µgm^{-3}							
			2009[c]	2010 [c]	2011[c]	2012 [c]	2013[c]	2014 [c]	2015 [c]	2016 [c]
Cranford	*n/a*	99.6%	-	0 (86)	0	0 (107)	0 (113)	0	0	2
Chiswick	*n/a*	99.6%	-	-	0 (155)	0	1 (147)	0	0	6
Brentford	*n/a*	99.6%	-	1 (100)	0	0	0 (140)	4	0	7
Heston	*n/a*	74.6%	-	3 (153)	1	4	1	4 (168)	0 (120)	1 (176)
Hatton Cross	*n/a*	84.5%	-	0 (128)	0	0 (111)	0 (131)	0	0	0 (134)
Gunnersbury	*n/a*	90.3%	-	-	-	9 (191)	4	**36**	0	**39**
Feltham	*n/a*	99.0%	-	0 (116)	0 (146)	0 (131)	17 (134)	0	0	0

Notes: Exceedance of the NO_2 short term AQO of 200 µgm^{-3} over the permitted 18 times per year are shown in **bold**
Where the period of valid data is less than 85% of a full year, the 99.8th 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%

As discussed above, the only continuous monitoring site to exceed the 1-hour mean NO2 objective was the Gunnersbury Avenue location. All other sites in the borough remained below the permitted number (18) of exceedances. We anticipate that the early introduction of ULEZ announced by the London Mayor should have positive and desirable impact in delivering significant NOx reductions towards achieving compliance with the AQO. However, in line with our previous representations made to the London Mayor, we would reiterate that GLA consider additional measures, including but not limited to, extension of the ULEZ to Greater London, in order to maximise emission reductions necessary to protect communities and deliver public health and quality of life.

Particulate Matter

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

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2016 % [b]	Annual Mean Concentration (µgm^{-3})							
			2009[c]	2010 [c]	2011[c]	2012 [c]	2013[c]	2014 [c]	2015 [c]	2016 [c]
Cranford	n/a	98.7%	21.0	21.0	20.0	18.0	19.0	18.1	17.0	17.5
Chiswick	n/a	95.2%	26.0	26.0	–	27.0	26.0	25.5	22.1	22.4
Brentford	n/a	99.7%	32.0	32.0	33.0	31.0	30.0	31.9	31.1	30.7
Heston	n/a	89.0%	24.0	24.0	24.0	27.0	28.0	24.5	24.9	25.9
Hatton Cross	n/a	95.4%	19.0	19.0	19.0	21.0	20.0	20.4	18.1	19.0
Gunnersbury	n/a	92.1%	–	–	–	–	31.0	28.7	25.6	27.0
Feltham	n/a	99.5%	–	–	23.0	20.0	23.0	20.0	18.7	19.1

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%

All of the continuous monitoring sites in the borough were below the annual mean PM_{10} objective during 2016, with averages for all sites similar to those recorded in 2015.

Trend in Annual Mean PM10 Concentration

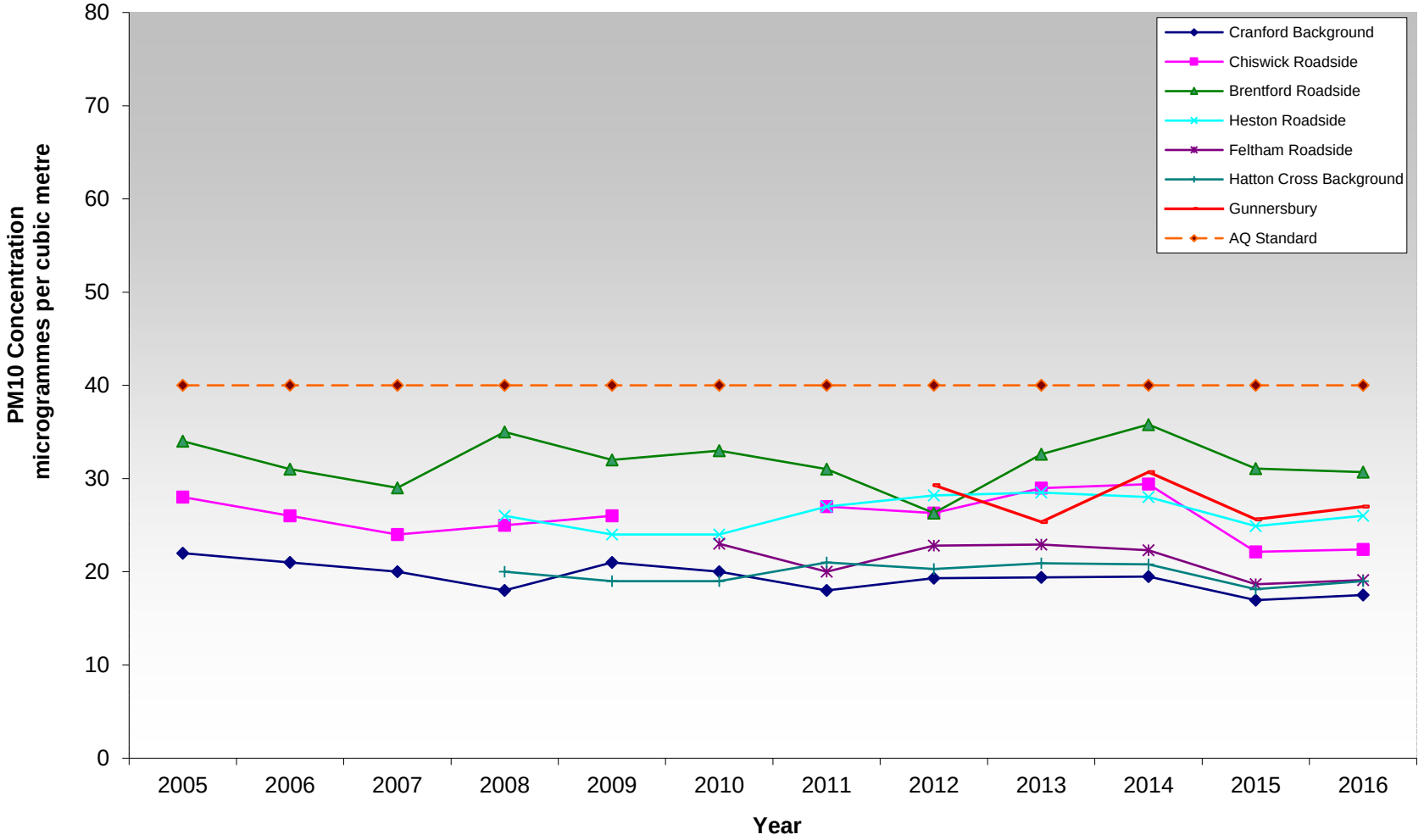


Table G. PM10 Automatic Monitor Results: Comparison with 24-Hour Mean Objective

Site ID	Valid data capture for monitoring period % [a]	Valid data capture 2016 % [b]	Number of Daily Means > 50 µgm^{-3}							
			2009[c]	2010 [c]	2011[c]	2012 [c]	2013[c]	2014 [c]	2015 [c]	2016 [c]
Cranford	n/a	98.7%	4 (51)	1 (34)	1 29)	15 (39)	1 (19)	5	4	8
Chiswick	n/a	95.2%	12 (57)	-	15 (49)	15 (47)	15	15	5	9
Brentford	n/a	96.7%	20 (86)	10 (61)	35	31 (52)	28	42	30	28
Heston	n/a	89.0%	10 (62)	7 (34)	31	26	9	18	10	17 (42)
Hatton Cross	n/a	95.4%	2 (37)	1 (26)	12	8	1 (21)	6	4	6
Gunnersbury	n/a	92.1%	-	1 (36)	0 (30)	13	1 (22)	7	15	15
Feltham	n/a	99.5%	-	-	-	28 (54)	16	17	4	7

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 there are progressively fewer exceedances of the 24-hour objective, in spite of the 2015 USA report recommending 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, this trend has been and will continue to be closely monitored during 2017, before we review our position and liaise with the stakeholders responsible for improving air quality, under whose jurisdiction these transport routes operate and who are responsible for delivering AQO.
Given there is a progressive reduction in both the 24 hour and annual mean exceedances of these objectives over the past two years (2015 and 2016), and associated compliance with these AQO, we consider there to be reduced risk of relevant exposure, which we anticipate will continue over the next few years, with newer vehicle fleet equipped with reduced emission technologies.

Ozone

Table H. O3 Automatic Monitor Results for 2015: Comparison with 8 Hour Running Mean

Site ID	Site Type	Within AQMA?	Description	% Data Capture 2014	Number of Exceedances				
					2012	2013	2014	2015	2016
HS2 Cranford	Background	Y	Maximum 8- hour Running Mean > 100 g/m3	96.0%	5	5	4	NA	**12**
				Objective	10				

Though this borough not seen exceedances of O_3 objective in the past, therefore this data needs to be further interrogated, before considering what action, if any, may be taken.

Sulphur Dioxide

Table I. SO2 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%

Concentrations of SO_2 were recorded at the Cranford continuous monitoring site. There were no exceedances of SO_2 mean concentration level for the 15-minute, 1-hour and the 24-hour objectives.

Benzene

Table J. 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	2015	2016
HS BTEX 1	Roadside	Y	43	2.0	0.6	0.7	-	0.9
HS BTEX 2	Roadside	Y	43	1.6	0.7	0.7	-	0.7
HS BTEX 3	Roadside	Y	42	2.2	0.7	0.7	-	0.8
HS BTEX 5	Background	Y	42	2.1	0.7	0.6	-	0.7
HS BTEX 9	Roadside	Y	41	2.1	0.7	0.7	-	0.8
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%).

Non-automatic monitoring of benzene concentrations took place at five diffusion tube sites within Hounslow, as summarised above. Only a single set of BTEX diffusion tubes, which are exposed for two weeks, were used in each month which is responsible for the low data capture rates. The recorded concentrations at each site remained stable over the year.

2. Action to Improve Air Quality

Table K. 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 Draft AQAP together with the measures suggested by GLA is appended to this document. The draft AQAP is awaiting public consultation (July 2017) pending further changes resulting from consultation with internal stakeholders. 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.	On-going	There is intent to implement anti-idling campaign in schools and review and find ways on how to of school travel plans more effective. >>>Outcome: Agreed to implement anti-idling outside schools, taxi ranks and in/around bus depots
	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. Outcome >>> Outcome: Post implementation survey found a reduction in traffic queue length of 13%, at most junctions
	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. Outcome >>> Project under construction.

	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 $PM_{2.5}$. >>> Project under implementation. Although further work will be undertaken in identifying areas impacted by primary $PM_{2.5}$ emissions, once we've established reasonable baseline using the new monitoring capability.
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. >>> Additional resources have been secured (additional staff inducted)
	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. A diffusion tube has been moved to establish a more representative monitoring near schools in Chiswick.
	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 public health system	**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 commitment towards improving air quality by virtue of helping us monitor $PM_{2.5}$ and gather associated intelligence that can help the Council establish a real baseline and make informed decision as to what action/measures might be appropriate.
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, including re-juvenating engagement with different groups using AirTEXT App. 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 L. 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.	• Phase 1 of Project (Hounslow Road Crematorium to A312) is complete. • Benefits might include in existing car journeys being replaced through uptake of cycling, walking and use of public transport. Therefore, this is expected to lead in reduction in emissions and healthier life	Post completion survey will be undertaken, in order to determine uptake of cycling and walking and associated reduction in car journeys & associated emission reductions.

		styles, both by reducing exposure to harmful pollutants and increased exercise.	
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 improved, however peak-time congestion still remains and there have been only marginal reductions in NO_2 annual mean concentration level.	Enhanced air quality monitoring at this site is being continued in order to assess the 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	Hardware procured and will be installed in June 2017.

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

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

Signature……

Mr. Brendon Walsh, Executive Director of Regeneration, Economic Development and Environment

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 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 locally derived bias adjustment factor (BAF) of 0.87 has been used this year as there was a significant difference between the local BAF and the national BAF, and it 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
HS2	30.8	31.7	0.97
HS4	49.8	62.0	0.80
HS5	56.9	72.3	0.79
HS6	42.2	62.5	0.68
HS7	31.6	42.9	0.74
HS8	59.1	51.4	1.15
HS9	38.4	50.5	0.76
Average BAF (all sites)			0.84
Average BAF (excluding all sites with low data capture)			0.87

Factor from Local Co-location Studies (if available)

A locally derived bias adjustment factor (BAF) has been calculated and used in accordance with guidance/Tool given in section 7.192 in TG16.

Co-location questionnaire for the above studies will be submitted to the LAQM, albeit a little late.

A.3 *Cranford 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	07/01/2016	12/02/2016	39.97	40.20	38.66	40	0.8	2	2.1	45.9	95.3	Good	Good
2	12/02/2016	06/03/2016	38.82	35.60	39.31	38	2.0	5	5.0	51.2	98.8	Good	Good
3	06/03/2016	02/04/2016	30.17	31.00	27.51	30	1.8	6	4.5	42.8	99.7	Good	Good
4	02/04/2016	03/05/2016	27.80	27.34	26.99	27	0.4	1	1.0	47.7	99.7	Good	Good
5	03/05/2016	30/05/2016	28.57	28.42	29.27	29	0.5	2	1.1	39.9	99.5	Good	Good
6	30/05/2016	05/07/2016	25.39	25.12	26.55	26	0.8	3	1.9	41.0	99.9	Good	Good
7	05/07/2016	06/08/2016	21.04	21.70	22.50	22	0.7	3	1.8	40.5	100	Good	Good
8	06/08/2016	08/11/2016	32.07	30.88	31.29	31	0.6	2	1.5	46.4	99.9	Good	Good
9	08/11/2016	03/12/2016	41.81	41.14	41.81	42	0.4	1	1.0	47.9	99.4	Good	Good
10	03/12/2016	30/01/2017	47.38	44.46	46.61	46	1.5	3	3.8	50.6	99.7	Good	Good
11										42.9	99.2		Good
12										41.9	99.9		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

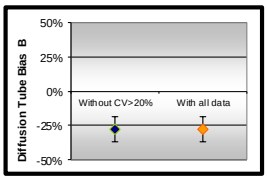
Site Name/ ID:	Cranford

Precision: 10 out of 10 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 10 periods of data
Bias factor A: 1.38 (1.22 - 1.57)
Bias B: -27% (-36% - -18%)
Diffusion Tubes Mean: 33 µgm^{-3}
Mean CV (Precision): 3
Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 46 (40 - 52) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A: 1.38 (1.22 - 1.57)
Bias B: -27% (-36% - -18%)
Diffusion Tubes Mean: 33 µgm^{-3}
Mean CV (Precision): 3
Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 46 (40 - 52) µgm^{-3}



Jaume Targa, for AEA
Version 04 - February 2011

A.4 *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	07/01/2016	12/02/2016	69.09	76.17	72.36	73	3.5	5	8.8	45.9	95.3	Good	Good
2	12/02/2016	06/03/2016	62.88	68.56	61.62	64	3.7	6	9.2	51.2	98.8	Good	Good
3	06/03/2016	02/04/2016	59.41	60.76	61.76	61	1.2	2	2.9	42.8	99.7	Good	Good
4	02/04/2016	03/05/2016	61.97	56.70	62.91	61	3.3	6	8.3	47.7	99.7	Good	Good
5	03/05/2016	30/05/2016	74.80	75.51	74.37	75	0.6	1	1.4	39.9	99.5	Good	Good
6	30/05/2016	05/07/2016								41.0	99.9		Good
7	05/07/2016	06/08/2016	43.65	40.72	45.82	43	2.6	6	6.4	40.5	100	Good	Good
8	06/08/2016	08/11/2016	70.44	66.70	21.21	53	27.4	52	68.1	46.4	99.9	Poor Precision	Good
9	08/11/2016	03/12/2016	79.81	75.26	79.07	78	2.4	3	6.1	47.9	99.4	Good	Good
10	03/12/2016	30/01/2017		105.44	100.03	103	3.8	4	34.4	50.6	99.7	Good	Good
11										42.9	99.2		Good
12										41.9	99.9		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

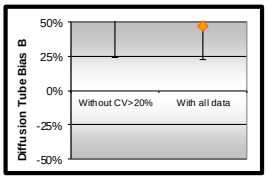
Site Name/ ID:	Chiswick (High Road)

Precision: 8 out of 9 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 8 periods of data
Bias factor A: 0.66 (0.56 - 0.8)
Bias B: 52% (25% - 79%)
Diffusion Tubes Mean: 70 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 46 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 46 (39 - 56) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 9 periods of data
Bias factor A: 0.68 (0.58 - 0.82)
Bias B: 48% (23% - 73%)
Diffusion Tubes Mean: 68 µgm^{-3}
Mean CV (Precision): 9
Automatic Mean: 46 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 46 (39 - 56) µgm^{-3}



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Version 04 - February 2011

A.5 *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	07/01/2016	12/02/2016	67.61	66.53	74.55	70	4.4	6	10.8	45.9	95.3	Good	Good
2	12/02/2016	06/03/2016	77.95	67.78	72.56	73	5.1	7	12.6	51.2	98.8	Good	Good
3	06/03/2016	02/04/2016	71.27	74.01	68.36	71	2.8	4	7.0	42.8	99.7	Good	Good
4	02/04/2016	03/05/2016	69.27	68.09	74.30	71	3.3	5	8.2	47.7	99.7	Good	Good
5	03/05/2016	30/05/2016	78.69	80.76	75.43	78	2.7	3	6.7	39.9	99.5	Good	Good
6	30/05/2016	05/07/2016	67.46	67.39	67.58	67	0.1	0	0.2	41.0	99.9	Good	Good
7	05/07/2016	06/08/2016	43.49	40.99	49.49	45	4.4	10	10.8	40.5	100	Good	Good
8	06/08/2016	08/11/2016	72.19	75.54	72.94	74	1.8	2	4.4	46.4	99.9	Good	Good
9	08/11/2016	03/12/2016	102.00	87.01	92.58	94	7.6	8	18.8	47.9	99.4	Good	Good
10	03/12/2016	30/01/2017	105.36	107.66	101.65	105	3.0	3	7.5	50.6	99.7	Good	Good
11										42.9	99.2		Good
12										41.9	99.9		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:	Brentford

Precision: 10 out of 10 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

Bias calculated using 10 periods of data
Bias factor A 0.61 (0.54 - 0.7)
Bias B 65% (44% - 86%)

Diffusion Tubes Mean: 75 µgm^{-3}
Mean CV (Precision): 5

Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%

Adjusted Tubes Mean: 46 (40 - 52) µgm^{-3}

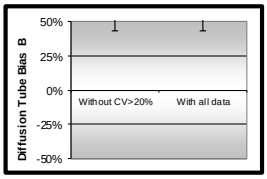
Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 10 periods of data
Bias factor A 0.61 (0.54 - 0.7)
Bias B 65% (44% - 86%)

Diffusion Tubes Mean: 75 µgm^{-3}
Mean CV (Precision): 5

Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%

Adjusted Tubes Mean: 46 (40 - 52) µgm^{-3}



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A.6 *Heston 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	07/01/2016	12/02/2016	65.81	61.97	65.21	64	2.1	3	5.1	45.9	95.3	Good	Good
2	12/02/2016	06/03/2016	66.28	65.56	57.69	63	4.8	8	11.8	51.2	98.8	Good	Good
3	06/03/2016	02/04/2016	59.85	56.90	61.73	59	2.4	4	6.0	42.8	99.7	Good	Good
4	02/04/2016	03/05/2016	59.96	55.64	59.22	58	2.3	4	5.7	47.7	99.7	Good	Good
5	03/05/2016	30/05/2016	70.45	67.07	70.26	69	1.9	3	4.7	39.9	99.5	Good	Good
6	30/05/2016	05/07/2016	51.86	48.92	51.19	51	1.5	3	3.8	41.0	99.9	Good	Good
7	05/07/2016	06/08/2016	35.59	40.45	44.58	40	4.5	11	11.2	40.5	100	Good	Good
8	06/08/2016	08/11/2016	57.54	61.86	61.35	60	2.4	4	5.9	46.4	99.9	Good	Good
9	08/11/2016	03/12/2016	76.00	80.24	82.83	80	3.4	4	8.6	47.9	99.4	Good	Good
10	03/12/2016	30/01/2017	108.41	103.88	109.82	107	3.1	3	7.7	50.6	99.7	Good	Good
11										42.9	99.2		Good
12										41.9	99.9		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:	Heston

Precision: 10 out of 10 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

Bias calculated using 10 periods of data
Bias factor A 0.7 (0.6 - 0.83)
Bias B 44% (20% - 67%)

Diffusion Tubes Mean: 65 µgm^{-3}
Mean CV (Precision): 5

Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%

Adjusted Tubes Mean: 46 (39 - 54) µgm^{-3}

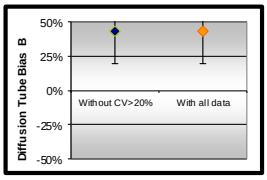
Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 10 periods of data
Bias factor A 0.7 (0.6 - 0.83)
Bias B 44% (20% - 67%)

Diffusion Tubes Mean: 65 µgm^{-3}
Mean CV (Precision): 5

Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%

Adjusted Tubes Mean: 46 (39 - 54) µgm^{-3}



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Version 04 - February 2011

A.7 *Hatton Cross 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	07/01/2016	12/02/2016	40.51	46.22	46.68	44	3.4	8	8.5	45.9	95.3	Good	Good
2	12/02/2016	06/03/2016	53.30	55.09	52.17	54	1.5	3	3.7	51.2	98.8	Good	Good
3	06/03/2016	02/04/2016	44.56	41.83	41.56	43	1.7	4	4.1	42.8	99.7	Good	Good
4	02/04/2016	03/05/2016	36.34	42.76	35.48	38	4.0	10	9.9	47.7	99.7	Good	Good
5	03/05/2016	30/05/2016	42.23	44.40	40.54	42	1.9	5	4.8	39.9	99.5	Good	Good
6	30/05/2016	05/07/2016	35.84	31.70	37.86	35	3.1	9	7.8	41.0	99.9	Good	Good
7	05/07/2016	06/08/2016	29.75	27.68	27.68	28	1.2	4	3.0	40.5	100	Good	Good
8	06/08/2016	08/11/2016	45.79	41.00	41.04	43	2.8	6	6.8	46.4	99.9	Good	Good
9	08/11/2016	03/12/2016	61.96	61.44	62.46	62	0.5	1	1.3	47.9	99.4	Good	Good
10	03/12/2016	30/01/2017	56.24	59.10	53.71	56	2.7	5	6.7	50.6	99.7	Good	Good
11										42.9	99.2		Good
12										41.9	99.9		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

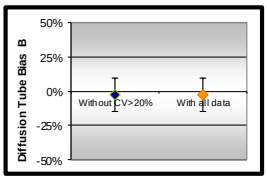
Site Name/ ID:	Hatton Cross

Precision: 10 out of 10 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 10 periods of data
Bias factor A: 1.02 (0.91 - 1.16)
Bias B: -2% (-14% - 10%)
Diffusion Tubes Mean: 45 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 45 (41 - 52) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A: 1.02 (0.91 - 1.16)
Bias B: -2% (-14% - 10%)
Diffusion Tubes Mean: 45 µgm^{-3}
Mean CV (Precision): 5
Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 45 (41 - 52) µgm^{-3}



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A.8 *Feltham 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	07/01/2016	12/02/2016	48.80	50.93	50.92	50	1.2	2	3.0	45.9	95.3	Good	Good
2	12/02/2016	06/03/2016	53.36	52.04	56.49	54	2.3	4	5.7	51.2	98.8	Good	Good
3	06/03/2016	02/04/2016	45.96	48.32	49.26	48	1.7	4	4.2	42.8	99.7	Good	Good
4	02/04/2016	03/05/2016	44.02	42.22		43	1.3	3	11.4	47.7	99.7	Good	Good
5	03/05/2016	30/05/2016	48.58	48.80	54.31	51	3.2	6	8.1	39.9	99.5	Good	Good
6	30/05/2016	05/07/2016	44.23	45.40	44.87	45	0.6	1	1.5	41.0	99.9	Good	Good
7	05/07/2016	06/08/2016	32.93	31.87	32.89	33	0.6	2	1.5	40.5	100	Good	Good
8	06/08/2016	08/11/2016	57.36	52.00	51.26	54	3.3	6	8.3	46.4	99.9	Good	Good
9	08/11/2016	03/12/2016	59.45	62.26	60.55	61	1.4	2	3.5	47.9	99.4	Good	Good
10	03/12/2016	30/01/2017	80.75	69.47	79.82	77	6.3	8	15.6	50.6	99.7	Good	Good
11										42.9	99.2		Good
12										41.9	99.9		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

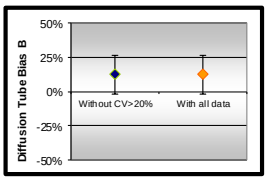
Site Name/ ID:	Feltham

Precision: 10 out of 10 periods have a CV smaller than 20%

(Check average CV & DC from Accuracy calculations)

Accuracy (with 95% confidence interval)
without periods with CV larger than 20%
Bias calculated using 10 periods of data
Bias factor A: 0.88 (0.78 - 1.01)
Bias B: 13% (-1% - 27%)
Diffusion Tubes Mean: 51 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 45 (40 - 52) µgm^{-3}

Accuracy (with 95% confidence interval)
WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A: 0.88 (0.78 - 1.01)
Bias B: 13% (-1% - 27%)
Diffusion Tubes Mean: 51 µgm^{-3}
Mean CV (Precision): 4
Automatic Mean: 45 µgm^{-3}
Data Capture for periods used: 99%
Adjusted Tubes Mean: 45 (40 - 52) µgm^{-3}



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Discussion of Choice of Factor to Use

Local bias adjustment factor (0.87) has been used as there is significant difference between this and the national bias adjustment factor (0.97). Although we'd prefer to adopt a consistent approach in applying the national bias adjustment factor, however we could not ignore the significant difference between these two BAFs.

A.9 Adjustments to the Ratified Monitoring Data

Short-term to Long-term Data Adjustment

There were four diffusion tubes with the data capture rate less than 75% (HS61, HS80, HS83, HS87A). The annualisation factor was calculated and applied to the annual mean values for the above diffusion tubes and results presented in Table D and Appendix B.

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

Start date	End date	B1 (HS2 BG site)	HS61 (D1)	B1 when D1 is available	HS80 (D2)	B1 when D2 is available	HS83 (D3)	B1 when D3 is available	HS87A (D4)	B1 when D4 is available
07/01/2016	12/02/2016	27.3	58.53	27.3	85.06	27.3			92.82	27.3
12/02/2016	06/03/2016	39.3	49.87	39.3	80.64	39.3	31.57	39.3	68.3	39.3
06/03/2016	02/04/2016	35.1			67.74	35.1	29.03	35.1		
02/04/2016	03/05/2016	30	40.54	30	80.97	30	21.6	30	66.93	30
03/05/2016	30/05/2016	28.3			62.98	28.3	25.98	28.3	57.1	28.3
30/05/2016	05/07/2016	21.6	43.68	21.6			16.74	21.6	68.16	21.6
05/07/2016	06/08/2016	20.5	31.58	20.5						
06/08/2016	08/11/2016	29.1								
08/11/2016	03/12/2016	38.9	58.6	38.9	148.13	38.9	<43.02	38.9	73.56	38.9
03/12/2016	30/01/2017	56	46.57	56	111.65	56	49.66	56	105.51	56
Average		**32.6**	**47.1**	**33.4**	**91**	**36.4**	**31.1**	**35.6**	**76.1**	**34.5**

Annual Mean (AM)			32.6		32.6		32.6		32.6
Period Mean (PM)			33.4		36.4		35.6		34.5
Ratio (Ra) - Annualisation Factor			**0.98**		**0.90**		**0.92**		**0.95**

A.10 The extent of exceedances of the NO_2 limit value at sensitive receptors in Chiswick, Brentford, Heston and Gunnersbury.

In response to the feedback received from Defra/GLA on the 2016 ASR, the Council acknowledges that there are a limited number of sensitive receptor facades that are likely to be to be exposed to exceedances of the NO_2 annual mean concentration level. Whilst there is no exceedance at Heston Road and just marginal exceedance at Brentford, there are significant exceedances at Chiswick High Road and Gunnersbury, the latter being a TfL route and the former being a LA route, where the Council has implemented measures, including several SCOOT systems that have delivered reduction in peak time congestion, however more needs to be done.

Table 1 – Impact of NO_2 exceedances on Brentford (A4) Sensitive Receptors

BUREAU VERITAS

Air Quality CONSULTANTS

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	3	metres
Step 2	How far from the KERB is your receptor (in metres)?	20	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	28.8	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	57	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	43.2	$\mu g/m^3$

Table 2 – Impact of NO_2 exceedances on Chiswick High Road Sensitive Receptors

BUREAU VERITAS

Air Quality CONSULTANTS

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	3	metres
Step 2	How far from the KERB is your receptor (in metres)?	6.1	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	35.2	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	49.8	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	47.1	$\mu g/m^3$

Table 3 – Impact of NO_2 exceedances on Heston Road Sensitive Receptors

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	1	metres
Step 2	How far from the KERB is your receptor (in metres)?	7.6	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	29.2	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	42.2	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	36.9	$\mu g/m^3$

Table 4 – Impact of NO_2 exceedances on Gunnersbury Ave. (A406) Sensitive Receptors

Enter data into the red cells

Step 1	How far from the KERB was your measurement made (in metres)?	4	metres
Step 2	How far from the KERB is your receptor (in metres)?	7.6	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	36.6	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	59.1	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	55.1	$\mu g/m^3$

Appendix B Full Monthly Diffusion Tube Results for 2016

Table N. NO2 Diffusion Tube Results

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* [c]	*Annual mean – bias adjusted* [c]
BREN A	100.0%	100.0%	67.61	77.95	71.27	69.27	78.69	67.46	43.49	72.19	72.19	72.19	102.00	105.36	74.97	65.2
BREN B	100.0%	100.0%	66.53	67.78	74.01	68.09	80.76	67.39	40.99	75.54	75.54	75.54	87.01	107.66	73.90	64.3
BREN C	100.0%	100.0%	74.55	72.56	68.36	74.30	75.43	67.58	49.49	72.94	72.94	72.94	92.58	101.65	74.61	64.9
CHIS A	83.3%	83.3%	69.09	62.88	59.41	61.97	74.80		43.65	70.44	70.44	70.44	79.81		66.29	57.7
CHIS B	91.7%	91.7%	76.17	68.56	60.76	56.70	75.51		40.72	66.70	66.70	66.70	75.26	105.44	69.02	60.0
CHIS C	91.7%	91.7%	72.36	61.62	61.76	62.91	74.37		45.82	21.21	21.21	21.21	79.07	100.03	56.51	49.2
CRAN A	100.0%	100.0%	39.97	38.82	30.17	27.80	28.57	25.39	21.04	32.07	32.07	32.07	41.81	47.38	33.10	28.8
CRAN B	100.0%	100.0%	40.20	35.60	31.00	27.34	28.42	25.12	21.70	30.88	30.88	30.88	41.14	44.46	32.30	28.1
CRAN C	100.0%	100.0%	38.66	39.31	27.51	26.99	29.27	26.55	22.50	31.29	31.29	31.29	41.81	46.61	32.76	28.5
FELT A	100.0%	100.0%	48.80	53.36	45.96	44.02	48.58	44.23	32.93	57.36	57.36	57.36	59.45	80.75	52.51	45.7
FELT B	100.0%	100.0%	50.93	52.04	48.32	42.22	48.80	45.40	31.87	52.00	52.00	52.00	62.26	69.47	50.61	44.0
FELT C	91.7%	91.7%	50.92	56.49	49.26		54.31	44.87	32.89	51.26	51.26	51.26	60.55	79.82	52.99	46.1
HAT A	100.0%	100.0%	40.51	53.30	44.56	36.34	42.23	35.84	29.75	45.79	45.79	45.79	61.96	56.24	44.84	39.0
HAT B	100.0%	100.0%	46.22	55.09	41.83	42.76	44.40	31.70	27.68	41.00	41.00	41.00	61.44	59.10	44.44	38.7
HAT C	100.0%	100.0%	46.68	52.17	41.56	35.48	40.54	37.86	27.68	41.04	41.04	41.04	62.46	53.71	43.44	37.8
HEST A	100.0%	100.0%	65.81	66.28	59.85	59.96	70.45	51.86	35.59	57.54	57.54	57.54	76.00	108.41	63.90	55.6
HEST B	100.0%	100.0%	61.97	65.56	56.90	55.64	67.07	48.92	40.45	61.86	61.86	61.86	80.24	103.88	63.85	55.6

HEST C	100.0%	100.0%	65.21	57.69	61.73	59.22	70.26	51.19	44.58	61.35	61.35	61.35	82.83	109.82	65.55	57.0
HS32	91.7%	91.7%	70.44	59.68		64.23	70.09	63.25	49.32	68.13	68.13	68.13	77.43	93.62	68.40	59.5
HS33	100.0%	100.0%	64.24	70.94	57.98	65.58	62.47	65.83	51.07	65.85	65.85	65.85	76.26	84.80	66.39	57.8
HS34	91.7%	91.7%	46.09	42.81	39.02		39.17	29.70	22.68	35.32	35.32	35.32	54.07	51.73	39.20	34.1
HS35	91.7%	91.7%	47.38	50.41		37.20	38.55	31.54	25.51	37.52	37.52	37.52	56.96	71.83	42.90	37.3
HS41	91.7%	91.7%	57.32	65.21	64.23	56.20	70.53	53.45		57.38	57.38	57.38	70.94	93.74	63.98	55.7
HS42	91.7%	91.7%	44.81	43.44	38.06	37.67	42.38	37.65	28.69	43.75	43.75	43.75		58.23	42.02	36.6
HS43	100.0%	100.0%	48.04	55.52	54.06	44.42	58.90	40.75	28.18	44.09	44.09	44.09	75.77	57.60	49.63	43.2
HS51	91.7%	91.7%	39.00	44.04	36.32		29.01	27.00	22.83	34.64	34.64	34.64	49.01	51.59	36.61	31.9
HS52	100.0%	100.0%	33.11	42.45	37.02	31.49	31.89	25.14	20.02	31.24	31.24	31.24	47.05	48.18	34.17	29.7
HS53	91.7%	91.7%	46.02	45.55	41.52	31.65	36.59	31.07	26.78	38.62	38.62	38.62	55.31		39.12	34.0
HS54	100.0%	100.0%	64.30	51.42	51.67	57.78	54.24	49.97	33.87	41.33	41.33	41.33	64.11	82.79	52.85	46.0
HS55	75.0%	75.0%	58.21	61.67	58.62	52.48	60.22	45.08	29.26				69.88	90.05	58.39	50.8
HS61	58.3%	58.3%	58.53	49.87		40.54		43.68	31.58				58.60	46.57	47.05	40.0
HS62	91.7%	91.7%	52.37	47.88	47.65	44.00	44.34	34.13		44.81	44.81	44.81	67.18	80.57	50.23	43.7
HS63	75.0%	75.0%	73.95	57.22	57.14	52.26	56.16	43.91	33.55				64.60	61.51	55.59	48.4
HS64	100.0%	100.0%	38.46	41.84	39.42	32.97	42.42	29.83	24.75	40.52	40.52	40.52	58.24	58.31	40.65	35.4
HS65	100.0%	100.0%	43.54	46.60	<55.57	53.21	31.62	27.53	25.16	34.90	34.90	34.90	51.11	49.89	40.75	35.4
HS66	91.7%	91.7%	55.73	67.00		35.34	53.80	49.10	32.87	46.89	46.89	46.89	64.09	91.56	53.65	46.7
HS67	100.0%	100.0%	95.46	71.31	68.47	70.48	76.69	70.74	54.78	72.35	72.35	72.35	97.39	115.03	78.12	68.0
HS68	100.0%	100.0%	69.71	58.28	50.70	53.56	58.59	52.75	40.86	52.91	52.91	52.91	82.24	95.93	60.11	52.3
HS69	100.0%	100.0%	57.90	80.18	70.33	57.26	78.30	57.74	36.82	57.69	57.69	57.69		89.89	63.77	55.5
HS70	91.7%	91.7%		75.93	68.27	69.71	87.03	61.28	49.49	67.95	67.95	67.95	93.18	114.10	74.81	65.1
HS71	100.0%	100.0%	65.41	67.17	58.98	61.31	51.66	54.59	42.57	56.47	56.47	56.47	77.80	98.74	62.30	54.2
HS72	100.0%	100.0%	74.02	59.34	51.03	57.67	45.38	47.01	45.53	54.09	54.09	54.09	70.90	101.96	59.59	51.8
HS73	100.0%	100.0%	38.27	39.41	37.61	35.70	32.00	35.97	27.03	36.40	36.40	36.40	51.45	52.62	38.27	33.3
HS74	100.0%	100.0%	54.90	49.09	49.25	44.72	43.45	36.21	25.80	41.12	41.12	41.12	64.37	87.13	48.19	41.9
HS75	100.0%	100.0%	53.82	43.72	43.28	47.83	51.89	44.59	33.02	47.37	47.37	47.37	67.20	58.79	48.85	42.5
HS76	91.7%	91.7%	47.52	43.68	35.88		33.85	31.01	28.19	60.27	60.27	60.27	57.24	56.50	46.79	40.7

HS77	91.7%	91.7%	21.91	46.03	33.83	29.88		85.91	19.83	42.27	42.27	42.27	8.27	55.29	38.89	33.8
HS78	100.0%	100.0%	69.94	72.24	65.51	62.40	69.05	59.92	38.65	60.27	60.27	60.27	76.60	102.38	66.46	57.8
HS79	91.7%	191.7%	54.61	52.62	42.34	38.20	41.67	61.48		42.27	42.27	42.27	61.09	57.67	48.77	42.4
HS80	58.3%	58.3%	85.06	80.64	67.74	80.97	62.98						148.13	111.65	91.02	71.1
HS81	100.0%	100.0%	31.96	33.80	31.66	26.25	25.85	21.07	17.84	28.91	28.91	28.91	46.40	48.96	30.88	26.9
HS82	91.7%	91.7%	34.94		44.58	25.63	29.96	24.91	20.60	29.64	29.64	29.64	49.13	77.20	35.99	31.3
HS83	58.3%	58.3%		31.57	29.03	21.60	25.98	16.74					<43.02	49.66	31.09	24.8
HS84	100.0%	100.0%	54.14	56.79	46.61	48.38	43.41	41.50	32.69	47.01	47.01	47.01	69.16	92.67	52.20	45.4
HS85	100.0%	100.0%	56.26	62.65	51.80	50.01	53.34	51.58	40.65	54.97	54.97	54.97	71.76	93.68	58.05	50.5
HS86	100.0%	100.0%	73.40	73.66	58.53	57.06	60.44	56.29	39.13	58.62	58.62	58.62	69.24	93.12	63.06	54.9
HS87A	58.3%	58.3%	92.82	68.30		66.93	57.10	68.16					73.56	105.51	76.05	62.7
HS88	100.0%	100.0%	17.93	37.76	30.00	28.14	31.43	24.53	17.25	28.69	28.69	28.69	44.84	52.39	30.86	26.9
HS89	100.0%	100.0%	48.19	60.57	59.45	37.92	45.43	35.32	27.46	45.05	45.05	45.05	73.09	58.57	48.43	42.1
HS90	75.0%	75.0%	35.83	43.19	38.16	33.87	38.46	27.11	25.89				56.23	50.55	38.81	33.8

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%

Appendix C Air Quality Action Plan