2014 Air Quality Progress Report for London Borough of Ealing

In fulfillment of Part IV of the
Environment Act 1995
Local Air Quality Management

June 2014

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London Borough of Ealing 2014 Progress Report

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Executive Summary

In fulfilment of its Local Air Quality Management duties, the London Borough of Ealing commissioned AECOM Ltd to compile its 2014 Air Quality Progress Report. This Progress Report documents changes in monitored pollutant concentrations within the Borough since the publication of the London Borough of Ealing's 2013 Air Quality Progress Report. New local developments and planning applications which have the potential to affect air quality are also summarised, along with relevant local air quality policies, strategies, Local Transport Plans and Climate Change initiatives.

In 2013 the London Borough of Ealing undertook monitoring at five continuous monitoring sites and 95 NO_2 diffusion tube sites within the Borough.

Exceedences of the annual mean nitrogen dioxide (NO_2) air quality objective were monitored in 2013 at the Hanger Lane Gyratory, Horn Lane and Western Avenue automatic monitoring stations. In addition, monitored hourly mean NO_2 concentrations at the Hanger Lane Gyratory site exceeded the 1-hour NO_2 air quality objective, as in previous years, with 53 exceedances of the hourly NO_2 standard of 200 µg/m^3 recorded compared to the 18 permitted.

Exceedences of the annual mean NO_2 objective (40 µg/m^3) were also monitored in 2013 at 38 diffusion tube sites. Of the 38 tubes exceeding the annual mean objective, 8 recorded concentrations above 60 µg/m^3 indicating potential exceedances of the hourly mean NO_2 objective at these locations.

No exceedence of the annual mean particulate matter (PM_{10}) objective (40 µg/m^3) was recorded at any monitoring site in 2013. The daily mean PM_{10} air quality objective (50 µg/m^3, not to be exceeded more than 35 times a year) was also not exceeded at any of the monitoring sites.

A number of proposed new developments which form part of the local development plan may influence local air quality. The potential effect of these developments on local air quality will be considered in the 2015 Updating and Screening Assessment.

In conclusion, the results of this 2014 Progress Report indicate that a Detailed Assessment is not currently required and the Air Quality Management Area is to be retained.

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1 Introduction

1.1 Description of Local Authority Area

The London Borough of Ealing, located in west London, is home to over 300,000 people and covers approximately 55 square kilometres. The Borough consists of seven main areas: Acton, Ealing, Greenford, Hanwell, Northolt, Perivale and Southall. It comprises of both urban and rural areas, has a large number of parks and open spaces, as well as large amounts of housing, commercial and industrial areas. The Borough contains more than 13,000 businesses and includes half of the largest industrial and business park in London, Park Royal.

The Council regulates 84 Part B industrial and other minor processes. There are two Part A installations within the Borough; Vale Europe Ltd and GW Neale Ltd. The main source of air pollution comes from busy and congested roads, including the A40, A406, A4020, A4127 and A4000 that run through the Borough.

The whole Borough has been declared an Air Quality Management Area (AQMA) for nitrogen dioxide (NO_2) and particulate matter less than 10 µm in diameter (PM_{10}).

1.2 Purpose of Progress Report

This report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment reports. Their purpose is to maintain continuity in the LAQM process.

They are not intended to be as detailed as Updating and Screening Assessment Reports,. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the Local Authority (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

A Borough-wide Air Quality Management Area (AQMA) was declared in 2000 as a result of exceedences of the NO_2 and PM_{10} air quality objectives. An Air Quality Action Plan (AQAP)[1] was subsequently published in 2003.

The outcomes of previous rounds of LAQM review and assessment are summarised in Table 1.2. The latest Updating and Screening Assessment report produced by the London Borough of Ealing[2] highlighted the need to maintain the AQMA and continue monitoring of nitrogen dioxide and PM_{10} concentrations within the Borough.

Figure 1.1 Map of AQMA Boundaries

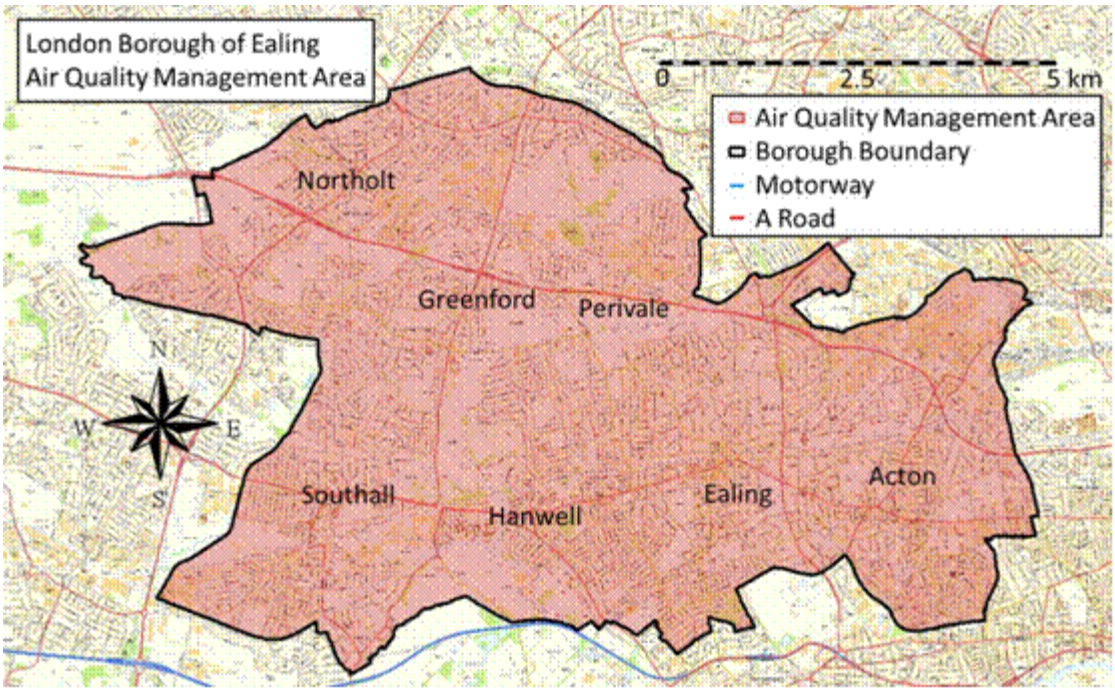


Table 1.2 Summary of Previous Rounds of Review and Assessment

Report	Date produced	Outcome
Stage 1 and 2	May-99	Need for Stage 3 for NO_2, PM_{10}, SO, CO and Pb.
Stage 3	Jan-00	Need to declare AQMA for NO_2 and PM_{10}.
Stage 4	Dec-00	Declaration of whole Borough AQMA for NO_2 and PM_{10}
Air Quality Action Plan	Apr-03	Action Plan adopted.
USA 2004	Apr-04	Detailed assessment for PM required for EWS Goods Yard, Horn Lane.
USA 2006	Apr-06	AQMA retained for whole Borough.
Detailed Assessment of PM_{10}	May-06	AQMA retained for whole Borough.
Progress Report 2007	Apr-07	No other sources require detailed assessment.
Progress Report 2008	Apr-08	No other sources require detailed assessment.
USA 2009	Jun-09	AQMA retained and additional monitoring required.
Further Assessment of NO_2	Feb-11	Extend monitoring close to rail line at sites with relevant exposure.
Progress Report 2011		AQMA retained
USA 2012	Dec-12	AQMA retained
Progress Report 2013		AQMA retained

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

The London Borough of Ealing currently operates five automatic monitoring stations. Two are situated at roadside sites, one at an industrial site, one at a near road site and one at an urban background location.

During 2013, all sites were operated as part of the London Air Quality Network[3]. Details of the relevant Quality Assurance / Quality Control (QA/QC) procedures that were followed during the monitoring are provided in Appendix A. **Error! Reference source not found.** and Table 2.1 provide details of the automatic monitoring sites located in the Borough.

Figure 2.1 Map of Automatic Monitoring Sites

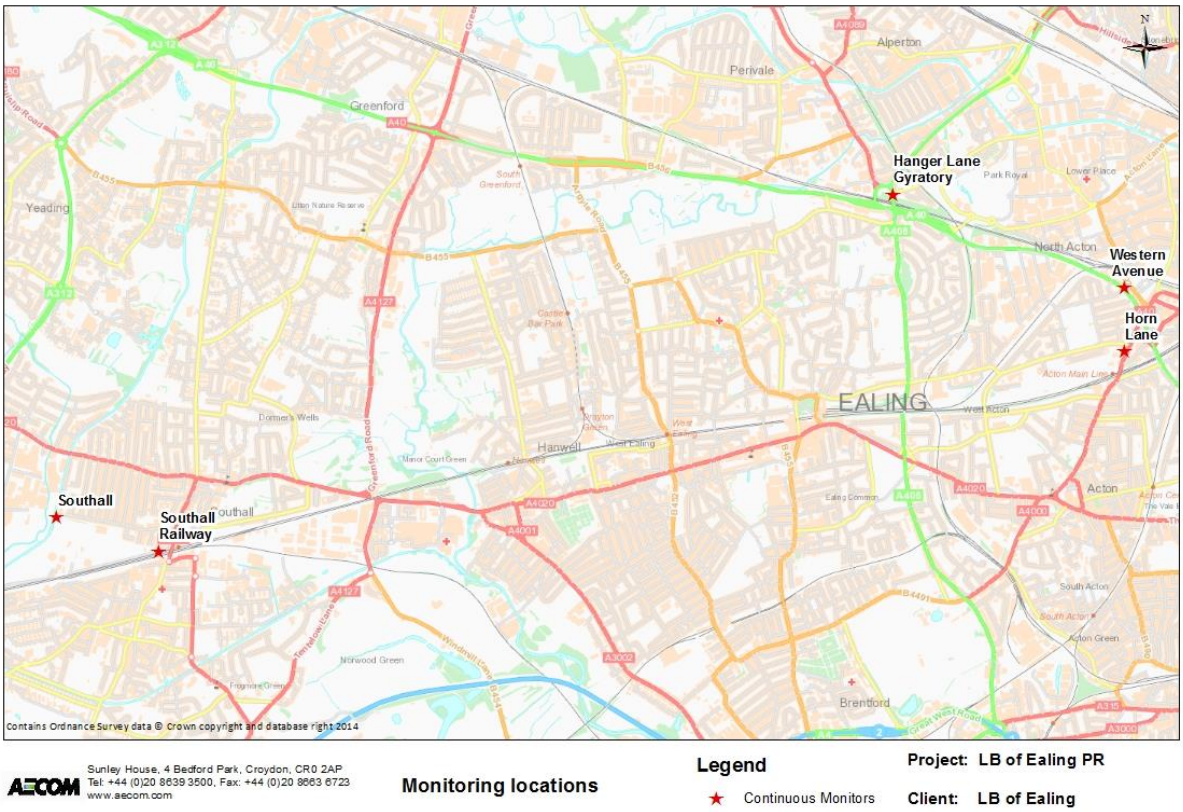


Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Hanger Lane Gyratory	Roadside	518537	182708	NO_2, PM_{10}	Y	Chemiluminescence, TEOM	Y (4)	3	Y
Horn Lane	Industrial	520432	181428	NO_2, PM_{10}	Y	Chemiluminescence, TEOM	Y (8)	2.5	Y
Southall	Urban Background	511677	180071	NO_2, PM_{10}, $PM_{2.5}$, O_3	Y	Chemiluminescence, FDMS	Y (17)	N/A	N
Southall Railway	Near road	512514	179795	NO_2, PM_{10}	Y	Chemiluminescence, TEOM	Y (22)	1	Y
Western Avenue	Roadside	520430	181950	NO_2, PM_{10}	Y	Chemiluminescence, TEOM	Y (4)	4	Y

2.1.2 Non-Automatic Monitoring Sites

The London Borough of Ealing historically monitored annual mean nitrogen dioxide concentrations using passive diffusion tubes at 126 sites located throughout the Borough. This was reduced to 98 sites in 2012 and further reduced to 95 diffusion tubes in 2013, with four triplicate sites co-located with four air quality monitoring stations (Southall, Hanger Lane, Horn Lane and Western Avenue). **Error! Reference source not found.** and Table 2.2 provides details of the diffusion tube sites operated within the Borough during 2013.

Figure 2.2 Map of Non-Automatic Monitoring Sites

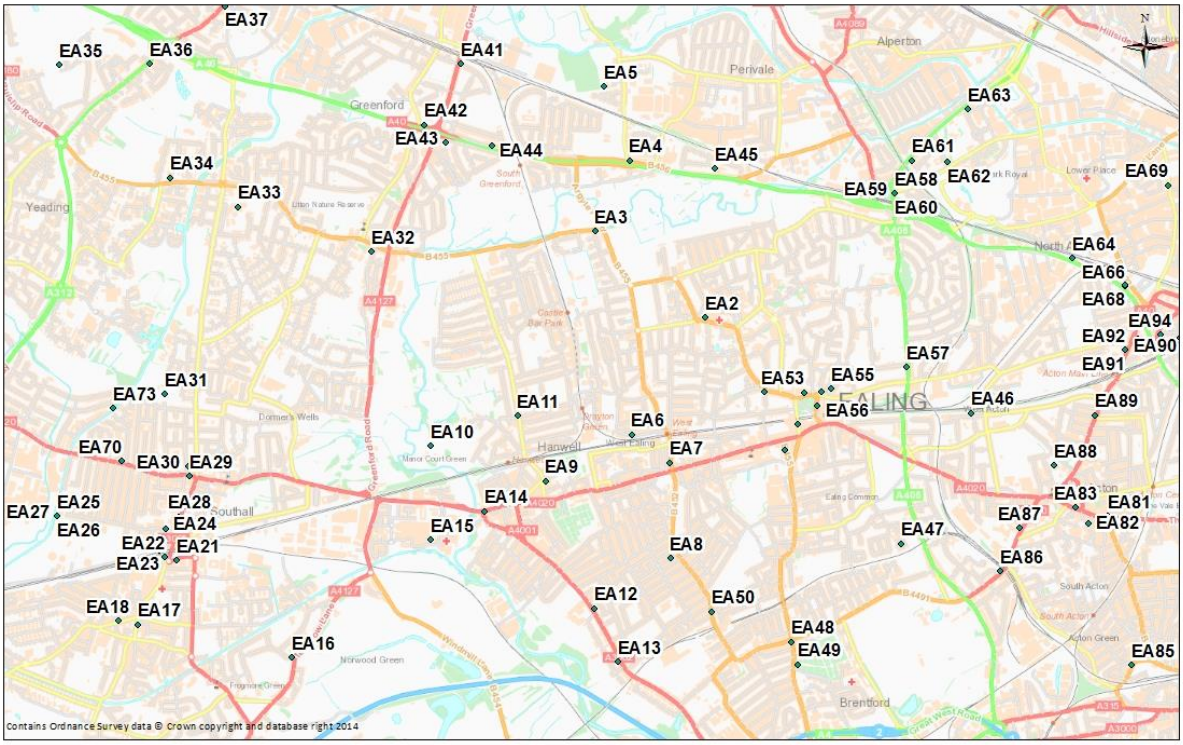


Table 2.2 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
EA1	31 Castlebar Road, Ealing,W5 2DJ	NR	517472	181088	NO_2	Y	N	Y(F)	19.3	Y
EA2	St David's Home, 12 Castlebar Hill, Ealing,W5 1TE	B	516992	181698	NO_2	Y	N	Y (L)	20.0	Y
EA3	1-4 Peal Gardens, West Ealing,W13 OBA	R	516089	182400	NO_2	Y	N	Y (F)	5.0	Y
EA4	2 Horsenden Lane South, Greenford, UB6 8AB	R	516368	182978	NO_2	Y	N	Y (F)	5.0	Y
EA5	Perivale Wood, 36-38 Sunley Gardens, Greenford,UB6 7PE	B	516160	183582	NO_2	Y	N	Y (L)	44.7	N
EA6	41 Manor Road, West Ealing,W13 OJA	NR	516387	180738	NO_2	Y	N	Y (L-10M)	11.7	Y
EA7	1 Kirn Road, Ealing, W13 0UB	R	516699	180509	NO_2	Y	N	Y (L)	4.8	Y
EA8	12 Balfour Road, Ealing, W13 9TN	R	516703	179728	NO_2	Y	N	Y (F)	4.7	Y
EA9	Health Centre, 20 Church Road, Hanwell, W7 1DR	NR	515680	180360	NO_2	Y	N	Y (F)	25.0	Y
EA10	Visitor Centre, Brent Lodge Park, Church Road, Hanwell,W7 3BP	B	514740	180643	NO_2	Y	N	Y (F)	N/A	N
EA11	74A Greenford Avenue, Hanwell, W7 3QS	R	515451	180894	NO_2	Y	N	Y (F)	5.0	Y
EA12	255 Boston Road, Hanwell,W7 2AT	NR	516080	179318	NO_2	Y	N	Y (F)	10.6	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
EA13	6 Boston Gardens, Boston Road, Hanwell, W7 2AN	NR	516277	178882	NO_2	Y	N	Y (F)	12.2	Y
EA14	200 Uxbridge Road, Hanwell, W7 3TB	R	515180	180111	NO_2	Y	N	Y(F)	3.5	Y
EA15	Moot House, Ealing Hospital, Uxbridge Road, Southall, UB1 3HW	B	514740	179876	NO_2	Y	N	Y (F)	N/A	N
EA16	4 Minterne Avenue, Southall,UB2 4LL	NR	513606	178917	NO_2	Y	N	Y (F)	11.5	Y
EA17	55 King Street, Southall, UB2 4DQ	R	512341	179186	NO_2	Y	N	Y(F))	3.8	Y
EA18	Belmont Health Centre,18 Western Road, Southall,UB2 5DU	NR	512181	179219	NO_2	Y	N	Y (F)	7.5	Y
EA19	22 Bulls Bridge Road, Southall, UB2 5LU	B	511176	178893	NO_2	Y	N	Y (F)	N/A	N
EA20	150 Brent Road, Southall, UB2 5LD	NR	511170	179251	NO_2	Y	N	Y (L)	7.7	Y
EA21	Maypole Court, 2 Merrick Road, Southall, UB2 4AU	NR	512657	179712	NO_2	Y	N	Y (F)	14.3	Y
EA22	Martin Court, Southbridge Way, Southall, UB2 4QW	NR	512560	179739	NO_2	Y	N	Y (F)	27.5	N
EA23	1 Randolph Road,Southall,UB1 1BL	R	512514	179795	NO_2	Y	N	Y (L))	1.9	Y
EA24	16 Beaconsfield Road, Southall, UB1 1DW	NR	512570	179969	NO_2	Y	N	Y(F)	6.3	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
EA25	Blair Peach School, Beaconsfield Road, UB1 1DD(Southall *AQMS*) (Tri)	B	511680	180071	NO_2	Y	Y	Y (F)	50.0	N
EA26	Blair Peach School, Beaconsfield Road,UB1 1DD (Southall *AQMS*) (Tri)	B	511680	180071	NO_2	Y	Y	Y (F)	50.0	N
EA27	Blair Peach School, Beaconsfield Road, UB1 1DD(Southall *AQMS*) (Tri)	B	511680	180071	NO_2	Y	Y	Y (F)	50.0	N
EA28	Hambrough Primary School, South Road,Southall,UB1 1SF	NR	512673	180069	NO_2	Y	N	Y (F)	10.8	Y
EA29	11 The Broadway, Southall, UB1 3PX	R	512768	180400	NO_2	Y	N	Y (F)	4.3	Y
EA30	7 Greenford Avenue, Southall, UB1 2AA	NR	512753	180478	NO_2	Y	N	Y(L)	9.0	Y
EA31	Athletic Park, Spike Bridges Park, West Avenue, Southall, UB1 2AR	B	512563	181069	NO_2	Y	N	Y(L)	N/A	N
EA32	205 Windmill Lane, Greenford, UB6 9DW	R	514259	182234	NO_2	Y	N	Y (F)	5.0	Y
EA33	Greenford High School, Lady Margaret Road, Southall, UB1 2GU	B	513158	182600	NO_2	Y	N	Y (F)	150.0	N
EA34	2 Shadwell Drive, Northolt, UB5 6DB	NR	512603	182837	NO_2	Y	N	Y (F))	14.0	Y
EA35	32 Irving Avenue, Northolt, UB5 5LX	B	511698	183760	NO_2	Y	N	Y (F)	35.0	N

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
EA36	213 Church Road, Northolt, UB5 5BE	NR	512442	183769	NO_2	Y	N	Y(F)	12.4	Y
EA37	31 Mandeville Road, Northolt, UB5 5HF	NR	513056	184241	NO_2	Y	N	Y (F)	12.6	Y
EA38	126 Petts Hill, Northolt, UB5 4NW	NR	513794	185348	NO_2	Y	N	Y (F)	9.4	Y
EA39	1504 Greenford Road, Greenford, UB6 0HR	NR	515402	185313	NO_2	Y	N	Y (F)	10.5	Y
EA40	79 Whitton Avenue East, Greenford, UB6 0QD	NR	516867	184689	NO_2	Y	N	Y (F)	14.7	Y
EA41	914 Greenford Road,Greenford,UB6 8QN	NR	514985	183770	NO_2	Y	N	Y (F)	11.5	Y
EA42	6 Karoline Gardens, Greenford, UB6 9JP	NR	514691	183269	NO2	Y	N	Y (F)	9.4	Y
EA43	12 Blenheim Close, Greenford, UB6 8ET	NR	514863	183122	NO_2	Y	N	Y (F)	9.4	Y
EA44	19 Runnymede Gardens, Greenford,UB6 8SX	NR	515240	183102	NO_2	Y	N	Y (F)	11.2	Y
EA45	4 Thirlmere Avenue, Perivale, UB6 8EF	B	517072	182912	NO_2	Y	N	Y (F)	46.5	N
EA46	Oakley House, Oakley Avenue,Ealing,W5 3SB	NR	519167	180915	NO_2	Y	N	Y (F)	20.5	N
EA47	53-61 St Pauls Close, Ealing,W5 3JX	NR	518594	179848	NO_2	Y	N	Y (F)	11.0	N
EA48	158 South Ealing Road, Ealing, W5 4QL	R	517694	179045	NO_2	Y	N	Y (F)	3.5	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
EA49	South Ealing Cemetery, Popes Lane, Ealing, W5 4NA	B	517750	178860	NO_2	Y	N	Y (F)	32.0	N
EA50	213 Northfields Ave, West Ealing, W13 9QU	R	517045	179292	NO_2	Y	N	Y(F)	5.2	Y
EA51	12 Bond Street, Ealing, W5 5AP	R	517644	180613	NO_2	Y	N	Y (F)	2.7	Y
EA52	Sinton Andrews, 8 Spring Bridge Road,Ealing,W5 2AA	R	517745	180827	NO_2	Y	N	Y(F)	3.0	Y
EA53	Haven Green Court, Haven Green, Ealing, W5 2UZ	NR	517803	181082	NO_2	Y	N	Y(F)	16.9	Y
EA54	27 Haven Green, Ealing,W5 2NZ	NR	517940	181092	NO_2	Y	N	Y(L)	12.1	Y
EA55	21 Haven Lane, Ealing,W5 2HZ	NR	518022	181114	NO_2	Y	N	Y(F)	2.4	Y
EA56	41-42 Haven Green, Ealing,W5 2NX	R	517909	180971	NO_2	Y	N	Y(F)	3.0	Y
EA57	64 Hanger Lane,Ealing,W5 2JH	NR	518635	181288	NO_2	Y	N	Y (F)	12.7	Y
EA58	Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane *AQMS*) (Tri)	R	518541	182707	NO_2	Y	Y	Y (F)	4.0	Y
EA59	Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane *AQMS*) (Tri)	R	518541	182707	NO_2	Y	Y	Y (F)	4.0	Y
EA60	Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane *AQMS*) (Tri)	R	518541	182707	NO_2	Y	Y	Y (F)	4.0	Y
EA61	25 Waverley Gardens, A406,Park Royal, NW10 7EX	R	518680	182979	NO_2	Y	N	Y (F)	10.1	Yes

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
EA62	6 Brentmead Gardens, Park Royal,NW10 7DS	NR	518976	182963	NO_2	Y	N	Y (F)	8.4	N
EA63	3 Iveagh Terrace, A406, Park Royal,NW10 7SY	NR	519142	183399	NO_2	Y	N	Y (F)	27.2	Y
EA64	Wendover Court,Western Avenue,Acton,W3 -Grnd Floor	NR	519997	182178	NO_2	Y	N	Y (F)	11.0	Y
EA65	322 & 324 Western Avenue, Acton, W3 OPL ((Western Ave *AQMS*) (*Tri*)	R	520430	181950	NO_2	Y	N	Y	5.0	Y
EA66	322 & 324 Western Avenue, Acton, W3 OPL (Western Ave *AQMS*) (*Tri*)	R	520430	181950	NO_2	Y	N	Y	5.0	Y
EA67	322 & 324 Western Avenue, Acton, W3 OPL (Western Ave *AQMS*) (*Tri*)	R	520430	181950	NO_2	Y	N	Y	5.0	Y
EA68	326 Western Avenue, Acton, W3 0PL	NR	520426	181958	NO_2	Y	N	Y	11.4	Y
EA69	94 North Acton Road, Park Royal, NW10 7AY	NR	520780	182775	NO_2	Y	N	Y (F)	7.2	Y
EA70	1 Shaftesbury Gardens, Park Royal, NW10 6LJ	NR	512206	180522	NO_2	Y	N	Y (F)	17.1	Y
EA71	39 Old Oak Lane,Park Royal, NW10 6EJ	NR	521587	182684	NO_2	Y	N	Y (F)	6.1	Y
EA72	27 Wells House Road, Park Royal, NW10 6ED	NR	521305	181966	NO_2	Y	N	Y(K)	6.2	N
EA73	4 St Andrews Road, Acton,W3 7NE	NR	512138	180953	NO_2	Y	N	Y (F)	8.2	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
EA74	98 Western Avenue, Acton, W3 7TZ	NR	521173	180981	NO_2	Y	N	Y (F)	10.0	Y
EA75	6 Western Avenue, Acton, W3 7UD	R	521549	180923	NO_2	Y	N	Y (F)	5.3	Y
EA76	57 Old Oak Common Lane (PO), Acton,W3 7DD	NR	521557	180996	NO_2	Y	N	Y (F)	11.0	Y
EA77	205 Old Oak Road, Acton, W3 7HH	R	521614	180852	NO_2	Y	N	Y (F)	4.7	Y
EA78	17 The Vale, Acton, W3 7SH	NR	521720	180084	NO_2	Y	N	Y (F)	4.8	Y
EA79	3 Warple Way, Acton, W3 0RH	R	521088	180046	NO_2	Y	N	Y (L)	2.2	Y
EA80	Old School House adj East Acton Primary School, East Acton Lane, Acton,W3 7HA	NR	521093	180613	NO_2	Y	N	Y (F)	11.0	Y
EA81	Scope, 88 High Street, Acton, W3 6QX	R	520285	180075	NO_2	Y	N	Y(F)	5.2	Y
EA82	Acton Health Centre,35-61Church Road,Acton,W3 8QE	NR	520128	180016	NO_2	Y	N	Y (F)	10.8	N
EA83	Dexters, 182 High Street, Acton, W3 9NN	R	520026	180141	NO_2	Y	N	Y (F)	3.7	Y
EA84	26 Hawkshead Road, Chiswick, W4 1AD	B	521264	179560	NO_2	Y	N	Y (F)	8.0	N
EA85	44 Acton Lane, Chiswick, W4 5ED	NR	520480	178854	NO_2	Y	N	Y (F)	8.1	Y
EA86	Acton Medical Centre, 122 Gunnersbury Lane,Acton,W3 9BA	R	519404	179620	NO_2	Y	N	N (L)	8.9	Y

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
EA87	Acton Care Centre, 48 Gunnersbury Lane, Acton,W3 8EG	NR	519562	179977	NO_2	Y	N	Y (F)	16.7	Y
EA88	15 Lantry Court, Lexden Road, Acton, W3 9PE	B	519849	180485	NO_2	Y	N	Y (F)	58.9	N
EA89	Horn Lane Surgery, 156 Horn Lane,Acton,W3 6PH	NR	520180	180896	NO_2	Y	N	Y (F)	6.0	Y
EA90	317 Horn Lane, Acton,W3 0BU (Horn Lane *AQMS*) (*Tri*)	R	520432	181428	NO_2	Y	Y	Y(F)	3.0	Y
EA91	317 Horn Lane, Acton,W3 0BU (Horn Lane *AQMS*) (*Tri*)	R	520432	181428	NO_2	Y	Y	Y(F)	3.0	Y
EA92	317 Horn Lane, Acton,W3 0BU (Horn Lane *AQMS*) (*Tri*)	R	520432	181428	NO_2	Y	Y	Y(F)	3.0	Y
EA93	5 Leamington Park, Acton, W3 6TJ	NR	520532	181517	NO_2	Y	N	Y (F)	11.0	Y
EA94	36 Wales Farm Road, Acton,W3 6UE	NR	520724	181552	NO_2	Y	N	Y (F)	9.9	Y
EA95	67-72 Sea Close, Acton, W3 6TF	B	520880	181531	NO_2	Y	N	Y (F)	59.1	N

Notes: For 'Site Type' NR = Near Road, R = Roadside, B = Background and K = Kerbside.

In Relevant Exposure column, diffusion tubes located on residential façades are shown with an F in brackets, those on lampposts with an L in brackets and those on other street furniture with an O in brackets.

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide (NO_2)

Automatic Monitoring Data

In 2012 the London Borough of Ealing reduced its number of automatic monitoring stations, closing the stations at Acton Town Hall (roadside) and Ealing Town Hall (urban background). Currently there are five automatic monitoring stations in operation which measure NO_2: Southall, Southall Railway, Hanger Lane Gyratory, Horn Lane and Western Avenue, the results from which in recent years are shown in Table 2.3 and Table 2.4.

It should be noted that whilst data capture was relatively low at Horn Lane in 2013 (76%), as it was above 75% the monitored annual mean NO_2 concentration at this site did not require annualisation in accordance with the methodology in Box 3.2 in LAQM.TG(09).

Exceedances of the 40 µg/m^3 annual mean objective were observed at three of the five monitoring stations (Hanger Lane Gyratory, Horn Lane and Western Avenue) in all years between 2010 and 2013. The highest annual mean concentration in 2013 (74.3 µg/m^3) was recorded at the Hanger Lane Gyratory Site.

Monitored hourly mean NO_2 concentrations at the Hanger Lane Gyratory site also exceeded the 1-hour NO_2 objective in 2013, as in previous years, with 53 exceedances of the hourly NO_2 standard of 200 µg/m^3 recorded compared to the 18 permitted. The 99.8th percentile of hourly mean NO_2 concentrations recorded at Western Avenue in 2013, which was calculated as data capture at this site was less than 90%, suggests that the hourly mean NO_2 objective was potentially also exceeded at this site. No other sites monitored exceedances of the 1 hour NO_2 objective.

Error! Reference source not found. shows trends in monitored NO_2 concentrations at each of the automatic monitoring sites over the last five years. Concentrations appear to have remained relatively constant all sites apart from at the Hanger Lane Gyratory site where monitored concentrations appear to show a slow downward trend, despite a peak in concentration in 2012.

Table 2.3 Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 %	Annual Mean NO_2 Concentration ($\mu g/m^3$)				
				2009	2010	2011	2012	2013
Hanger Lane Gyratory	Roadside	Y	92.8	**93.0**	**91.5**	**79.2**	**95.0**	**74.3**
Horn Lane	Industrial	Y	76.0	-	**54.2**[a]	**58.1**[a]	**53.4**	**56.6**
Southall	Urban Background	Y	85.6	31.0	30.8	28.6	34.7	31.8
Southall Railway	Near road	Y	85.4	-	-	37.2	35.4	33.7
Western Avenue	Roadside	Y	85.8	-	**67.7**	**61.7**	**69.8**[a]	**63.9**

Notes: In bold, exceedence of the NO_2 annual mean AQS objective of $40\mu g/m^3$

[a] Where data captures are less than 90%, data have been annualised.

Figure 2.3 Trends in Annual Mean NO_2 Concentrations Measured at Automatic Monitoring Sites

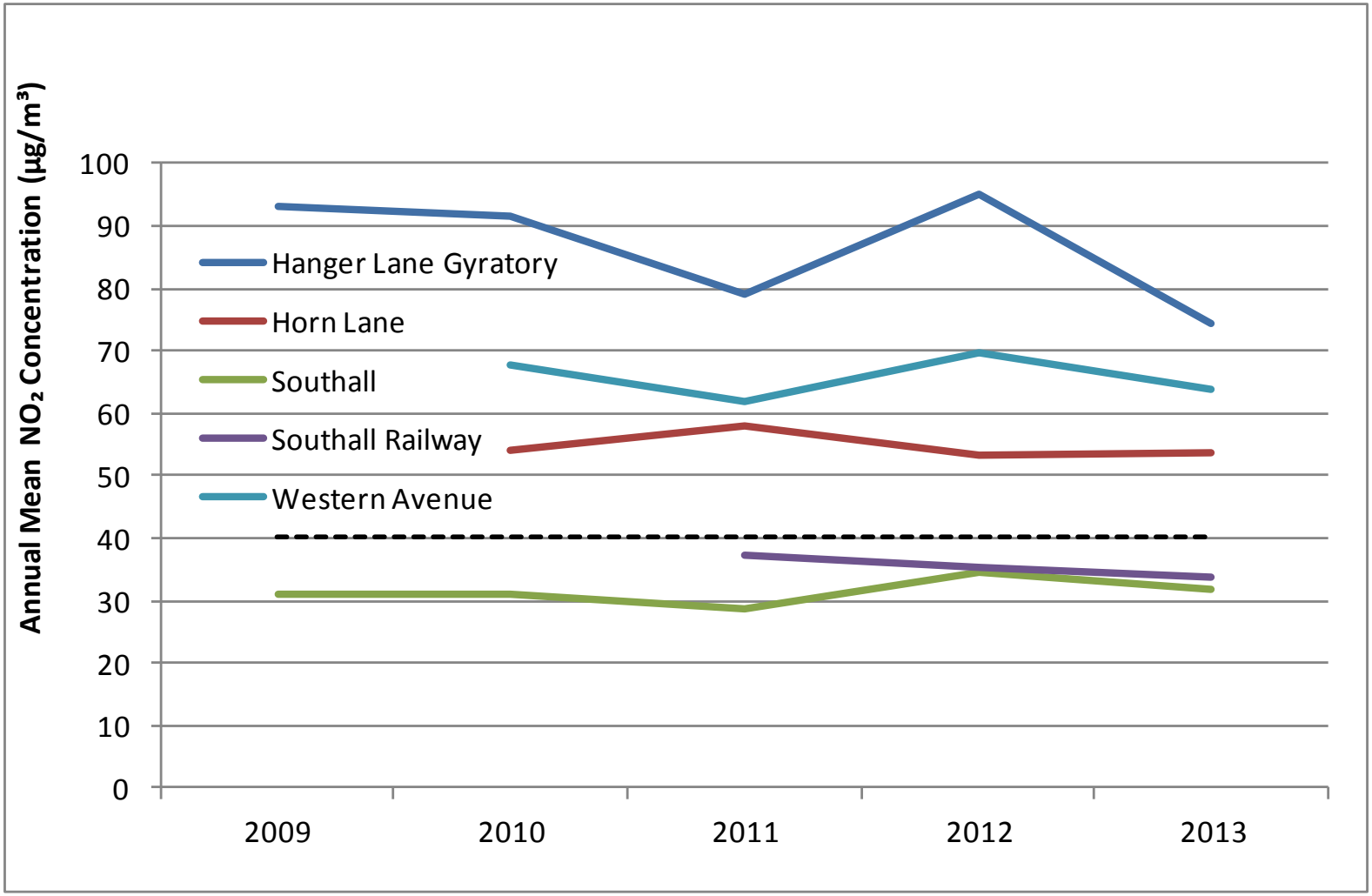


Table 2.4 Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 %	Number of Hourly Means > 200µg/m^3				
				2009[c]	2010	2011	2012	2013
Hanger Lane Gyratory	Roadside	Y	92.8	**166**	**134 (231)**	**66**	**173**	**56**
Horn Lane	Industrial	Y	76.0	-	0 (138)	14 (192)	2	0 (152)
Southall	Urban Background	Y	85.6	0	0	0	0	0 (121)
Southall Railway	Near road	Y	85.4	-	-	0 (126)	0	1 (116)
Western Avenue	Roadside	Y	85.8	-	9 (185)	2 (168)	10	17 (**202**)

Notes: In bold, exceedence of the NO_2 hourly mean AQS objective (200µg/m^3 – not to be exceeded more than 18 times per year)

Where data capture for the full calendar year was less than 90%, the 99.8th percentile of hourly means is shown in brackets.

Diffusion Tube Monitoring Data

Up until 2012, the London Borough of Ealing network of diffusion tubes numbered 126, however in 2012 this was reduced to 87 diffusion tubes sites, including four triplicate sites. The diffusion tubes are prepared and analysed by Environmental Scientifics Group (using the 20% Triethanolamine in acetone method). Details of the QA/QC procedures applied to the diffusion tube results are summarised in Appendix A. Data capture for the diffusion tubes was generally high with only one of the 95 tubes requiring annualisation, details of which can be found in Appendix B.

Twelve of the sites at which monitoring has been undertaken since 2012 were new sites where monitoring had not previously been undertaken. In 2013, NO_2 concentrations at four of the twelve newly monitored locations exceeded the annual mean air quality objective.

In total, 38 of the diffusion tubes recorded concentrations greater than the 40 µg/m^3 air quality objective in 2013. Of the 38 tubes exceeding the annual mean air quality objective, 8 recorded a value above 60 µg/m^3. Concentrations greater than 60 µg/m^3 indicate a risk of the 1-hour NO_2 objective being exceeded.

The results for 2013 are shown in Table 2.5 and results from 2009 to 2013 for the locations at which monitoring is currently undertaken are shown in Table 2.6.

The maximum recorded value in 2013 was 75.2 µg/m^3 at site EA75, 6 Western Avenue, Acton. This location has recorded concentrations above 70 µg/m^3 in four of the last five years.

Table 2.5 Results of NO_2 Diffusion Tubes 2013

-	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration ($\mu g/m^3$) - Bias Adjustment factor = 0.76
EA1	31 Castlebar Road, Ealing,W5 2DJ	NR	Y	N	92%	30.8
EA2	St David's Home, 12 Castlebar Hill, Ealing,W5 1TE	B	Y	N	100%	26.5
EA3	1-4 Peal Gardens, West Ealing,W13 OBA	R	Y	N	92%	31.1
EA4	2 Horsenden Lane South, Greenford, UB6 8AB	R	Y	N	83%	**53.1**
EA5	Perivale Wood, r/o 36-38 Sunley Gardens, Greenford,UB6 7PE	B	Y	N	100%	22.2
EA6	41 Manor Road, West Ealing,W13 OJA	NR	Y	N	100%	29.6
EA7	1 Kirn Road, Ealing, W13 0UB	R	Y	N	100%	**46.8**
EA8	12 Balfour Road, Ealing, W13 9TN	R	Y	N	100%	26.9
EA9	Health Centre, 20 Church Road, Hanwell, W7 1DR	NR	Y	N	100%	30.1
EA10	Visitor Centre,Brent Lodge Park,Church Road, Hanwell,W7 3BP	B	Y	N	100%	23.5
EA11	74A Greenford Avenue, Hanwell, W7 3QS	R	Y	N	83%	36.5
EA12	255 Boston Road, Hanwell,W7 2AT	NR	Y	N	100%	30.9
EA13	6 Boston Gardens, Boston Road,Hanwell, W7 2AN	NR	Y	N	100%	33.1
EA14	200 Uxbridge Road, Hanwell, W7 3TB	R	Y	N	100%	**52.6**
EA15	Moot House, Ealing Hospital, Uxbridge Road, Southall, UB1 3HW	B	Y	N	100%	29.4
EA16	4 Minterne Avenue, Southall,UB2 4LL	NR	Y	N	100%	25.1
EA17	55 King Street, Southall, UB2 4DQ	R	Y	N	100%	**47.3**

-	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.76
EA18	Belmont Health Centre,18 Western Road, Southall,UB2 5DU	NR	Y	N	100%	36.4
EA19	22 Bulls Bridge Road, Southall, UB2 5LU	B	Y	N	100%	34.5
EA20	150 Brent Road, Southall, UB2 5LD	NR	Y	N	92%	37.6
EA21	Maypole Court, 2 Merrick Road, Southall, UB2 4AU	NR	Y	N	92%	32.6
EA22	Martin Court, Southbridge Way, Southall, UB2 4QW	NR	Y	N	100%	33.2
EA23	1 Randolph Road,Southall,UB1 1BL	R	Y	N	100%	34.0
EA24	16 Beaconsfield Road, Southall, UB1 1DW	NR	Y	N	75%	39.6[a]
EA25	Blair Peach School, Beaconsfield Road, UB1 1DD (Southall AQMS) (Tri)	B	Y	Y	100%	25.2
EA26	Blair Peach School, Beaconsfield Road,UB1 1DD (Southall AQMS) (Tri)	B	Y	Y	100%	23.8
EA27	Blair Peach School, Beaconsfield Road, UB1 1DD (Southall AQMS) (Tri)	B	Y	Y	100%	24.5
EA28	Hambrough Primary School, South Road,Southall,UB1 1SF	NR	Y	N	100%	**41.1**
EA29	11 The Broadway, Southall, UB1 3PX	R	Y	N	92%	**55.2**
EA30	7 Greenford Avenue, Southall, UB1 2AA	NR	Y	N	100%	29.2
EA31	Athletic Park, Spike Bridges Park, West Avenue, Southall, UB1 2AR	B	Y	N	100%	30.4
EA32	205 Windmill Lane, Greenford, UB6 9DW	R	Y	N	100%	33.2

-	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.76
EA33	Greenford High School, Lady Margaret Road, Southall, UB1 2GU	B	Y	N	100%	31.1
EA34	2 Shadwell Drive, Northolt, UB5 6DB	NR	Y	N	100%	27.8
EA35	32 Irving Avenue, Northolt, UB5 5LX	B	Y	N	100%	22.6
EA36	213 Church Road, Northolt, UB5 5BE	NR	Y	N	100%	**42.1**
EA37	31 Mandeville Road, Northolt, UB5 5HF	NR	Y	N	100%	**40.2**
EA38	126 Petts Hill, Northolt, UB5 4NW	NR	Y	N	92%	32.5
EA39	1504 Greenford Road, Greenford, UB6 0HR	NR	Y	N	100%	33.5
EA40	79 Whitton Avenue East, Greenford, UB6 0QD	NR	Y	N	100%	26.1
EA41	914 Greenford Road,Greenford,UB6 8QN	NR	Y	N	100%	36.5
EA42	6 Karoline Gardens, Greenford, UB6 9JP	NR	Y	N	92%	**42.2**
EA43	12 Blenheim Close, Greenford, UB6 8ET	NR	Y	N	100%	38.6
EA44	19 Runnymede Gardens, Greenford,UB6 8SX	NR	Y	N	100%	39.4
EA45	4 Thirlmere Avenue, Perivale, UB6 8EF	B	Y	N	100%	31.0
EA46	Oakley House, Oakley Avenue,Ealing,W5 3SB	NR	Y	N	100%	28.6
EA47	53-61 St Pauls Close, Ealing,W5 3JX	NR	Y	N	100%	24.4
EA48	158 South Ealing Road, Ealing, W5 4QL	R	Y	N	100%	**57.3**
EA49	South Ealing Cemetery, Popes Lane, Ealing, W5 4NA	B	Y	N	100%	26.6
EA50	213 Northfields Ave, West Ealing, W13 9QU	R	Y	N	100%	37.9
EA51	12 Bond Street, Ealing, W5 5AP	R	Y	N	100%	**50.7**

-	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.76
EA52	8 Spring Bridge Road,Ealing,W5 2AA	R	Y	N	100%	**61.4**
EA53	Haven Green Court, Haven Green, Ealing, W5 2UZ	NR	Y	N	100%	33.5
EA54	27 Haven Green, Ealing,W5 2NZ	NR	Y	N	100%	32.5
EA55	21 Haven Lane, Ealing,W5 2HZ	NR	Y	N	100%	33.8
EA56	41-42 Haven Green, Ealing,W5 2NX	R	Y	N	100%	**48.4**
EA57	64 Hanger Lane,Ealing,W5 2JH	NR	Y	N	100%	38.7
EA58	Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane AQMS) (Tri)	R	Y	Y	100%	**75.1**
EA59	Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane AQMS) (Tri)	R	Y	Y	100%	**74.3**
EA60	Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane AQMS) (Tri)	R	Y	Y	100%	**74.7**
EA61	25 Waverley Gardens, A406,Park Royal, NW10 7EX	R	Y	N	100%	**49.7**
EA62	6 Brentmead Gardens, Park Royal,NW10 7DS	NR	Y	N	100%	27.5
EA63	3 Iveagh Terrace, A406, Park Royal,NW10 7SY	NR	Y	N	100%	**40.6**
EA64	Wendover Court,Western Avenue,Acton,W3 0TG-Grnd Floor	NR	Y	N	92%	**59.3**
EA65	322 & 324 Western Avenue, Acton, W3 OPL (Western Ave AQMS) (Tri)	R	Y	N	100%	**67.6**
EA66	322 & 324 Western Avenue, Acton, W3 OPL (Western Ave AQMS) (Tri)	R	Y	N	100%	**68.2**

-	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.76
EA67	322 & 324 Western Avenue, Acton, W3 OPL (Western Ave AQMS) (Tri)	R	Y	N	100%	**66.7**
EA68	326 Western Avenue, Acton, W3 0PL	NR	Y	N	100%	**57.3**
EA69	94 North Acton Road, Park Royal, NW10 7AY	NR	Y	N	92%	34.2
EA70	1 Shaftesbury Gardens, Park Royal, NW10 6LJ	NR	Y	N	100%	37.8
EA71	39 Old Oak Lane,Park Royal, NW10 6EJ	NR	Y	N	100%	**50.5**
EA72	27 Wells House Road, Park Royal, NW10 6ED	NR	Y	N	100%	39.8
EA73	4 St Andrews Road, Acton,W3 7NE	NR	Y	N	100%	35.8
EA74	98 Western Avenue, Acton, W3 7TZ	NR	Y	N	100%	**48.2**
EA75	6 Western Avenue, Acton, W3 7UD	R	Y	N	92%	**75.2**
EA76	57 Old Oak Common Lane (PO), Acton,W3 7DD	NR	Y	N	100%	**48.1**
EA77	205 Old Oak Road, Acton, W3 7HH	R	Y	N	100%	**58.6**
EA78	17 The Vale, Acton, W3 7SH	NR	Y	N	83%	**44.3**
EA79	3 Warple Way, Acton, W3 0RH	R	Y	N	100%	**43.1**
EA80	Old School House adj East Acton Primary School, East Acton Lane, Acton,W3 7HA	NR	Y	N	100%	29.5
EA81	Scope, 88 High Street, Acton, W3 6QX	R	Y	N	100%	**56.2**
EA82	Acton Health Centre,35-61Church Road,Acton,W3 8QE	NR	Y	N	92%	30.6
EA83	Dexters, 182 High Street, Acton, W3 9NN	R	Y	N	100%	**59.0**
EA84	26 Hawkshead Road, Chiswick, W4 1AD	B	Y	N	100%	27.7
EA85	44 Acton Lane, Chiswick, W4 5ED	NR	Y	N	100%	38.4

-	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (%)	2013 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.76
EA86	Acton Medical Centre, 122 Gunnersbury Lane,Acton,W3 9BA	R	Y	N	100%	33.5
EA87	Acton Care Centre, 48 Gunnersbury Lane, Acton,W3 8EG	NR	Y	N	100%	33.4
EA88	15 Lantry Court, Lexden Road, Acton, W3 9PE	B	Y	N	100%	26.9
EA89	Horn Lane Surgery, 156 Horn Lane,Acton,W3 6PH	NR	Y	N	100%	**42.2**
EA90	317 Horn Lane, Acton,W3 0BU (Horn Lane AQMS) (Tri)	R	Y	Y	100%	**51.5**
EA91	317 Horn Lane, Acton,W3 0BU (Horn Lane AQMS) (Tri)	R	Y	Y	100%	**51.8**
EA92	317 Horn Lane, Acton,W3 0BU (Horn Lane AQMS) (Tri)	R	Y	Y	100%	**50.1**
EA93	5 Leamington Park, Acton, W3 6TJ	NR	Y	N	100%	**41.9**
EA94	36 Wales Farm Road, Acton,W3 6UE	NR	Y	N	100%	**44.7**
EA95	67-72 Seaclose Close, Acton, W3 6TF	B	Y	N	100%	33.7

Notes: For Site Type NR = Near Road, R = Roadside, B = Background and K = Kerbside.

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

Underlined, annual mean > 60µg/m^3, indicating a potential exceedence of the NO_2 hourly mean AQS objective

[a] These values have been "annualised" in accordance with the methodology within Box 3.2 of LAQM.TG(09) as full calendar year data capture was less than 75%. See Appendix A for further details.

Table 2.6 Results of NO_2 Diffusion Tubes (2009 to 2013)

Site Name	Site Type	Within AQMA?	Annual Mean NO_2 Concentration ($\mu g/m^3$) - Adjusted for Bias				
			2009[a]	2010[a]	2011 (Bias Adjustment Factor = 1.01)	2012 (Bias Adjustment Factor = 0.96)	2013 (Bias Adjustment Factor = 0.76)
39 Old Oak Lane,Park Royal, NW10 6EJ	NR	Y	**52.1**	**56.7**	**54.1**	**51.1**	**50.5**
36 Wales Farm Road, Acton,W3 6UE	NR	Y	N/A	N/A	**48.5**	**44.8**	**44.7**
5 Leamington Park, Acton, W3 6TJ	NR	Y	**44.7**	**47.5**	**48.6**	**46.6**	**41.9**
Wendover Court,Western Avenue,Acton,W3 0TG-Grnd Floor	NR	Y	**58.5**	**67.4**	38.9	**56.0**	**59.3**
25 Waverley Gardens, A406,Park Royal, NW10 7EX	R	Y	N/A	N/A	**54.9**	**51.8**	**49.7**
6 Brentmead Gardens, Park Royal (Roadside 2009/2010 and on facade from 2011)	NR	Y	**43.0**	**40.5**	36.3	34.4	27.5
3 Iveagh Terrace, Park Royal	NR	Y	N/A	N/A	**44.5**	**45.0**	**40.6**
57 Old Oak Common Lane, Acton,W3 7DD	NR	Y	**53.5**	**56.5**	**53.2**	**49.6**	**48.1**
4 St Andrews Road, Acton,W3 7NE	NR	Y	**48.0**	**50.7**	**43.4**	**42.3**	35.8
205 Old Oak Road, Acton, W3 7HH	R	Y	**67.2**	**76.9**	**59.7**	**55.2**	**58.6**
Old School House adj East Acton Primary School, East Acton Lane, Acton,W3 7HA	NR	Y	35.8	37.8	**40.4**	35.9	29.5
17 The Vale, Acton, W3 7SH	R	Y	N/A	N/A	**50.1**	**49.5**	**44.3**
15 Lantry Court, Lexden Road, Acton, W3 9PE	B	Y	**67**	33.4	30.5	31.7	26.9
Dexters, 182 High Street, Acton, W3 9NN	R	Y	**55.9**	**64.9**	**67.4**	**48.9**	**59**
Acton Health Centre,35-61Church Road,Acton,W3 8QE	NR	Y	33.4	39.6	32.9	39.5	30.6
Acton Care Centre, 48 Gunnersbury Lane, Acton,W3 8EG (Kerbside during 2009/2010)	NR	Y	**50.8**	**52.0**	37.0	36.1	33.4
Horn Lane Surgery, 156 Horn Lane, Acton	NR	Y	**45.6**	**49.4**	**46.6**	**40.7**	**42.2**
1-4 Peal Gardens, West Ealing,W13 OBA	R	Y	37.3	39.1	38.8	36.0	31.1
19 Runnymede Gardens, Perivale (Kerbside during 2009/2010 and then Roadside from 2011)	R	Y	**71.2**	**79.3**	**43.3**	**44.7**	39.4

Site Name	Site Type	Within AQMA?	Annual Mean NO_2 Concentration ($\mu g/m^3$) - Adjusted for Bias				
			2009[a]	2010[a]	2011 (Bias Adjustment Factor = 1.01)	2012 (Bias Adjustment Factor = 0.96)	2013 (Bias Adjustment Factor = 0.76)
12 Blenheim Close, Greenford, UB6 8ET	NR	Y	37.9	**48.3**	39.9	**43.2**	38.6
205 Windmill Lane, Greenford, UB6 9DW	R	Y	**40.3**	**44.3**	**40.9**	37.9	33.2
Greenford High School, Lady Margaret Road, Southall, UB1 2GU	B	Y	N/A	**44.6**	35.0	37.1	31.1
2 Shadwell Drive, Northolt (Kerbside during 2009 & 2010 and then near road on façade from 2011)	NR	Y	**48.4**	**42.1**	32.9	32.5	27.8
213 Church Road, Northolt, UB5 5BE	NR	Y	N/A	N/A	**45.3**	**44.6**	**42.1**
11 The Broadway, Southall, UB1 3PX	R	Y	**68.1**	**66.4**	**69.3**	**60.9**	**55.2**
Acton Medical Centre, 122 Gunnersbury Lane,Acton,W3 9BA	NR	Y	**44.5**	**51.1**	38.1	37.6	33.5
Moot House, Ealing Hospital, Uxbridge Road, Southall, UB1 3HW (kerbside prior to 2011)	B	Y	**46.8**	**46.3**	28.6	29.2	29.4
1 Shaftesbury Gardens, Park Royal, NW10 6LJ	NR	Y	N/A	N/A	**42.1**	**43.4**	37.8
Hambrough Primary School, South Road,Southall,UB1 1SF	NR	Y	**46.7**	**53.7**	**47.2**	**44.9**	**41.1**
Maypole Court, 2 Merrick Road, Southall, UB2 4AU	NR	Y	**40.9**	**45.7**	**43.1**	38.4	32.6
Perivale Wood, r/o 36-38 Sunley Gardens, Greenford,UB6 7PE	B	Y	31.1	25.7	28.2	27.7	22.2
55 King Street, Southall, UB2 4DQ	R	Y	N/A	N/A	**63.3**	**56.3**	**47.3**
Brent Lodge Park,Church Road, Hanwell,W7 3BP	B	Y	29.9	29.4	27.2	28.9	23.5
Health Centre, 20 Church Road, Hanwell, W7 1DR	NR	Y	37.1	**41.9**	36.0	38.3	30.1
12 Bond Street, Ealing, W5 5AP	R	Y	**51.0**	**54.3**	**57.0**	**49.3**	**50.7**
South Ealing Cemetery,Popes Lane, Ealing, W5 4NA	B	Y	34.8	32.6	30.2	31.2	26.6
53-61 St Pauls Close, Ealing,W5 3JX	NR	Y	N/A	N/A	29.1	30.9	24.4

Site Name	Site Type	Within AQMA?	Annual Mean NO_2 Concentration ($\mu g/m^3$) - Adjusted for Bias				
			2009[a]	2010[a]	2011 (Bias Adjustment Factor = 1.01)	2012 (Bias Adjustment Factor = 0.96)	2013 (Bias Adjustment Factor = 0.76)
44 Acton Lane, Chiswick, W4 5ED	NR	Y	**50.7**	**57.2**	**41.8**	**40.1**	38.4
12 Balfour Road, Ealing, W13 9TN (kerbside until 2011)	R	Y	38.6	35.9	29.3	29.8	26.9
1 Kirn Road, Ealing, W13 0UB	R	Y	**50.0**	**57.9**	**52.1**	**51.4**	**46.8**
St David's Home, 12 Castlebar Hill, Ealing,W5 1TE	B	Y	35.1	32.3	33	30.4	26.5
4 Thirlmere Avenue,Perivale, UB6 8EF	B	Y	N/A	N/A	38.5	35.7	31.0
2 Horsenden Lane South, Greenford, UB6 8AB	R	Y	**58**	**60.1**	**61.9**	**61.4**	**53.1**
64 Hanger Lane,Ealing,W5 2JH	NR	Y	N/A	N/A	**42.7**	**44.4**	38.7
1504 Greenford Road, Greenford, UB6 0HR	NR	Y	N/A	N/A	39.5	38.6	33.5
79 Whitton Avenue East, Greenford, UB6 0QD (kerbside prior to 2011)	NR	Y	**40.8**	**44.1**	30.3	30.4	26.1
126 Petts Hill, Northolt, UB5 4NW	NR	Y	38.5	**42.3**	**40.1**	**40.8**	32.5
4 Minterne Avenue, Southall,UB2 4LL	NR	Y	34.4	**42.8**	30.2	28.9	25.1
150 Brent Road, Southall, UB2 5LD	NR	Y	N/A	N/A	**42.8**	**41.0**	37.6
6 Boston Gardens, Boston Road,Hanwell, W7 2AN	NR	Y	**49.7**	39.5	37.1	36.5	33.1
255 Boston Road, Hanwell,W7 2AT	NR	Y	N/A	N/A	33.7	34.6	30.9
7 Greenford Avenue, Southall, UB1 2AA	NR	Y	35.8	39.2	38.8	36.8	29.2
Oakley House, Oakley Avenue,Ealing,W5 3SB	NR	Y	N/A	N/A	33.6	32.3	28.6
Belmont Health Centre,18 Western Road, Southall,UB2 5DU	NR	Y	N/A	N/A	38.6	**41.9**	36.4
6 Western Avenue, Acton, W3 7UD	R	Y	**72.1**	**79.8**	**70.4**	**70.8**	**69.2**
Martin Court,Southbridge Way,Southall, UB2 4QW	NR	Y	N/A	N/A	**42.3**	38.6	33.2
98 Western Avenue, Acton, W3 7TZ	NR	Y	**51.9**	**57.1**	**51.4**	**51.8**	**48.2**
Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane AQMS) (Tri)	R	Y	**71.6**	**77.9**	**77.1**	**75.0**	**75.1**

Site Name	Site Type	Within AQMA?	Annual Mean NO_2 Concentration ($\mu g/m^3$) - Adjusted for Bias				
			2009[a]	2010[a]	2011 (Bias Adjustment Factor = 1.01)	2012 (Bias Adjustment Factor = 0.96)	2013 (Bias Adjustment Factor = 0.76)
Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane AQMS) (Tri)	R	Y	**73.2**	**78.6**	**80.6**	**81.7**	**74.3**
Fernlea House, Hanger Lane, Ealing,W5 1EF (Hanger Lane AQMS) (Tri)	R	Y	**74.5**	**76.1**	**78.5**	**79.3**	**74.7**
27 Wells House Road, Park Royal, NW10 6ED	R	Y	**40.9**	**43.4**	39.9	36.7	39.8
94 North Acton Road, Park Royal, NW10 7AY	NR	Y	39.0	**42.9**	39.8	38.9	34.2
914 Greenford Road,Greenford,UB6 8QN	NR	Y	**40.8**	**43.2**	**41.8**	39.5	36.5
Blair Peach School, Beaconsfield Road, UB1 1DD(Southall *AQMS*) (Tri)	B	Y	33.8	31.3	30.8	28.2	25.2
Blair Peach School, Beaconsfield Road, UB1 1DD(Southall *AQMS*) (Tri)	B	Y	31.2	30.5	28.7	28.7	23.8
Blair Peach School, Beaconsfield Road, UB1 1DD(Southall *AQMS*) (Tri)	B	Y	33.9	28	29.4	29.1	24.5
41 Manor Road, West Ealing,W13 OJA	NR	Y	N/A	N/A	**54.0**	**53.2**	**51.5**
317 Horn Lane, Acton,W3 0BU (Horn Lane *AQMS*) (*Tri*)	R	Y	N/A	**59.6**	**59.6**	**54.7**	**51.8**
317 Horn Lane, Acton,W3 0BU (Horn Lane *AQMS*) (*Tri*)	R	Y	N/A	**57.1**	**56.8**	**47.0**	**50.1**
317 Horn Lane, Acton,W3 0BU (Horn Lane *AQMS*) (*Tri*)	R	Y	N/A	**58.6**	**54.0**	**53.2**	**51.5**
322 & 324 Western Avenue, Acton, W3 OPL (Western Ave *AQMS*) (*Tri*)	R	Y	N/A	**72.4**	**77.8**	**73.8**	**68.2**
322 & 324 Western Avenue, Acton, W3 OPL (Western Ave *AQMS*) (*Tri*)	R	Y	N/A	**67.9**	**72.8**	**75.1**	**66.7**
322 & 324 Western Avenue, Acton, W3 OPL (Western Ave *AQMS*) (*Tri*)	R	Y	N/A	**73.1**	**73.5**	**74.5**	**67.6**
326 Western Avenue, Acton, W3 0PL	NR	Y	**51.4**	**62.6**	**62.5**	**59.9**	**57.3**
21 Haven Lane, Ealing,W5 2HZ	NR	Y	36.3	**40.1**	**41.4**	36.8	33.8
27 Haven Green, Ealing,W5 2NZ (kerbside	NR	Y	**40.8**	**42.7**	39.6	38.7	32.5

Site Name	Site Type	Within AQMA?	Annual Mean NO_2 Concentration (µg/m^3) - Adjusted for Bias				
			2009[a]	2010[a]	2011 (Bias Adjustment Factor = 1.01)	2012 (Bias Adjustment Factor = 0.96)	2013 (Bias Adjustment Factor = 0.76)
until 2011)							
31 Castlebar Road, Ealing,W5 2DJ	NR	Y	N/A	**57.3**	38.1	36.8	30.8
Haven Green Court, Haven Green, Ealing, W5 2UZ	NR	Y	N/A	**42.4**	39.5	**50.4**	33.5
8 Spring Bridge Road,Ealing,W5 2AA	R	Y	N/A	**68.2**	**71.8**	**66.8**	**61.4**
41-42 Haven Green, Ealing,W5 2NX	R	Y	N/A	N/A	**60.8**	**52.1**	**48.4**

All the site Id must include their area i.e acton, southall etc

Notes: In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3

Underlined, annual mean > 60µg/m^3, indicating a potential exceedence of the NO_2 hourly mean AQS objective

[a]2009 data bias adjusted using national factors of 0.89 for roadside and kerbside sites, 0.90 for near road sites and 1.02 for urban background sites. Similarly, 2010 data bias adjusted using local factors of 1.02, 1.06 and 1.01. The bias adjustment methods for 2009 and 2010 are presented in previous LAQM reports.

Figure 2.4 to Figure 2.11 show trends in annual mean NO_2 concentrations recorded at diffusion tubes in the LB of Ealing from 2009 to 2013. The 40 µg/m^3 objective value is indicated by a dotted line. The general trend appears to be a slight reduction in annual mean concentrations over the five year period. Due to differences in diffusion tube referencing over the past five years, addresses have been used to describe the locations of the diffusion tubes shown.

Figure 2.4 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

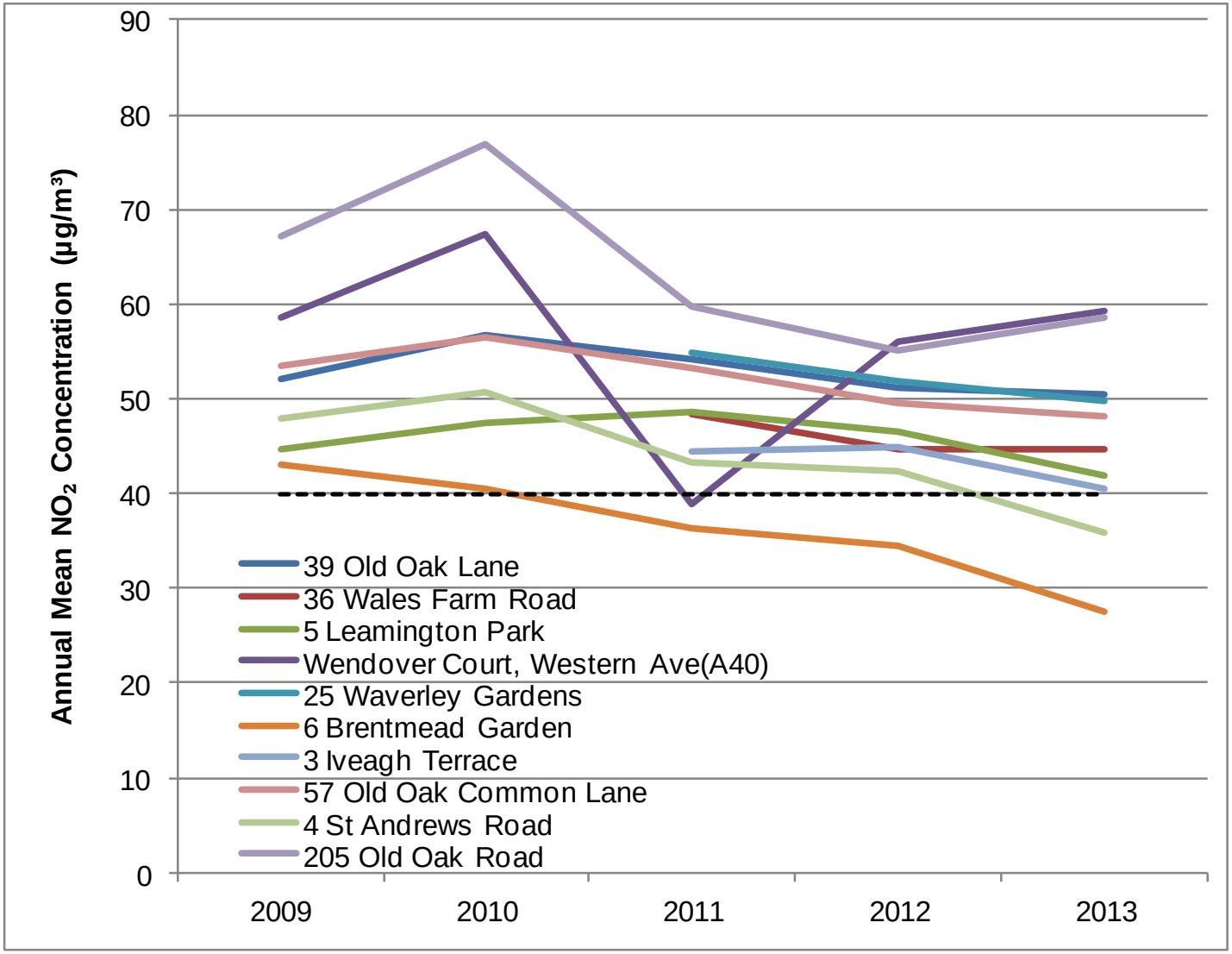


Figure 2.5 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

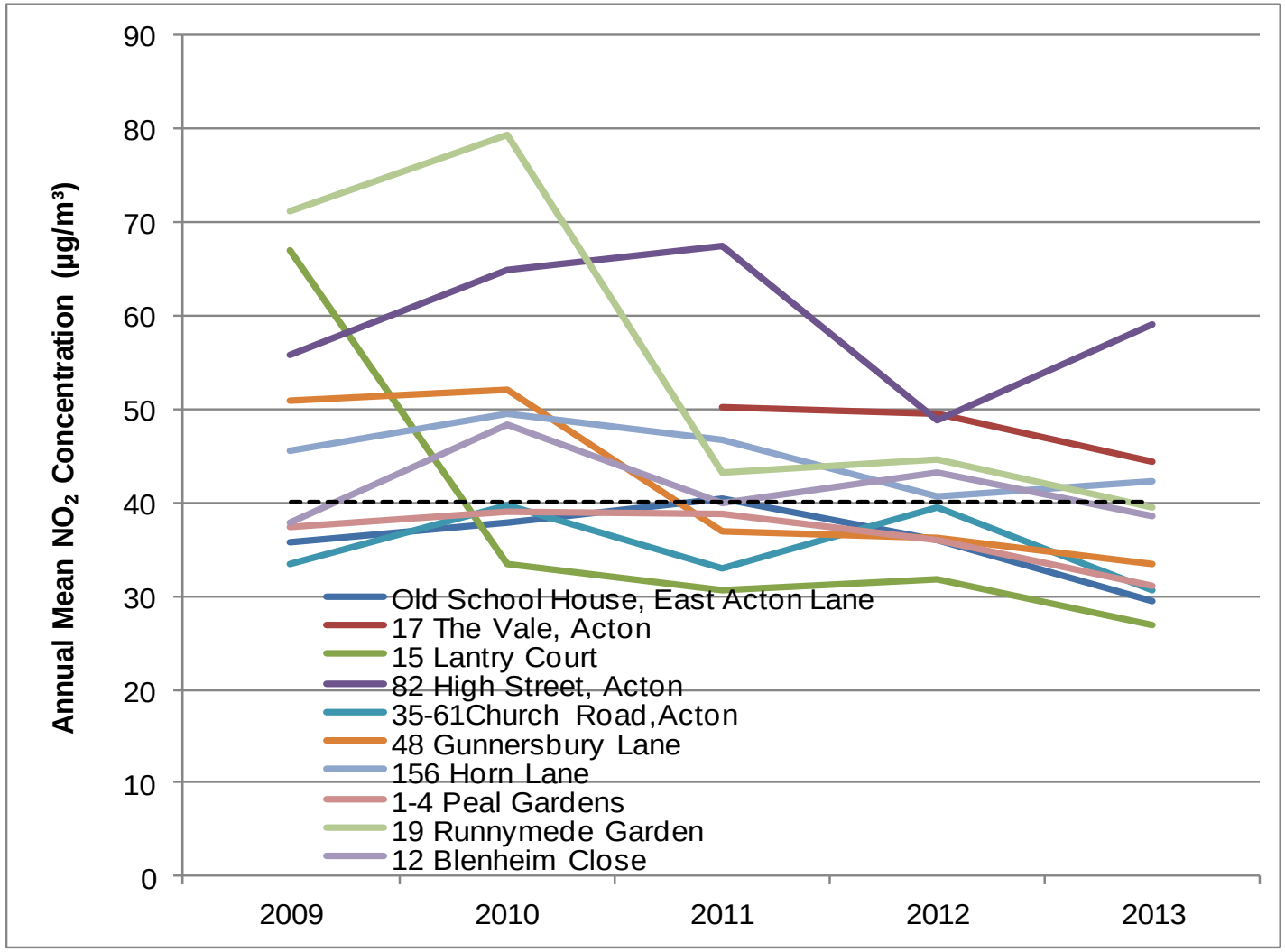


Figure 2.6 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

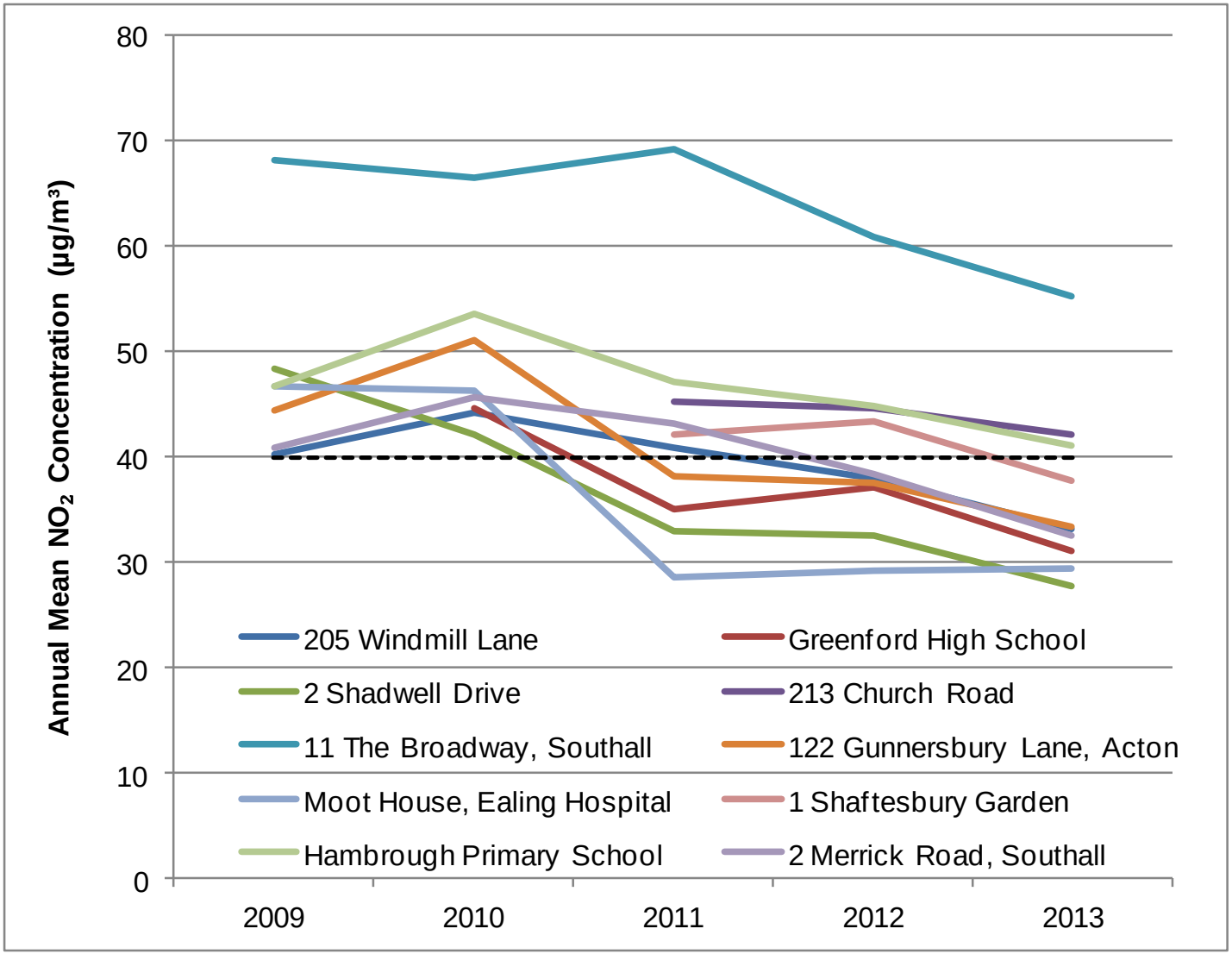


Figure 2.7 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

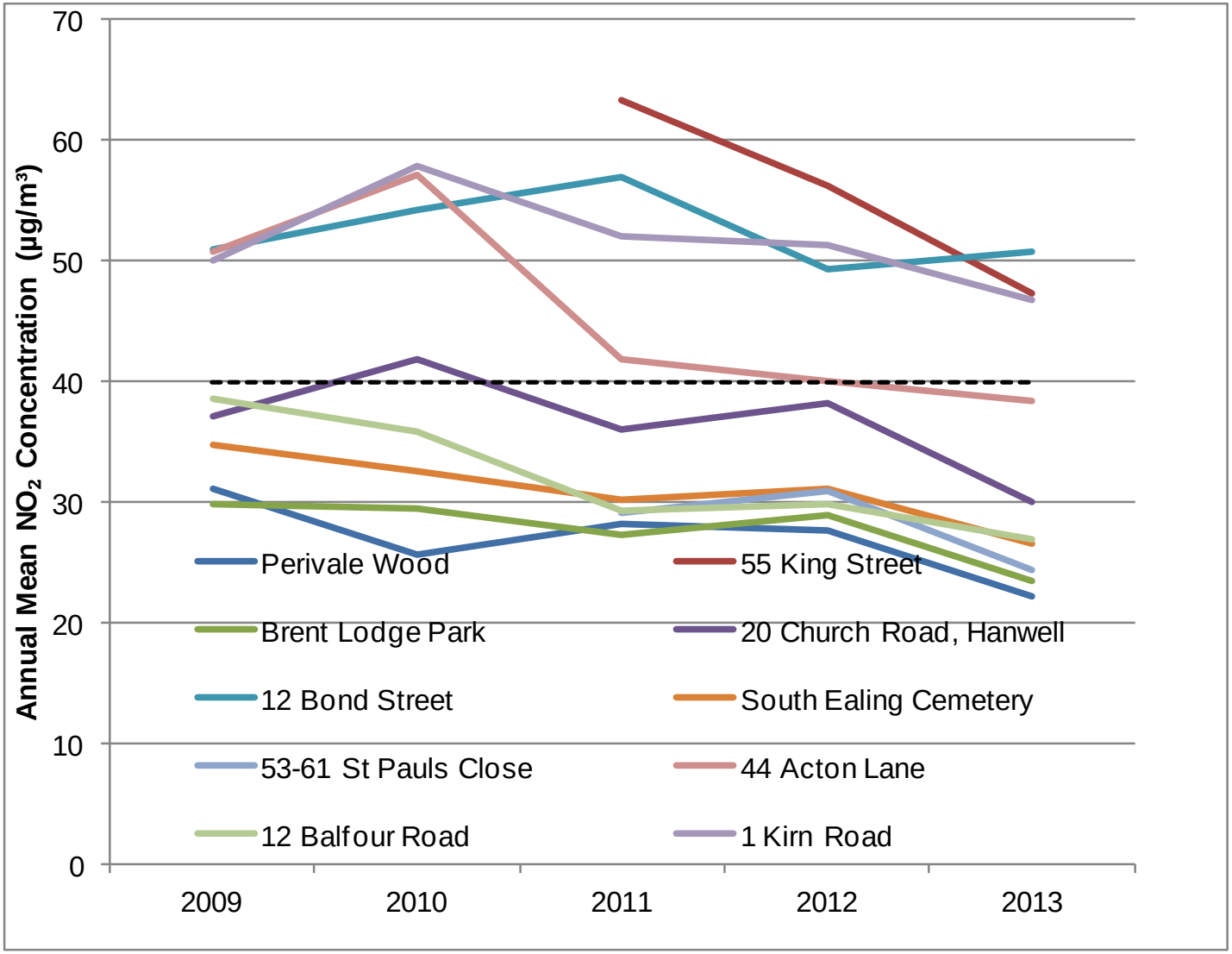


Figure 2.8 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

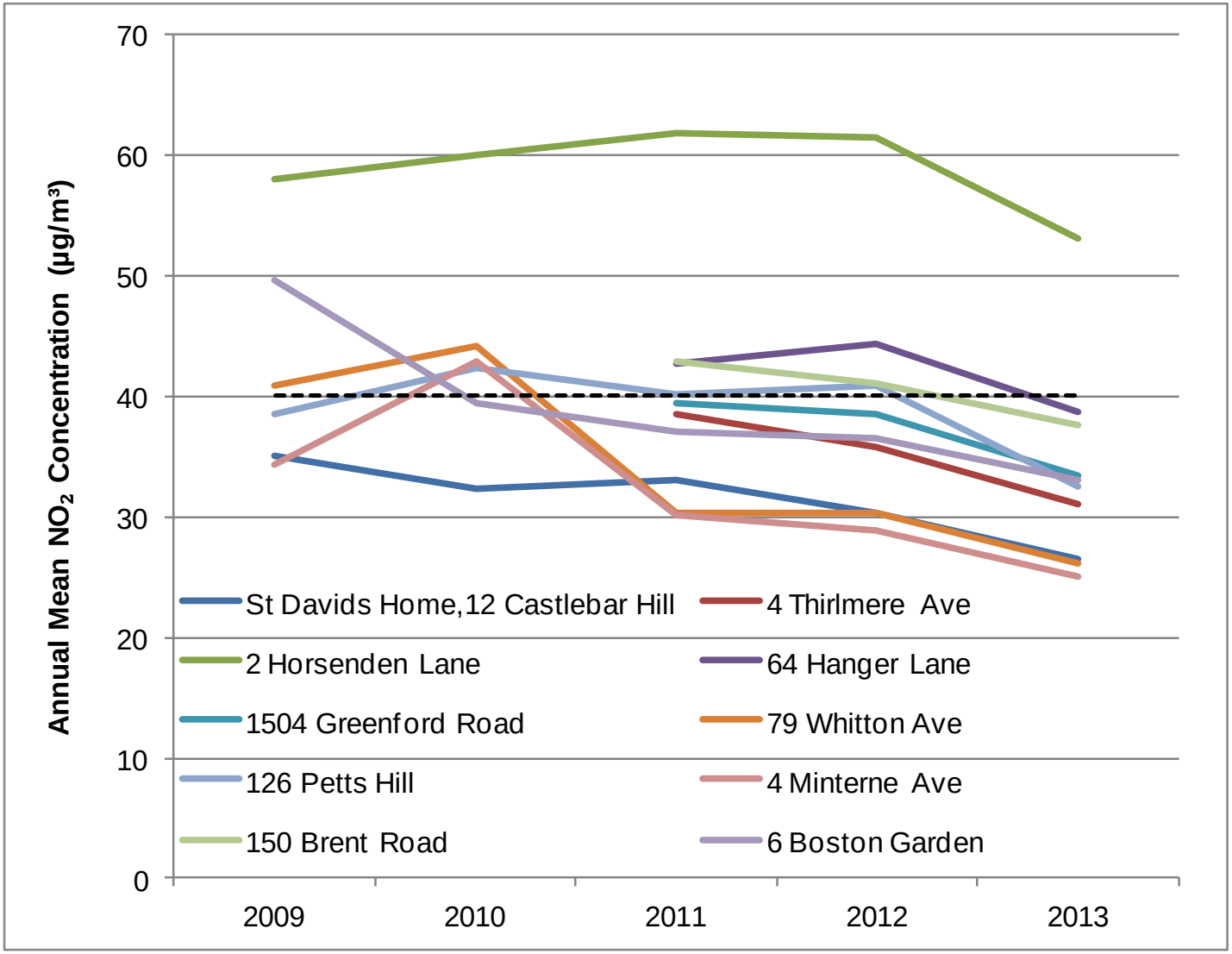


Figure 2.9 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

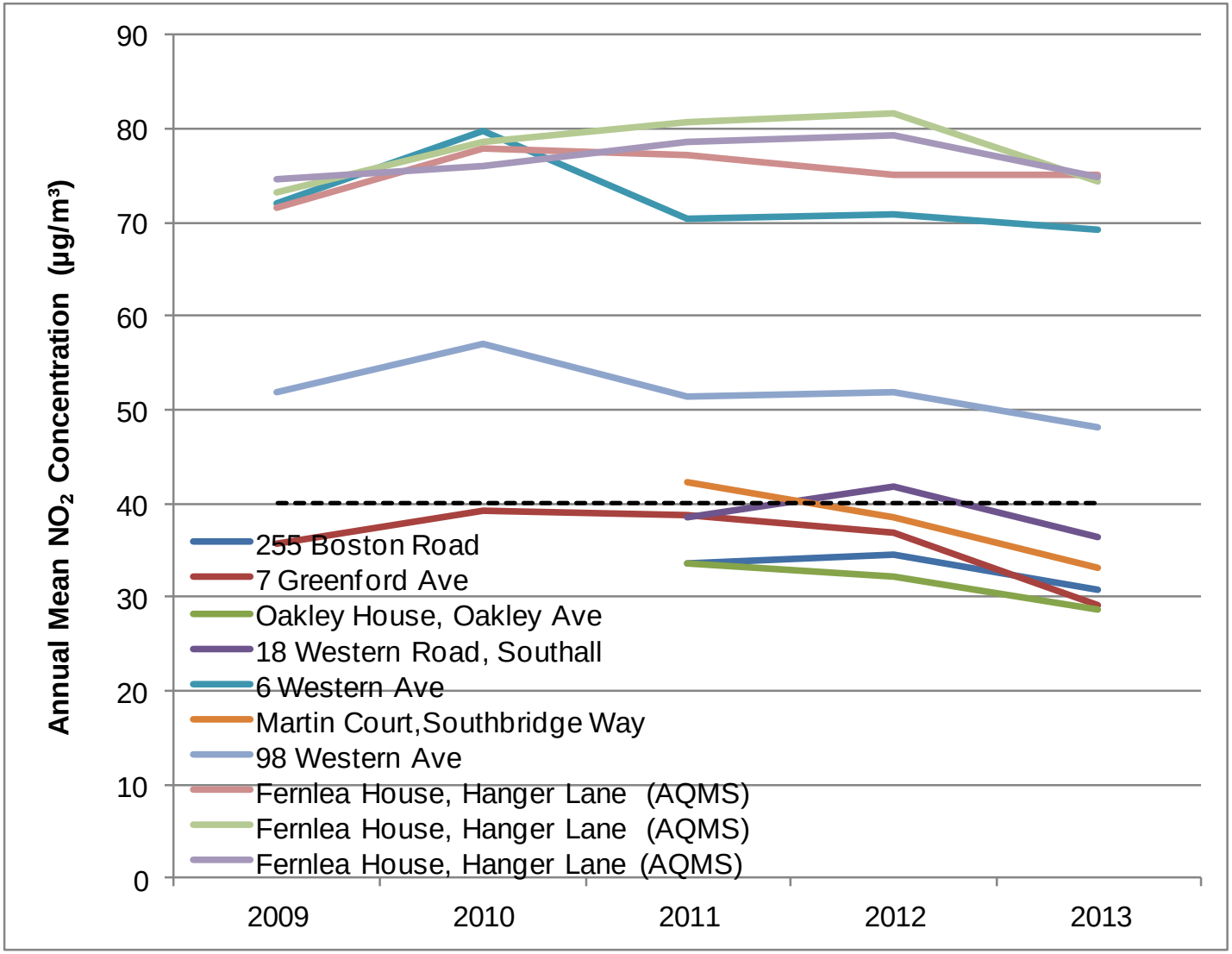


Figure 2.10 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites

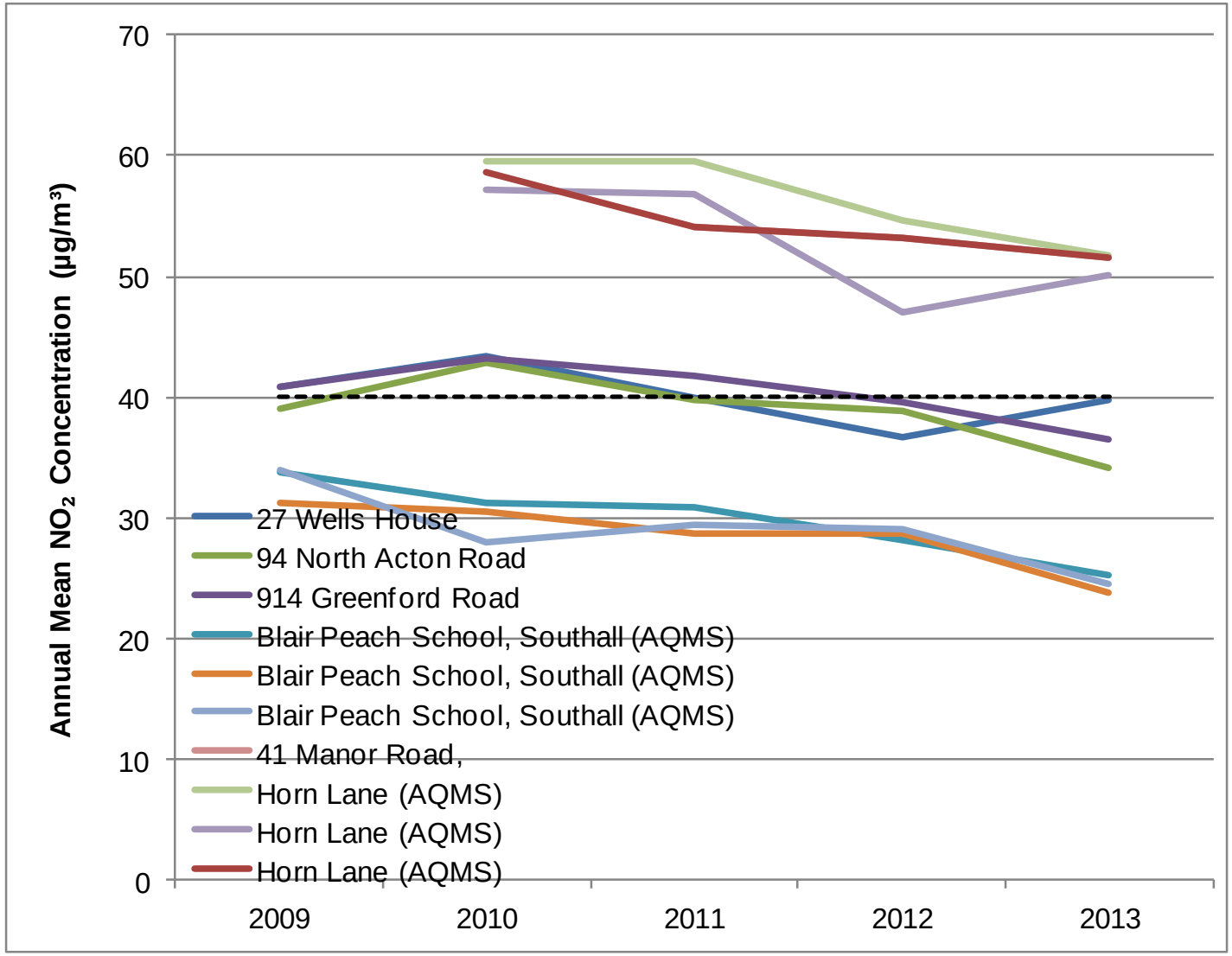
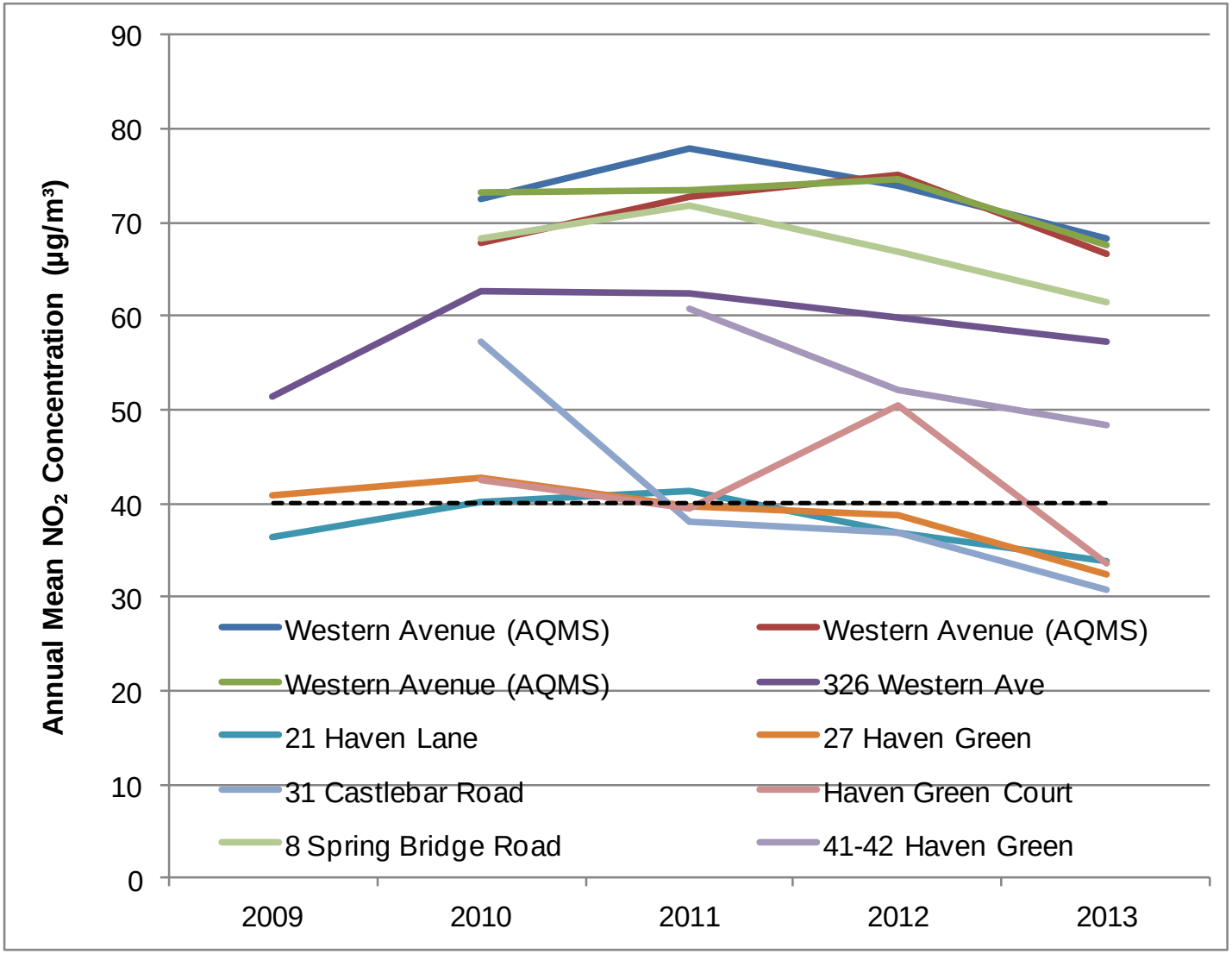


Figure 2.11 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites



2.2.2 Particulate Matter (PM_{10})

PM_{10} concentrations are measured at five locations in the LB of Ealing, as shown in Table 2.7. TEOMs are used to monitor PM_{10} at all sites except for Southall where an FDMS is used. Where applicable therefore, monitoring data has been corrected for the use of TEOMs using the Volatile Correction Model[4].

Concentrations in 2013 at all sites were found to meet the annual mean objective of 40 µg/m^3. The highest annual mean PM_{10} concentration was at Horn Lane in 2013 was 37.5 µg/m.

Figure 2.12 shows the trends in PM_{10} concentrations between 2009 and 2013 for the five monitoring locations, which appear to suggest that annual PM_{10} concentrations have remained relatively stable over this period.

The daily mean PM_{10} air quality objective (50 µg/m^3, not to be exceeded more than 35 times a year) was not exceeded at any of the five sites in 2013, as shown in Table 2.8. The site which saw the highest number of exceedances was the near road Horn Lane site which recorded 24 days when average concentrations were above 50 µg/m^3. This site had shown a consistently high number of exceedances since 2005 to 2011, with the lowest number of 59 recorded in 2011 and the highest in 2005 with 230 exceedances.

Table 2.7: Results of Automatic Monitoring for PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 %	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean PM_{10} Concentration ($\mu g/m^3$)				
					2009	2010	2011	2012	2013
Hanger Lane Gyratory	Roadside	Y	96.6	Y	-	-	30.8	29.1	28.6
Horn Lane	Industrial	Y	93.7	Y	38.6	41.5	36.3	35.6	37.5
Southall	Urban Background	Y	98.2	Y	19.9	20	21.7	17.7	22.5
Southall Railway	Near road	Y	98.2	Y	-	-	23.3	22.9	20.8
Western Avenue	Roadside	Y	82.0	Y	-	-	31.2	30.4	31.1

Notes: In bold, exceedence of the PM_{10} annual mean AQS objective of $40\mu g/m^3$

Figure 2.12 Trends in Annual Mean PM_{10} Concentrations

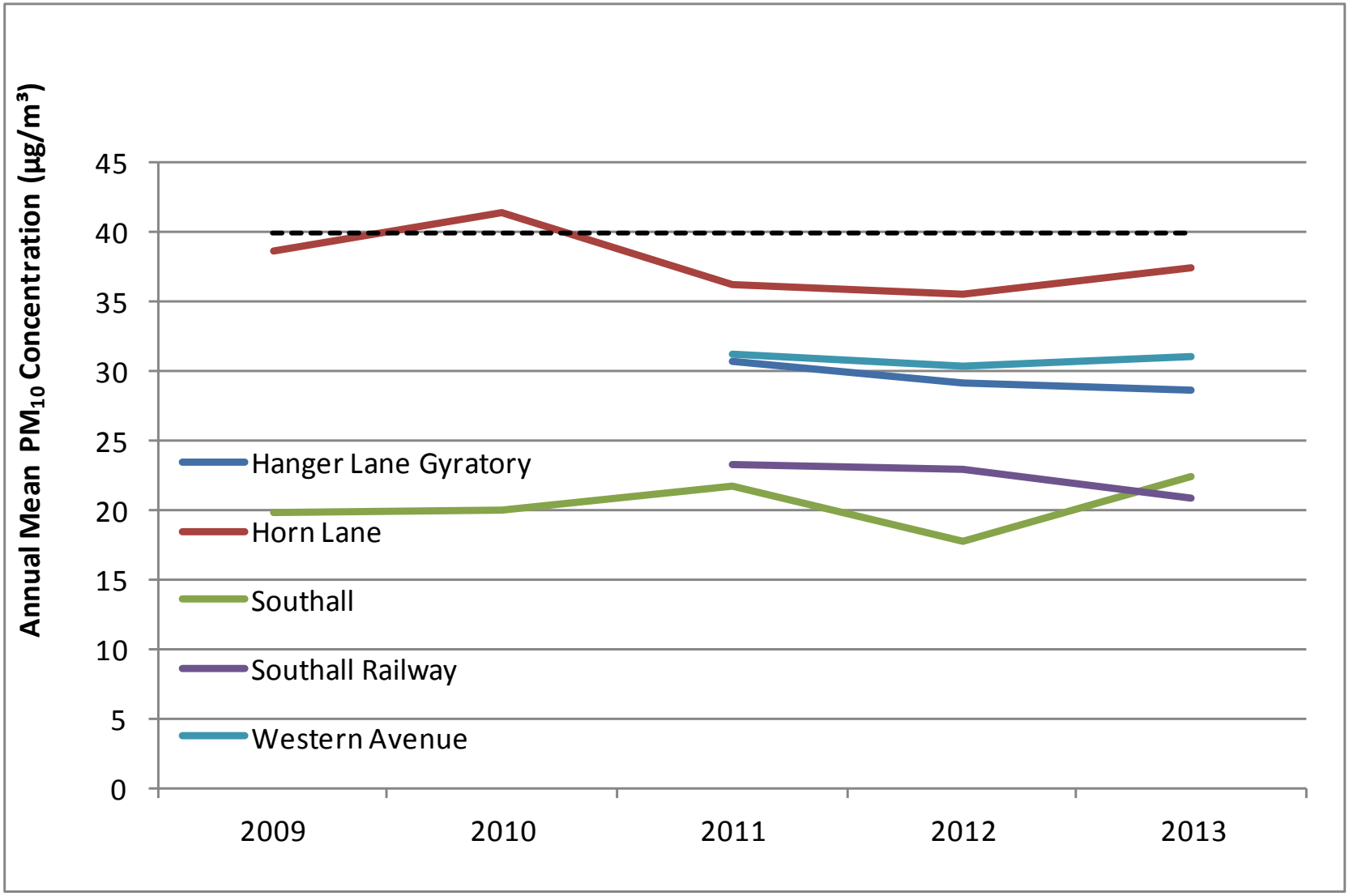


Table 2.8 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 (%)	Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg/m^3				
					2009	2010	2011	2012	2013
Hanger Lane Gyratory	Roadside	Y	96.6	Y	-	-	29 (47)	8	9
Horn Lane	Near Road	Y	93.7	Y	**71 (60)**	**91**	**59**	22	24
Southall	Background	Y	98.2	Y	4	2	9	9	9
Southall Railway	Roadside	Y	98.2	Y	-	-	5 (31)	4	5
Western Avenue	Roadside	Y	82.0	Y	-	-	23 (45)	10 (45)	22 (46)

Notes: In bold, exceedence of the PM_{10} daily mean AQS objective (50µg/m^3 – not to be exceeded more than 35 times per year)

Where data capture for the full calendar year was less than 90%, the 90.4th percentile of 24-hour means is shown in brackets

2.2.3 Sulphur Dioxide (SO_2)

The London Borough of Ealing operated one site (Ealing Town Hall) that monitored sulphur dioxide in the Borough. The site was however closed in January 2012 and no monitoring has since been conducted.

2.2.4 Benzene

Until 2011 the London Borough of Ealing operated three roadside passive diffusion tube sites that measured benzene within the Borough. The benzene monitoring continued at Fernlea House, Hanger Lane until the end of 2012. These sites have since been discontinued and no benzene monitoring is carried out within the Borough.

2.2.5 Other Pollutants Monitored

2.2.5.1 Ozone (O_3)

Ozone monitoring is conducted at the Southall automatic monitoring station. Local objectives for improving ground level ozone are not included in the Air Quality. Regulations as it is considered to be a regional pollutant. The UK Air Quality Strategy does however suggest a running 8-hour average of 100µg/m^3 should not be exceeded more than 10 times per year. Ozone concentrations at this site were found to be significantly greater than the suggested criteria.

Table 2.9 Results of Automatic Monitoring for O_3

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 (%)	Number of Daily Means > 100 µg/m^3	
				2012	2013
Southall	Urban Background	Y	89.1	**78**	**54**

2.2.5.2 Particulate Matter ($PM_{2.5}$)

The London Borough of Ealing commenced $PM_{2.5}$ monitoring in 2012 at the Southall urban background site. Concentrations for the first two years of monitoring are shown in Table 2.10**Error! Reference source not found.**. There was also $PM_{2.5}$ monitoring undertaken at the closed Acton Town Hall site during 1985-2011.

Table 2.10 Results of Automatic Monitoring for $PM_{2.5}$

Site ID	Site Type	Within AQMA?	Valid Data Capture 2013 (%)	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m^3)	
					2012	2013
Southall	Background	Y	91.0	N	9.7	9.9

2.2.6 Summary of Compliance with AQS Objectives

The London Borough of Ealing has examined the results from air quality monitoring in the Borough.

Annual mean and hourly mean concentrations of nitrogen dioxide remain in exceedence of the air quality objectives at numerous locations within the current borough-wide AQMA.

Measured PM_{10} concentrations did not exceed the annual mean objective for any continuous monitoring site, the same is true for the the daily mean PM_{10} objective.

The basis for the declaration of the current AQMA therefore remains unchanged and the AQMA should remain.

3 New Local Developments

LB of Ealing confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

LB of Ealing confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Local / Regional Air Quality Strategy

A number of air quality projects have been undertaken by the London Borough of Ealing in recent years as shown in Table 4.1. The results of these projects will be used to inform the revision of LB Ealing's Air Quality Action Plan during 2014/2015. Projects such as the final one in the table 'Transforming a hotspot' has the potential to reduce the significant number of exceedences for PM_{10} seen in the Horn Lane area of Acton.

Table 4.1 Summary of New Air Quality Strategy Actions

Year	Title of Project
2011/2012	Emissions from diesel trains in London
2011/2012	Remote sensing of NO_2 exhaust emissions from road vehicles
2012/2013	Scenario development to inform air quality action planning in the London Borough of Ealing
2013/2014	Transforming a Hotspot - Developing a Low Emissions Strategy for Horn Lane, Acton
2014/2015	Ealing Broadway Air Quality Exemplar This project will develop a 'toolkit', in partnership with the Ealing BID, to enable businesses to reduce their emissions. This will focus on: reducing emissions from transport, reducing emissions from buildings, business engagement/awareness raising and communications.

5 Planning Applications

There are a number of large developments in the LB of Ealing that have received planning permission for a first phase of multi phase schemes. The largest of these developments are documented below.

Havelock estate, Southall

900 residential homes with first phase approved by the council and construction due to begin in summer 2014. The developer for this scheme is Catalyst Housing. Construction is due to be completed by 2025.

Copley Close Estate, West Ealing

The council's 2008 estates review highlighted that Copley Close needs a lot of work to bring it up to the government's Decent Homes standard. The LB of Ealing proposes the demolition of the current 76 units and the construction of 211 new residential units. This redevelopment is due to be constructed with the planning application currently in the consultation phase.

South Acton Estate, Acton

A house redevelopment scheme with a total of 2,600 residential properties over 11 phases due for completion in 2026. LB of Ealing granted the phase 3 planning application in March 2014. The first two phases are currently under construction.

Green Man Estate, West Ealing

Redevelopment of the Green Man Estate in West Ealing due to be completed from 2009 – 2018 over four phases. Currently phase one and two are in construction and the planning application is being prepared for phase three. The phase four planning application with be submitted. Once completed the development will comprise of 706 new residential properties, a new gym, community cafe, energy centre and 401 car parking spaces. The project includes the demolition of the 464 current properties and multi-storey car park on site.

Southall Gasworks development

This is an 85 acre Brownfield site which is seeking planning permission for 20,000sqm of residential, 14,200sqm for non-food retail, 5,850sqm of food retail, 1,750sqm of Class A3-A5 uses; 650sqm of hotel, 3,000 sqm of conference and banqueting, 24,450sqm of multi-storey car park, 2,550sqm of health care facilities, 3,450sqm of education facilities, 3,500sqm of office/studio units, 390sqm of sports pavilion, 600sqm of energy centre, associated car and cycle parking, landscaping, public realm, open space and children's play-space. Phase one is due for completion in 2019.

Thames Tunnel-Acton Storm Tanks, Canham Road, Acton

Construction is assumed to start in 2018 and be complete by 2021. Work includes construction of underground structures to connect the existing Acton Storm Relief combined sewer overflow to a shaft approximately 31 m deep and with an internal diameter of approximately 15 m. As of March 12th 2014 the Secretary of State has 3 months in which to make their decision on the acceptance or refusal of the Thames Tideway Tunnel project.

High Speed 2 (HS2)

Construction is due to begin on the North Acton and Park Royal section of HS2 railway line in 2018.

6 Air Quality Planning Policies

These section details any planning policies that make reference to air quality, together with any new policies or guidance of relevance to air quality.

On 10 December 2013 the LB of Ealing's new Local Plan[5] superseded any saved policies in the Unitary Development Plan (UDP) that was adopted on 12 October 2004. The existing development plan for the LB of Ealing currently comprises the following documents (together with an associated Adopted Policies Map[6]):

- London Plan
- Development (or Core Strategy) DPD, April 2012
- Development Sites DPD, December 2013
- Development Management DPD, December 2013

The relevant air quality is Policy 7A which discusses amenities and planning decisions.

"***A*** *Development which in the course of its operations will cause emissions of any sort must;*

- *not erode the amenity of surrounding uses or the site itself*
- *take all reasonable steps to ameliorate these emissions*
- *provide all necessary evidence of mitigation that is requested by the local planning authority*

B *The requirement to properly regulate and ameliorate emissions applies also to functionally separate areas within a given development, for instance between separate flats or dwellings.*

C *Sensitive uses will not be permitted where these would achieve acceptable levels of amenity only by substantially sealing residents or users off from their surrounding environment.*

D *Development that is sensitive to operational emissions of a particular type must avoid locating in areas in which there are established concentrations of such emissions that cannot be properly"*

London Plan policy 7.14

Developers are to design their schemes so that they are at least 'air quality neutral'.

London Plan policy 5.3, 7.14

Developments should be designed to minimise the generation of air pollution.

London Plan policy 3.2, 5.3, 7.14

Developments should be designed to minimise and mitigate against increased exposure to poor air quality.

London Plan policy 5.3, 7.14

Developers should select plant that meets the standards for emissions from combined heat and power and biomass plants set out in Appendix 7.

The London Plan and the Mayor's Air quality Strategy set out that developments are to be at least 'air quality neutral'. To enable the implementation of this policy Building emission benchmarks (BEB) have been produced for buildings' operation and transport across London based on the latest technology (including its effectiveness and viability). Developments that do not exceed these benchmarks will be considered to avoid any increase in NOx and PM emissions across London as a whole and therefore be 'air quality neutral'. The benchmarks will be kept under review and will be updated in line with technological and commercial advances.

All planning development should comply with London Plan policy 7.14. A minimum benchmark requirement is the provision and installation of Ultra Low NOx boilers with maximum NOx Emissions of under 0.040 g/kWh in addition to enhanced fabric insulation in exceedance of Building Regulations Part L 2010.

In April 2013 the Cabinet pledged the London Borough of Ealing to commit to take action to improve local air quality, and become an air quality exemplar borough, in accordance with the Air Quality Exemplar Qualifying Criteria.

In order to comply with the Council commitment to being an 'Air Quality Exemplar Borough' the Pollution-Technical Team recommends that all development complies with emission standards as stated in the Sustainable Design and Construction SPG, April 2014.

7 Local Transport Plans and Strategies

This is a statutory document prepared by each London Borough under the Greater London Authority Act 1999, and sets out the policy context and proposals of the Borough for the implementation of the Mayor of London's Transport Strategy.

The main relevant policy in terms of air quality in the second Local Implementation Plan (LIP) for transport strategies and plans[7] is LIP Objective 4 i.e. 'Improve quality of life for residents, businesses and visitors to the borough, protecting and enhancing the urban and natural environment'. Other policies that affect air quality are:

- *Objective 2 – Increase sustainable travel capacity and key links in the borough*
- *Objective 3 - Smooth the flow of traffic and improve journey time reliability for all road-users, particularly bus passengers, cyclists and pedestrians*
- *Objective 5: - Promote healthy travel behaviour through a shift to more walking and cycling."*

The LIP notes roads which are known as particularly poor areas for air quality, these areas include road corridors with heavy vehicle flows such as the A40, A406 and A4020 (Uxbridge Road).

8 Climate Change Strategies

The London Borough of Ealing set out its Climate Change policy for 2011 to 2014 in a document released on September 18th 2008. This strategy aimed to reduce Ealing borough's contribution to climate change with a target to achieve a 10% reduction in per capita carbon dioxide emissions by 2010/11 from a 2005 baseline.

The adopted development management plan[8] for LB of Ealing sets out the updated Climate change strategy as Policy 5.2.

Policy 5.2: Minimising Carbon Dioxide Emissions: Planning Decisions

- *"With regards to planning permission, all major new-build residential developments are required to achieve the following standards under the Code for Sustainable Homes, or equivalent:*
    - *2012 onwards - Level 4*
    - *2016 onwards - Level 5*
- *all other new residential development in Ealing must achieve Code for Sustainable Homes Level 4 as a minimum.*
- *major residential developments consisting of the refurbishment of existing buildings, including the conversion of existing buildings to form flats, are required to achieve a BREEAM Domestic Refurbishment Scheme rating of Excellent, or equivalent.*
- *major non-residential developments are required to achieve a minimum Very Good rating under the most up-to-date BREEAM or equivalent scheme and make reasonable endeavours to achieve Excellent and Outstanding.*
- *other new development including residential extensions and conversions should undertake energy efficiency improvements up to 10% of the value of the proposed works."*

9 Implementation of Action Plans

The LB of Ealing is in the process of updating its Air Quality Action Plan. The updated plan is due to be published in 2014 / 2015.

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

In 2013 the London Borough of Ealing undertook monitoring at five continuous monitoring sites and 95 NO_2 diffusion tube sites within the Borough.

The results from the air quality monitoring show annual mean concentrations of nitrogen dioxide remain in exceedence of the AQS objective within the AQMA. Exceedences occurred at 38 diffusion tube sites and the automatic monitoring stations at Hanger Lane Gyratory, Horn Lane and Western Avenue. The 1-hour nitrogen dioxide was also exceeded at two continuous monitoring sites and potentially at a number of diffusion tube sites.

The annual mean PM_{10} air quality objective was not exceeded at any of the continuous monitoring stations; the daily mean objective was also not exceeded at any of the five sites. Concentrations were highest at the Horn Lane site with an annual mean concentration of 37.5 µg/m^3.

The basis for declaration of the AQMA with regards to NO_2 and PM_{10} remains unchanged and the borough-wide AQMA should therefore remain.

10.2 Conclusions relating to New Local Developments

LB of Ealing has identified a number of significant local developments that have the potential to impact upon local air quality once operational. These include two major infrastructure projects (Acton Storm Tanks as part of the Thames Tideway Tunnel project and the HS2 rail link) and a large number of new residential schemes. A number of the residential schemes are regeneration projects which will be replacing current housing stock and therefore the cumulative impact will be less than if construction was occurring on a brownfield site.

Impacts relating to the two major infrastructure projects will have been modelled as part of the planning application and therefore their impacts have already been assessed in detail. No further action is therefore considered necessary.

10.3 Proposed Actions

On the basis of the findings of the Progress Report the London Borough of Ealing proposes the following actions:

- Submit an Action Plan Progress Report in 2014/2015 and an Updating and Screening assessment in 2015, in accordance with the LAQM Review and Assessment process.

- Continue to operate a network of diffusion tubes and continuous monitoring sites throughout the Borough to monitor NO_2 and PM_{10} concentrations in the Borough.

- Maintain the extent of the existing AQMA for NO_2 and PM_{10}.

11 References

[1] London Borough of Ealing (2003), London Borough of Ealing Air Quality Action Plan.

[2] London Borough of Ealing (2009), Fourth Round Updating and Screening Assessment for London Borough of Ealing.

[3] London Air Quality Network (2012). Available online: www.londonair.org.uk. Accessed: 28/4/2014.

[4] Volatile Correction Model http://www.volatile-correction-model.info/Default.aspx. Accessed: 24/4/2014.

[5] LB of Ealing - Local Plan. Available at: http://www.ealing.gov.uk/info/200921/local_plans. Accessed: 28/4/2014

[6] LB of Ealing, Adopted Policies map. Available at: http://www.ealing.gov.uk/info/200921/local_plans/1513/policies_map. Accessed 28/4/2014

[7] LB of Ealing, Transport Strategies and Plans. Available at: http://www.ealing.gov.uk/info/100011/transport_and_streets/620/transport_strategies_and_plans/2 Accessed 28/4/2014.

[8] Adopted Development Management Plan (2013).

[9] Defra, National Diffusion Tube Bias Adjustment Factor Spreadsheet, Spreadsheet Version Number: 03/14. Available at http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html.

[10] Defra, WASP – Annual Performance Criteria for NO_2 Diffusion Tubes used in Local Air Quality Management (LAQM). Available at http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html

[11] Volatile Correction Model. Available at: http://www.volatile-correction-model.info/Default.aspx Accessed 28/4/2014

Appendices

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Bias adjustment is effectively a calculated factor which shows whether diffusion tubes are over or under reading ambient concentrations and therefore allows for a correction to be made.

In 2013 the London Borough of Ealing used the national factor for Environmental Scientifics Group, Didcot, as given on the review and assessment help desk website[9]. The diffusion tube preparation method is 20% TEA/Water. Previous to this the national factor for Gradko was used. Adjustment factors for the last three years were as follows:

- 2011 -1.01
- 2012 - 0.96
- 2013 – 0.76

QA/QC of diffusion tube monitoring

The Workplace Analysis Scheme for Proficiency (WASP)[10] is an independent analytical performance testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO_2 Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in their Local Air Quality Management work.

Defra and the Devolved Administrations advise that diffusion tubes used for LAQM should be obtained from laboratories that have demonstrated satisfactory performance in the WASP scheme.

The results for WASP Rounds 116 to 1119 (Jan 2012 - Dec 2013) show that Gradko where rated as 100% compliance. The results for WASP Rounds 120 to 124 (Jan 2012 - Sept 2013) show that Environmental Scientifics Group where rated as 100% compliance.

Diffusion Tube Bias Adjustment Factors

Figure A.1 National Bias Adjustment Factor 2013

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/14

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2014
LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1:	Step 2:	Step 3:	Step 4:								
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the	Select a Year from the Drop-Down	**Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.**								
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953								
Analysed By[1]	**Method** To make your selection, choose [All] from the pop-up list	**Year[5]** To make your selection, choose [All]	**Site Type**	**Local Authority**	**Length of Study (months)**	**Diffusion Tube Mean Conc. (Dm) (µg/m³)**	**Automatic Monitor Mean Conc. (Cm) (µg/m³)**	**Bias (B)**	**Tube Precision[4]**	**Bias Adjustment Factor (A) (Cm/Dm)**	
ESG Didcot	20% TEA in water	2013	KS	South Lakeland District Council	9	44	34	29.3%	G	**0.77**	
ESG Didcot	20% TEA in water	2013	KS	Marylebone Road Intercomparison	12	108	81	33.8%	G	**0.75**	
ESG Didcot	20% TEA in water	2013		**Overall Factor[3] (2 studies)**				**Use**		**0.76**	

Factor from Local Co-location Studies

Figure A.2: Results of 2013 Co-location Study at Southall Monitoring Station

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1	03/01/2013	30/01/2013	42.60	39.60	43.30	42	2.0	5	4.9
2	30/01/2013	27/02/2013	34.70	38.30	37.90	37	2.0	5	4.9
3	27/02/2013	26/03/2013	39.20	36.20	41.80	39	2.8	7	7.0
4	26/03/2013	24/04/2013	22.40	27.80	27.40	26	3.0	12	7.5
5	24/04/2013	29/05/2013	25.80	26.10	25.20	26	0.5	2	1.1
6	29/05/2013	25/06/2013	22.40	22.10	23.50	23	0.7	3	1.8
7	25/06/2013	29/07/2013	26.10	22.90	23.80	24	1.7	7	4.1
8	29/07/2013	05/09/2013		24.10	23.90	24	0.1	1	1.3
9	05/09/2013	02/10/2013	36.00	37.70	37.00	37	0.9	2	2.1
10	02/10/2013	29/10/2013	33.80	27.50	30.90	31	3.2	10	7.8
11	29/10/2013	04/12/2013	40.50	39.10	36.40	39	2.1	5	5.2
12	04/12/2013	07/01/2014	35.50	34.30	35.40	35	0.7	2	1.7
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
52.9505	99.53775	Good	Good
43.1239	99.554235	Good	Good
46.6352	99.691834	Good	Good
29.0769	1.8651363	Good	or Data Capture
24.0896	42.449465	Good	or Data Capture
15.0649	99.691834	Good	Good
15.0873	99.510404	Good	Good
22.6699	91.237678	Good	Good
35.6086	100	Good	Good
28.2731	99.845917	Good	Good
39.2546	99.884393	Good	Good
37.1187	100	Good	Good
Overall survey -->		Good precision	Poor Overall

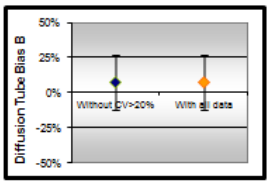
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Blair Peach School/Southall AQMS

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 10 periods of data	
Bias factor A	1.02 (0.85 - 1.27)
Bias B	-2% (-21% - 18%)
Diffusion Tubes Mean:	33 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	34 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	34 (28 - 42) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 10 periods of data	
Bias factor A	1.02 (0.85 - 1.27)
Bias B	-2% (-21% - 18%)
Diffusion Tubes Mean:	33 μgm^{-3}
Mean CV (Precision):	5
Automatic Mean:	34 μgm^{-3}
Data Capture for periods used:	99%
Adjusted Tubes Mean:	34 (28 - 42) μgm^{-3}



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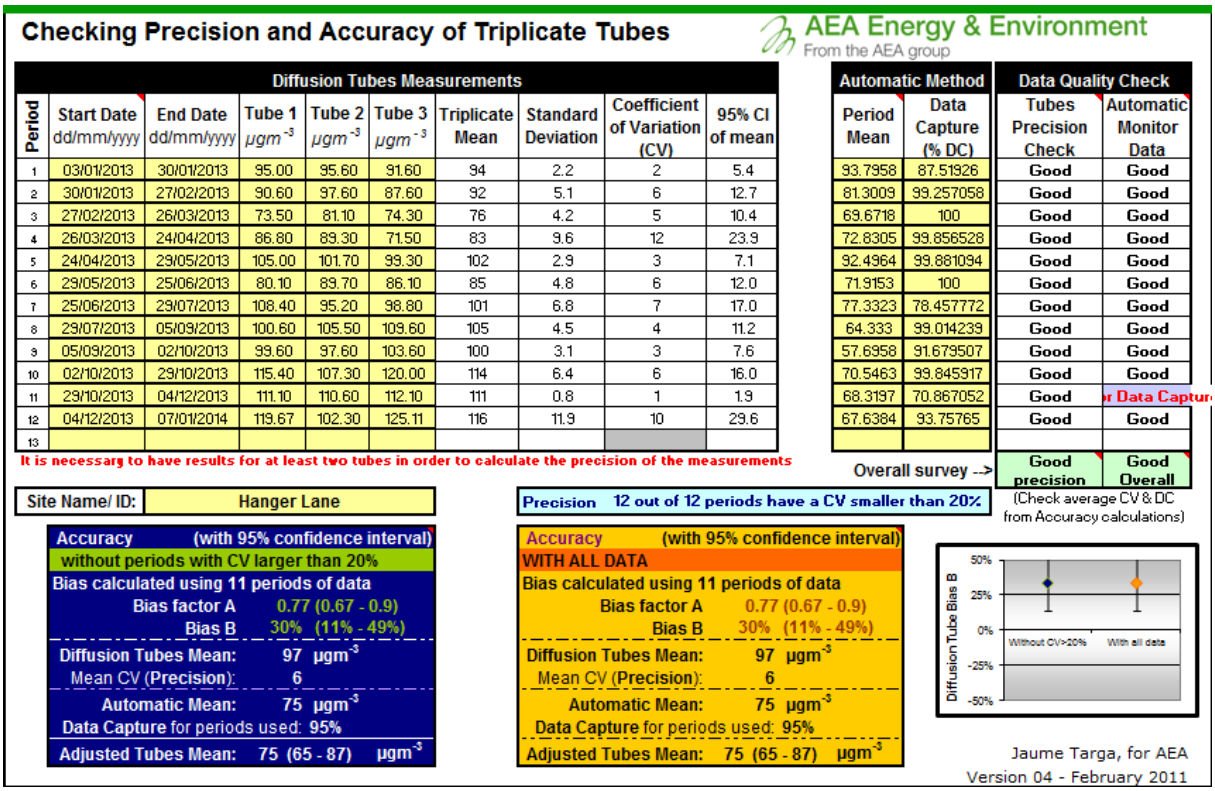
Version 04 - February 2011

Figure A.3: Results of 2013 Co-location Study at Hanger Lane Gyratory Monitoring Station



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1	03/01/2013	30/01/2013	95.00	95.60	91.60	94	2.2	2	5.4
2	30/01/2013	27/02/2013	90.60	97.60	87.60	92	5.1	6	12.7
3	27/02/2013	26/03/2013	73.50	81.10	74.30	76	4.2	5	10.4
4	26/03/2013	24/04/2013	86.80	89.30	71.50	83	9.6	12	23.9
5	24/04/2013	29/05/2013	105.00	101.70	99.30	102	2.9	3	7.1
6	29/05/2013	25/06/2013	80.10	89.70	86.10	85	4.8	6	12.0
7	25/06/2013	29/07/2013	108.40	95.20	98.80	101	6.8	7	17.0
8	29/07/2013	05/09/2013	100.60	105.50	109.60	105	4.5	4	11.2
9	05/09/2013	02/10/2013	99.60	97.60	103.60	100	3.1	3	7.6
10	02/10/2013	29/10/2013	115.40	107.30	120.00	114	6.4	6	16.0
11	29/10/2013	04/12/2013	111.10	110.60	112.10	111	0.8	1	1.9
12	04/12/2013	07/01/2014	119.67	102.30	125.11	116	11.9	10	29.6
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
93.7958	87.51926	Good	Good
81.3009	99.257058	Good	Good
69.6718	100	Good	Good
72.8305	99.856528	Good	Good
92.4964	99.881094	Good	Good
71.9153	100	Good	Good
77.3323	78.457772	Good	Good
64.333	99.014239	Good	Good
57.6958	91.679507	Good	Good
70.5463	99.845917	Good	Good
68.3197	70.867052	Good	or Data Capture
67.6384	93.75765	Good	Good
Overall survey -->		Good precision	Good Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Hanger Lane

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 11 periods of data
Bias factor A 0.77 (0.67 - 0.9)
Bias B 30% (11% - 49%)
Diffusion Tubes Mean: 97 µgm⁻³
Mean CV (Precision): 6
Automatic Mean: 75 µgm⁻³
Data Capture for periods used: 95%
Adjusted Tubes Mean: 75 (65 - 87) µgm⁻³

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 11 periods of data
Bias factor A 0.77 (0.67 - 0.9)
Bias B 30% (11% - 49%)
Diffusion Tubes Mean: 97 µgm⁻³
Mean CV (Precision): 6
Automatic Mean: 75 µgm⁻³
Data Capture for periods used: 95%
Adjusted Tubes Mean: 75 (65 - 87) µgm⁻³

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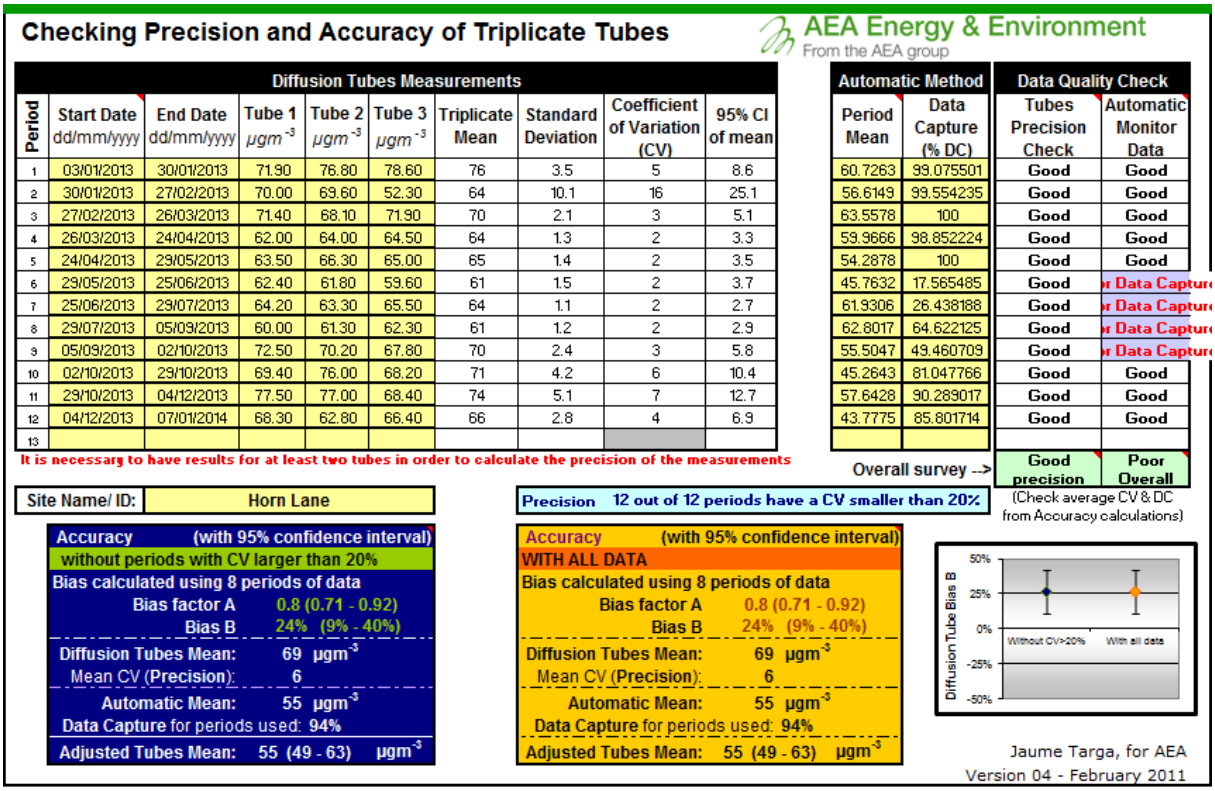
Figure A.4: Results of 2013 Co-location study at Horn Lane Monitoring Station



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1	03/01/2013	30/01/2013	71.90	76.80	78.60	76	3.5	5	8.6
2	30/01/2013	27/02/2013	70.00	69.60	52.30	64	10.1	16	25.1
3	27/02/2013	26/03/2013	71.40	68.10	71.90	70	2.1	3	5.1
4	26/03/2013	24/04/2013	62.00	64.00	64.50	64	1.3	2	3.3
5	24/04/2013	29/05/2013	63.50	66.30	65.00	65	1.4	2	3.5
6	29/05/2013	25/06/2013	62.40	61.80	59.60	61	1.5	2	3.7
7	25/06/2013	29/07/2013	64.20	63.30	65.50	64	1.1	2	2.7
8	29/07/2013	05/09/2013	60.00	61.30	62.30	61	1.2	2	2.9
9	05/09/2013	02/10/2013	72.50	70.20	67.80	70	2.4	3	5.8
10	02/10/2013	29/10/2013	69.40	76.00	68.20	71	4.2	6	10.4
11	29/10/2013	04/12/2013	77.50	77.00	68.40	74	5.1	7	12.7
12	04/12/2013	07/01/2014	68.30	62.80	66.40	66	2.8	4	6.9
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
60.7263	99.075501	Good	Good
56.6149	99.554235	Good	Good
63.5578	100	Good	Good
59.9666	98.852224	Good	Good
54.2878	100	Good	Good
45.7632	17.565485	Good	or Data Capture
61.9306	26.438188	Good	or Data Capture
62.8017	64.622125	Good	or Data Capture
55.5047	49.460709	Good	or Data Capture
45.2643	81.047766	Good	Good
57.6428	90.289017	Good	Good
43.7775	85.801714	Good	Good
Overall survey -->		Good precision	Poor Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Horn Lane

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 8 periods of data
Bias factor A 0.8 (0.71 - 0.92)
Bias B 24% (9% - 40%)
Diffusion Tubes Mean: 69 µgm⁻³
Mean CV (Precision): 6
Automatic Mean: 55 µgm⁻³
Data Capture for periods used: 94%
Adjusted Tubes Mean: 55 (49 - 63) µgm⁻³

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 8 periods of data
Bias factor A 0.8 (0.71 - 0.92)
Bias B 24% (9% - 40%)
Diffusion Tubes Mean: 69 µgm⁻³
Mean CV (Precision): 6
Automatic Mean: 55 µgm⁻³
Data Capture for periods used: 94%
Adjusted Tubes Mean: 55 (49 - 63) µgm⁻³

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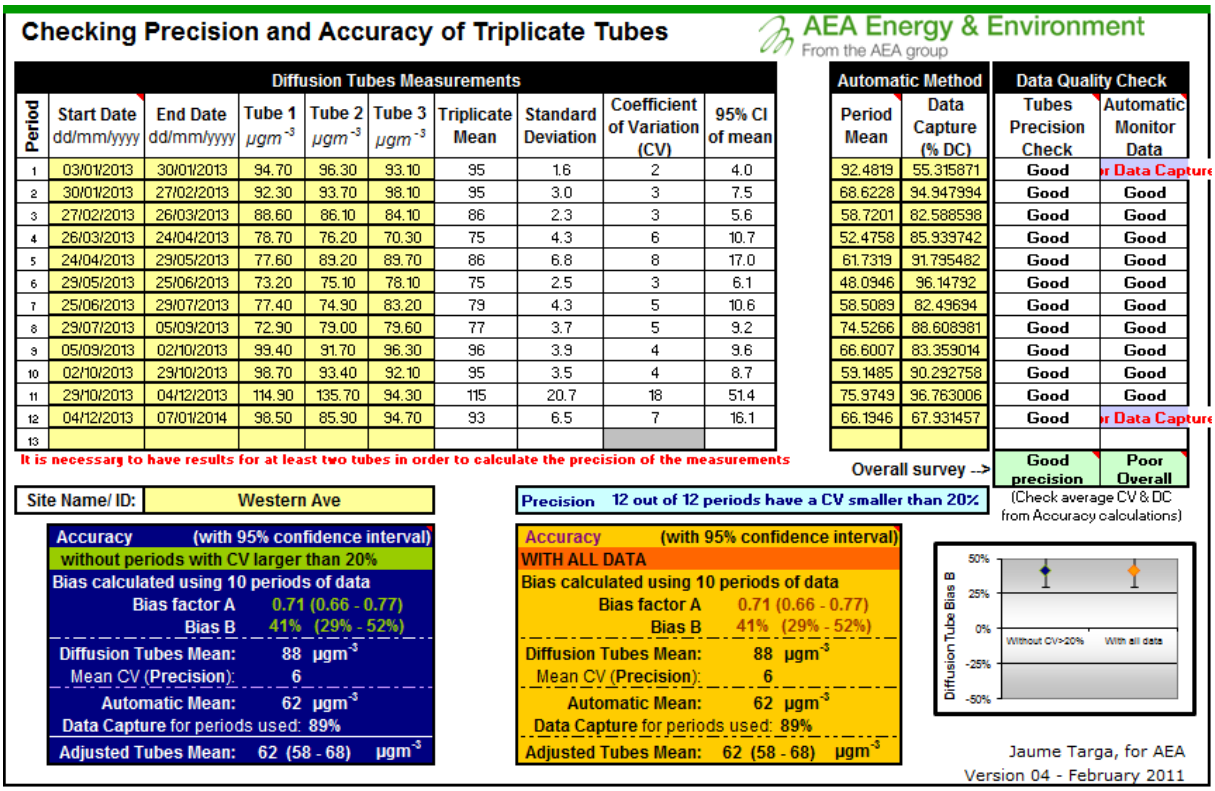
Version 04 - February 2011

Figure A.5: Results of 2013 Co-location study with Western Avenue Monitoring Station



Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

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
1	03/01/2013	30/01/2013	94.70	96.30	93.10	95	1.6	2	4.0
2	30/01/2013	27/02/2013	92.30	93.70	98.10	95	3.0	3	7.5
3	27/02/2013	26/03/2013	88.60	86.10	84.10	86	2.3	3	5.6
4	26/03/2013	24/04/2013	78.70	76.20	70.30	75	4.3	6	10.7
5	24/04/2013	29/05/2013	77.60	89.20	89.70	86	6.8	8	17.0
6	29/05/2013	25/06/2013	73.20	75.10	78.10	75	2.5	3	6.1
7	25/06/2013	29/07/2013	77.40	74.90	83.20	79	4.3	5	10.6
8	29/07/2013	05/09/2013	72.90	79.00	79.60	77	3.7	5	9.2
9	05/09/2013	02/10/2013	99.40	91.70	96.30	96	3.9	4	9.6
10	02/10/2013	29/10/2013	98.70	93.40	92.10	95	3.5	4	8.7
11	29/10/2013	04/12/2013	114.90	135.70	94.30	115	20.7	18	51.4
12	04/12/2013	07/01/2014	98.50	85.90	94.70	93	6.5	7	16.1
13									

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

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
92.4819	55.315871	Good	r Data Capture
68.6228	94.947994	Good	Good
58.7201	82.588598	Good	Good
52.4758	85.939742	Good	Good
61.7319	91.795482	Good	Good
48.0946	96.14792	Good	Good
58.5089	82.49694	Good	Good
74.5266	88.608981	Good	Good
66.6007	83.359014	Good	Good
59.1485	90.292758	Good	Good
75.9749	96.763006	Good	Good
66.1946	67.931457	Good	r Data Capture
Overall survey -->		Good precision	Poor Overall

(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Western Ave

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 10 periods of data
Bias factor A 0.71 (0.66 - 0.77)
Bias B 41% (29% - 52%)
Diffusion Tubes Mean: 88 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 62 µgm^{-3}
Data Capture for periods used: 89%
Adjusted Tubes Mean: 62 (58 - 68) µgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA
Bias calculated using 10 periods of data
Bias factor A 0.71 (0.66 - 0.77)
Bias B 41% (29% - 52%)
Diffusion Tubes Mean: 88 µgm^{-3}
Mean CV (Precision): 6
Automatic Mean: 62 µgm^{-3}
Data Capture for periods used: 89%
Adjusted Tubes Mean: 62 (58 - 68) µgm^{-3}

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Version 04 - February 2011

Discussion of Choice of Factor to Use

Co-location studies were carried out at a number of air quality monitoring stations. However due to poor overall data capture at the majority of these sites (as shown in Figure A.2 to A.5), it has been decided to use the nationally derived bias adjustment factor. It should be noted this factor (0.76) correlates well with the local bias-adjustment factor derived for the Hanger Lane Gyratory site, where good overall data capture was obtained (see Figure A.3.)

PM Monitoring Adjustment

Monitoring is conducted using TEOMs at four of the five air quality monitoring stations. There is therefore a need to eliminate the effect of changing humidity on the mass measurement; the TEOM is required to maintain the sample filter at an elevated temperature which may lead to losses of semi-volatile species such as ammonium nitrate. The Volatile Correction Model[xi] uses local FDMS monitoring sites to correct TEOM measurements for the loss of volatile components of particulate matter that occur due to the high sampling temperatures employed by this instrument.

Short-term to Long-term Data adjustment

As data capture for 2013 was low at the Beaconsfield Road diffusion tube site, seasonal adjustment factors were calculated to estimate the annual mean NO_2 concentration from the measured period mean. In accordance with LAQM.TG(09) guidance, period and annual mean NO_2 concentrations were calculated from three nearby background NO_2 AURN monitoring sites having data capture rates of greater than 90%. This was done by using the mean annual mean / period mean ratio. For Beaconsfield the calculated ratio was 1.11. Details of these calculations are presented below.

Table A.1 Short-Term to Long-Term Monitoring Data Adjustment Beaconsfield Road Diffusion Tube 2013

	NO_2 Concentration ($\mu g/m^3$)			Average Ratio of Annual Mean to Period Mean
	Ealing - Southall	Kensington and Chelsea - North Ken	Wandsworth - Putney	
Annual Mean	32.74	32.60	39.57	
Period Mean	27.58	30.17	36.96	**1.11**

Appendix B: Monthly NO_2 Diffusion Tube Results

Table B.1: Raw Monthly NO_2 Diffusion Tube Results, 2013 ($\mu g/m^3$)

Site ID	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Average
EA1	48	41.7	46.3	41.8	N/D	34.1	34	30.2	46.1	36.1	46.7	40.4	40.5
EA2	44.5	41.2	41.8	27.1	29.5	33.5	25.3	20	39.1	32.2	45.7	38.8	34.9
EA3	50.3	46.7	47.6	37.7	37.3	26.8	32.9	32.8	46.6	40	52.1	N/D	41.0
EA4	80.3	74.9	58.7	59.7	62.8	60.3	67.5	N/D	80.1	82.6	71.2	N/D	69.8
EA5	40	38.2	35.4	20.6	23.5	20.6	22.2	21.1	30.2	29	40.7	29.8	29.3
EA6	49	42	46.2	37.9	32.8	28.9	32.7	30.2	41.1	36.3	48.7	41.9	39.0
EA7	64	69.5	63.7	59.3	67.9	45.8	59.3	44.5	66.1	59.2	73.7	65.9	61.6
EA8	42	42.7	45.3	33.2	30.4	26.8	26.9	25.4	39.6	30.8	50.6	31.7	35.5
EA9	46.4	53.1	46.8	41.7	39.3	14.7	35.5	33.9	21.8	41.7	54.8	44.9	39.6
EA10	38.9	37.1	31.3	25.8	23.3	22.7	24.5	24.9	33.4	30.4	43	35.4	30.9
EA11	N/D	N/D	58.3	42.6	47	45.9	48.2	39.5	56.3	40	56.2	46.4	48.0
EA12	47.4	47.5	49.6	37.6	37.4	34.1	35	29.7	41.5	34.5	55.8	37.1	40.6
EA13	48.6	47.1	45.5	40.5	49.4	34.7	39	35.1	46.4	37.8	55.4	42.8	43.5
EA14	74.2	68.5	75.4	67.3	60.7	59.2	72.2	60.7	85.2	63.9	77.6	65.7	69.2
EA15	46.9	43.6	51.8	35.2	33.8	34.5	28.6	25.4	42.3	39.3	48.5	33.9	38.7
EA16	42.5	39.9	39.8	25.6	29.6	23.7	26.5	22.6	37.4	27.9	47.9	32.5	33.0
EA17	66.3	57.1	67.8	64.9	64.3	54.9	61.8	50.5	60.7	61.9	69.2	67.4	62.2
EA18	51.7	54.7	53	42.9	45.2	38.6	39.5	37.6	66.1	47	61.7	36.6	47.9
EA19	52.9	42.3	47.9	39.1	37	31.5	35.2	32.8	51.6	45.4	55.9	51.5	45.4
EA20	53.4	48.1	50.6	44.6	46.4	40.7	41.7	38.3	54.6	67.3	58.9	N/D	49.5
EA21	51.5	51	45.4	41	46.4	37	39.2	33.2	48.8	42.7	N/D	36.3	43.0
EA22	54.3	49.7	55	45	37.9	36.8	42.6	36.7	44.3	38.7	44.8	38.6	43.7
EA23	50.1	49.9	61.1	43.1	42.3	38	40.5	32.7	54.3	44.8	52.2	28.1	44.8
EA24	N/D	N/D	N/D	46.7	46	44.8	47.1	36.6	55.9	45.5	58.1	42.4	47.0
EA25	42.6	34.7	39.2	22.4	25.8	22.4	26.1	38.6	36	33.8	40.5	35.5	33.1
EA26	39.6	38.3	36.2	27.8	26.1	22.1	22.9	24.1	37.7	27.5	39.1	34.3	31.3
EA27	43.3	37.9	41.8	27.4	25.2	23.5	23.8	23.9	37	30.9	36.4	35.4	32.2
EA28	55.3	57	65.7	58.3	49.9	51.7	56.2	45.3	55.5	49.5	55.2	49.3	54.1
EA29	76.3	68.7	69.6	N/D	71.4	58.2	76.7	73.8	74.2	74.8	69.5	86.2	72.7
EA30	44.5	42	41.9	34.4	33.2	27.6	32.3	29.6	42.8	40	45.8	47.2	38.4

Site ID	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Average
EA31	56.9	44.7	50.6	36.3	27.1	27.7	30.5	24.4	47	38.4	49.8	46.6	40.0
EA32	48.3	47.5	53.5	39.9	40.2	37.6	42	33.8	48.5	37.9	49.5	45.1	43.7
EA33	56.4	50.8	46.4	33.4	31.7	26.3	28.2	31.2	50.8	38.9	56.6	40.5	40.9
EA34	45.1	31.7	43.8	31.3	33.2	25.8	28	28	36	46.3	45.9	43.7	36.6
EA35	44	32.7	41.5	27.4	22.8	22.4	19.8	20.9	21.3	31.7	38.9	34	29.8
EA36	61.9	67.1	68.5	53.8	51.4	48.3	50.4	41.6	56.1	47.3	63.3	55.5	55.4
EA37	55.7	62.4	51.3	47.8	56.1	45.2	47.8	47.2	53	53.1	62.9	52.6	52.9
EA38	53.6	41.2	48.5	37.3	39.3	30.7	36.9	36.7	42.3	45.8	58.8	N/D	42.8
EA39	54.7	45.4	49.4	41.9	40.8	32.6	35.7	32.7	50.3	42.5	54.8	47.6	44.0
EA40	46.8	37.4	43	27.6	30.3	26.4	28.1	25.5	40.9	32.9	37.3	36.4	34.4
EA41	63.4	51.7	53	43.8	48.8	41.4	42.8	38.7	46.6	42.4	52.9	51.2	48.1
EA42	66.1	60.5	N/D	46.1	44.2	42.9	51.3	51.4	62.8	57.7	61.2	66.2	55.5
EA43	66.2	50.5	67.2	48.3	46.1	42.3	42.2	35.6	53.6	43.8	65.1	47.9	50.7
EA44	64	56.6	52.4	49.4	50.6	41.4	44.5	42.4	51.9	53.5	58.5	57.2	51.9
EA45	50.3	44.9	41.8	35.9	36.1	27.9	33	34.9	41.3	45.9	47.4	50	40.8
EA46	47.2	44.4	48	31.9	34.3	31	33.8	27.4	42.2	28.9	46.6	36.3	37.7
EA47	38.8	29.8	43.6	28.7	26.5	22.3	26.3	23.5	41.1	28.8	43.5	32.1	32.1
EA48	50.1	78.7	74.9	58.1	65.4	63.3	75.1	74.3	82.7	92.6	90.8	99.3	75.4
EA49	43.6	36.5	39.5	26.5	31.8	24.5	28.8	24.8	42.7	32.8	52.4	36.5	35.0
EA50	84.8	53.8	62	46	43.6	34.5	39.2	35.1	50.6	44.2	58.9	46.1	49.9
EA51	85.4	74.7	64.4	56	63.2	56.3	63.6	57.6	68.6	61.3	79	70.5	66.7
EA52	84	86.8	80.1	72.3	82.6	74.5	84	83.2	85.1	76.9	79	80.7	80.8
EA53	53.9	48.2	48.4	44.5	43.6	32.2	36.5	36.9	47.3	44.3	50.3	42.4	44.0
EA54	51.5	45.9	47.8	38.3	35.1	30.2	34.9	33.6	45.6	43	53.8	53.3	42.8
EA55	55.1	55.7	47.8	36.5	42.9	32.7	36.3	35	48.1	48	52.4	43.8	44.5
EA56	71.5	65.9	65.7	58.1	59.5	51.3	62.5	62.1	69.3	62.6	71.9	63.4	63.7
EA57	56.9	53.9	53.7	46.6	48.4	41.1	45.1	40	47.6	48.7	63.8	54.4	50.9
EA58	95	90.6	73.5	86.8	105	80.1	108	100.6	99.6	115.4	111.1	119.7	98.8
EA59	95.6	97.6	81.1	89.3	102	89.7	95.2	105.5	97.6	107.3	110.6	102.3	97.8
EA60	91.6	87.6	74.3	71.5	99.3	86.1	98.8	109.6	103.6	120	112.1	125.1	98.3
EA61	63.2	67.1	72	66	67.6	64.8	64	61.5	65.7	62.4	75.2	55.8	65.4
EA62	36	41.3	39.7	31.7	34.3	28.5	30.4	31.4	41.3	36.9	43.9	38.8	36.2
EA63	59.3	56.4	63.4	47.9	52.8	48.3	45	41	56.1	52.2	62.9	55.5	53.4

Site ID	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Average
EA64	80.4	89.3	100.3	81	72.5	75.8	79.6	61.4	88.1	63.5	N/D	66.2	78.0
EA65	94.7	92.3	88.6	78.7	77.6	73.2	77.4	72.9	99.4	98.7	114.9	98.5	88.9
EA66	96.3	93.7	86.1	76.2	89.2	75.1	74.9	79	91.7	93.4	135.7	85.9	89.8
EA67	93.1	98.1	84.1	70.3	89.7	78.1	83.2	79.6	96.3	92.1	94.3	94.7	87.8
EA68	78.8	78.3	78.1	66.5	71.6	66.7	69.4	68.3	79.2	77.8	94.9	74.6	75.4
EA69	43.7	48.4	46.7	39.7	44.2	36	38.1	41.6	47.5	49.9	59.5	N/D	45.0
EA70	57.8	55.6	55.4	43.9	43.3	42.7	42.2	42.1	49	52.7	56.1	55.4	49.7
EA71	70.5	67.2	79.4	59.9	64	61.5	66.5	56.2	68.9	63.1	72.3	68.5	66.5
EA72	58.1	57.8	74.9	63.7	40.8	47.3	48.7	37	53.3	45.4	56.7	45.1	52.4
EA73	57	51.7	48.7	46.1	39.4	33.1	41	41.4	44.3	50.2	54.9	57.6	47.1
EA74	64.5	51.7	74.3	62.7	64.2	57.3	62.4	53.2	65.6	62.7	81.3	61	63.4
EA75	104.8	104.3	95.5	N/D	103	99.6	102	100.3	103.4	83.5	106.7	84.9	98.9
EA76	72.3	67.6	64.6	56.9	64.2	49.7	54.6	59.3	66.8	64.2	70.4	68.1	63.2
EA77	82.9	89.6	85.2	73	77.1	73.4	76.6	75.4	72.2	72.6	78.1	68.5	77.1
EA78	65.2	62.6	69.4	51.7	53.1	N/D	49.5	48.1	63.6	N/D	64.2	55.5	58.3
EA79	54.6	63.6	67.4	51.9	59.1	N/D	52.6	51.8	59.8	51.7	67.2	48.3	57.1
EA80	48.3	46.9	42	27.6	36.1	31.6	32	32.1	45	34	44.8	46.1	38.9
EA81	76.8	73	82.9	65.1	76.5	73.3	70.2	63.7	76.8	70.2	86.4	73.2	74.0
EA82	49.4	60.7	49.3	38.1	35	31.5	31.2	31.8	44.4	35.1	N/D	36.5	40.3
EA83	75.5	86.3	93.6	76.7	77.6	81.1	82.9	64.5	79	63.5	96.8	53.3	77.6
EA84	51	42.3	48.2	30.3	29.8	24.6	25.3	27.9	43.1	30.8	53.5	29.9	36.4
EA85	57.3	68.9	56.2	51.4	43.4	38.5	41.3	39.7	50.7	46	61.1	52.6	50.6
EA86	49.9	50.5	54.3	39.4	40.5	35	37.3	33.5	47.2	52.4	44.6	44.3	44.1
EA87	52.3	45.8	50.2	35.8	38.3	32.5	36	34.2	47.5	44.1	65.3	44.7	43.9
EA88	47.4	41.6	47.8	31.1	24.9	28.6	28.3	27.5	38.6	34.5	40.3	33.7	35.4
EA89	54.6	60.6	67.6	53.7	52.4	49.3	52.2	52.8	61.7	48	58.6	54.5	55.5
EA90	71.9	70	71.4	62	63.5	62.4	64.2	60	72.5	69.4	77.5	68.3	67.8
EA91	76.8	69.6	68.1	64	66.3	61.8	63.3	61.3	70.2	76	77	62.8	68.1
EA92	78.6	52.3	71.9	64.5	65	59.6	65.5	62.3	67.8	68.2	68.4	66.4	65.9
EA93	60.1	55.2	64.3	51.6	53.9	49.6	54.1	49.9	59.9	51.4	57.3	54.5	55.2
EA94	65.1	58.2	61.2	57.8	53.9	52.9	50.3	55.1	64.2	58.9	67.2	61.7	58.9
EA95	57.4	51.1	51.6	40.9	40.8	35.9	38.6	35.1	48.6	43.1	48.6	41	44.4

Notes: N/D = No Data