2014 Air Quality Progress Report for London Borough of Brent

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

May 2014

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Executive Summary

This is the London Borough of Brent 2014 Progress Report fulfilling the requirements of the Local Air Quality Management 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 published by Defra.

This Progress Report considers all new monitoring data collected in 2013, assesses these data against the Air Quality Strategy objectives, and summarises the progress made with Brent's Air Quality Action Plan measures for the 2013 - 2014.period.

Monitoring data for 2013 results confirm the retaining of the AQMA for the annual mean nitrogen dioxide (NO_2) objective and the 24-hour mean objective for particulate matter (PM_{10}), and the need to further extend current boundaries to include additional areas exceeding annual mean NO_2 concentrations at Harrow Road (left from Sudbury Court Drive) and at the Junction of Shaftesbury Avenue / Woodcock Hill.

The outcome of 2013 monitoring has also shown that the measured PM_{10} concentrations at two of the three Council's automatic monitoring sites (BT4 and BT5) exceeded the 24-hour mean objective for this pollutant.

The London Borough of Brent is unlikely to meet the objectives for NO_2 and PM_{10} in the future without significant intervention measures. A review and update of the Air Quality Action Plan will be undertaken shortly to identify additional measures to significantly decrease levels of these pollutants in the borough.

Proposed actions are to:

- Proceed to a Detailed Assessment for the areas listed above;
- Undertake an Updating and Screening Assessment in 2015; and
- Draft a new Local Action plan for the period 2015-2020

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1 INTRODUCTION

1.1 Description of Local Authority Area

Brent is a Greater London borough in north-west London and borders the London Borough of Harrow to the northwest, London Borough of Barnet to the northeast, London Borough of Camden to the east and London Borough of Ealing, London Borough of Hammersmith & Fulham, and Kensington & Chelsea to the south, and London Borough of Westminster to the southeast.

It has large areas of industrial estates; densely populated urban areas as well as more suburban regions; it also houses Wembley Stadium. Brent has the lowest percentage (21.9%) of green space of all outer London boroughs.

The A5 Edgware Road runs the length of the eastern Borough boundary, and the A406 North Circular Road transects the borough from east to west, both being significant contributors to air quality exceedences for nitrogen dioxide (NO_2) and particulate matter (PM_{10}) within the borough, (Figure 1.1).

The south area of the borough is the most heavily populated, occupied by over 70% of the total population; it has a mixture of residential, industrial and commercial land uses, and it is entirely within the Air Quality Management Area (AQMA) currently declared for Brent.

The north of the borough is less densely populated, with more parks and open spaces. The AQMA here is confined to zones surrounding the most heavily trafficked roads in the north of the borough(Figure 1.1).

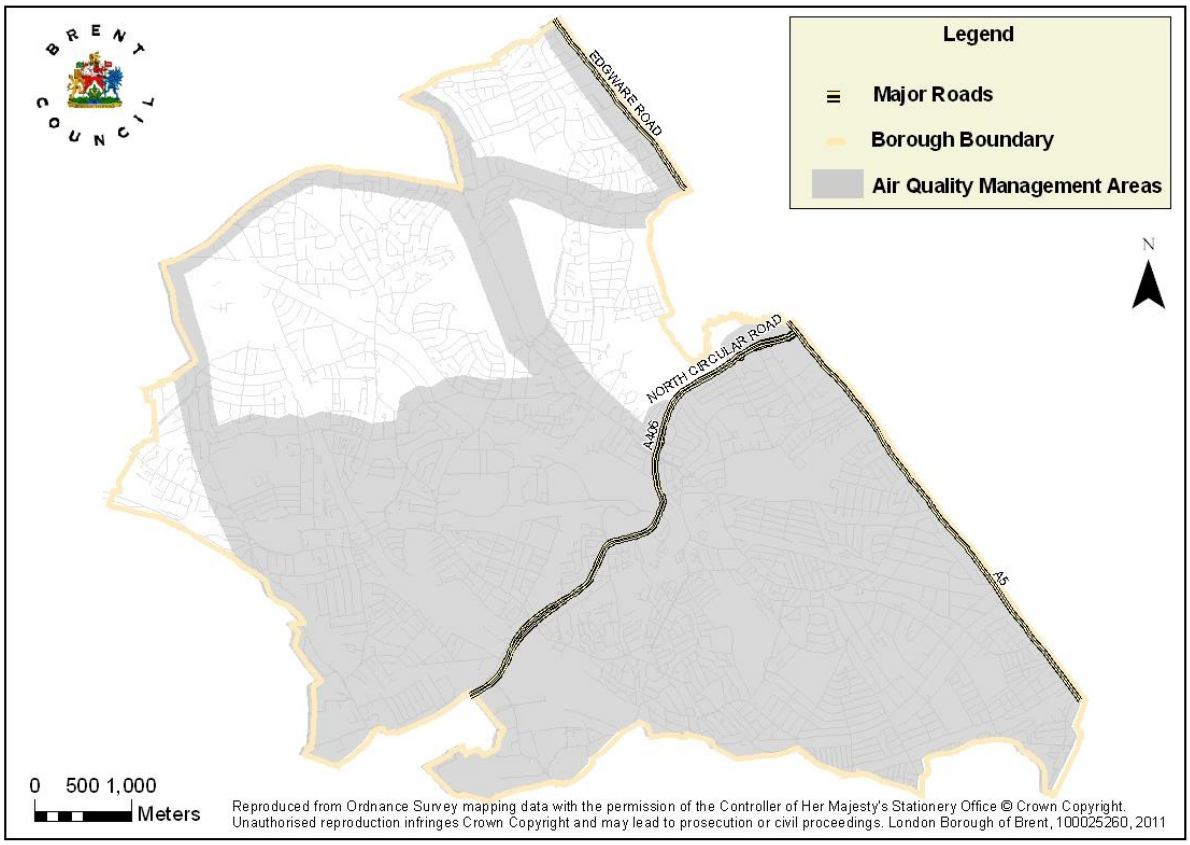

Figure 1.1: Air Quality Management Areas including LBB Major Roads

Wembley is the major conurbation within LBB and is home to the Wembley Stadium and Wembley Arena. The Wembley Regeneration Area was incorporated into the amended AQMA in 2006, since conversion from a previously industrial area to a predominantly residential area. All of the major town centres in Brent are now encompassed within the currently declared AQMA.

1.2 Purpose of Progress Report

Progress Reports are required in the intervening years between the three-yearly Updating and Screening Assessment (USA) reports. Their purpose is to maintain continuity in the Local Air Quality Management process.

They are not intended to be as detailed as USA Reports but 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 Local Air Quality Management (LAQM) in England are set out in the Air Quality (England) Regulations 2000 (SI 928) and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are listed below in Table 1.1 which also includes the number of permitted exceedences in any given year (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	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 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
Particles (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

1.4 Summary of Previous Review and Assessments

1999- *Stage 1: Review and assessment*
A full assessment of the eight priority pollutants undertaken. The stage 1 report concluded that carbon monoxide (CO), fine particles as PM_{10}, sulphur dioxide (SO_2) and NO_2 required further assessment at stage 2.

2000- *Stage 2: Review and assessment*

Brent's stage 2 report concluded that no further action was needed for CO, but further investigation was required for SO_2, PM_{10} and NO_2. .

2000- *Stage 3: Review and assessment*
Brent's stage 3 report predicted that levels of NO_2 and fine particles as PM_{10} would exceed National Air Quality objectives, the primary source being road traffic emissions. Having determined the areas of the borough where air quality would not meet the Objectives by 2005, Brent declared them as an Air Quality Management Area (AQMA) in April 2001.

2002-2003- *Stage 4: Detailed Assessment and Updating and screening assessment*
The Detailed Assessment carried out in 2002 identified exceedences of the annual mean NO_2 objective and of the annual mean for PM_{10}. The tasks required for reducing these and other emissions in the borough would need to be identified in the Air Quality Action Plan, which would set out policies and measures to work towards meeting the Air quality Objectives.

The Updating and Screening Assessment concluded that a further Detailed Assessment was necessary, based on NO_2 and PM_{10} concentrations around busy roads across the borough where exceedences were predicted outside of the AQMA declared in 2001.

2004- *Detailed Assessment*
The detailed assessment confirmed air quality objectives for NO_2 and PM_{10} will not be met at many locations including two key locations outside the existing Air Quality Management Area – Wembley Hill Road and Ealing Road. As a result of very high concentrations of measured particulates at Neasden Lane detailed modelling was also undertaken. This indicated that exceedances of the particulate 24-hour mean objective limit of 50 $\mu g\ m^{-3}$ (more than 35 times per year) would continue, and recommended control of emissions be prioritized in this area.
The impact of diesel train emissions from the Chiltern Line on SO_2 concentrations was determined as unlikely to breach the objectives set for this pollutant. An Air Quality Management Area was not declared for SO_2 as a result.

2005- *Air Quality Action Plan*
The Air Quality Action Plan listed 98 actions and outlined Brent's commitment to take action to reduce the impact of poor air quality in its area of jurisdiction. Regular reporting to chart progress would be made as part of our duties under LAQM.

2005- *Updating and screening assessment*
The Updating and Screening Assessment confirmed that concentrations of NO_2 continue to exceed the annual mean objective where there is relevant exposure. Additional monitoring in the Council's area indicated that the annual mean objective for NO_2 was being exceeded outside of the AQMA and that an extension of the AQMA was required.

2008- *Further Assessment*
Following the extension of the AQMA in 2006 the Council subsequently conducted a Further Assessment, to confirm that the objectives for NO_2 and PM_{10} would not be met in these areas in 2008.

2006- *AQMA extended to encompass all areas in exceedance of the AQS objectives and 2008/50/EC limit values.*

2011- *Progress Report*
Progress Reports provided an annual update of air quality issues in Brent and the progress achieved with the implementation of air quality action plan measures. The 2011 report determined that two areas not included into the AQMA marginally exceeded the annual mean objective for NO_2.

2012- *Updating and screening assessment*
The 2012 report confirmed the need for a Detailed Assessment for NO_2 at Harrow Road (left of Sudbury Court Drive) and at the junction of Shaftesbury Avenue and Woodcock Hill.

Traffic remained the key contributor to air pollution within Brent. The annual and hourly mean objective for NO_2 and PM_{10} continued to exceed the objectives in air the current AQMA in the Borough.

2012- *Air Quality Action Plan* 2012-2015
The new plan reduces the 98 measures listed in the previous plan to 28 measures including 15 new air quality action plan measures. Progress in delivering the plan will be reported annually in accordance with the National Review and Assessment process.

2013- *Progress Report*
There have been no significant changes to air quality since the last detailed assessment and Updating and Screening Assessment undertaken in 2012. NO_2 and particulates continue to exceed the national air quality objective levels in areas where there is relevant exposure.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

In 2013 the Council undertook continuous monitoring at three fixed sites in the Borough (see Figure 2.1 for a plan of all monitoring locations and Table 2.1 for details of all monitoring sites). All monitoring sites are within the Council's AQMA.

• Brent 4 (BT4) is a roadside site, located in the Neasden area, Drury Way and has been in operation since 2003;
• Brent 5 (BT5) is an industrial site, located in the Neasden area of Brent and has been in operation since 2004;
• Brent 6 (BT6) is a roadside site, located in the Harlesden area of Brent and has been in operation since 2006.

All analysers are manually calibrated by Brent Council fortnightly, using certified span gases. Although none of the three PM_{10} analysers (Tapered Element Oscillating Microbalances or TEOMs) are part of the national network, recommended quality assurance/quality control (QA/QC) procedures are followed, including the filter change frequency and methodology. All data are collected and ratified by the Environment Research Group at King's College (ERG) and is available to view via the Londonair (www.londonair.org.uk) website.

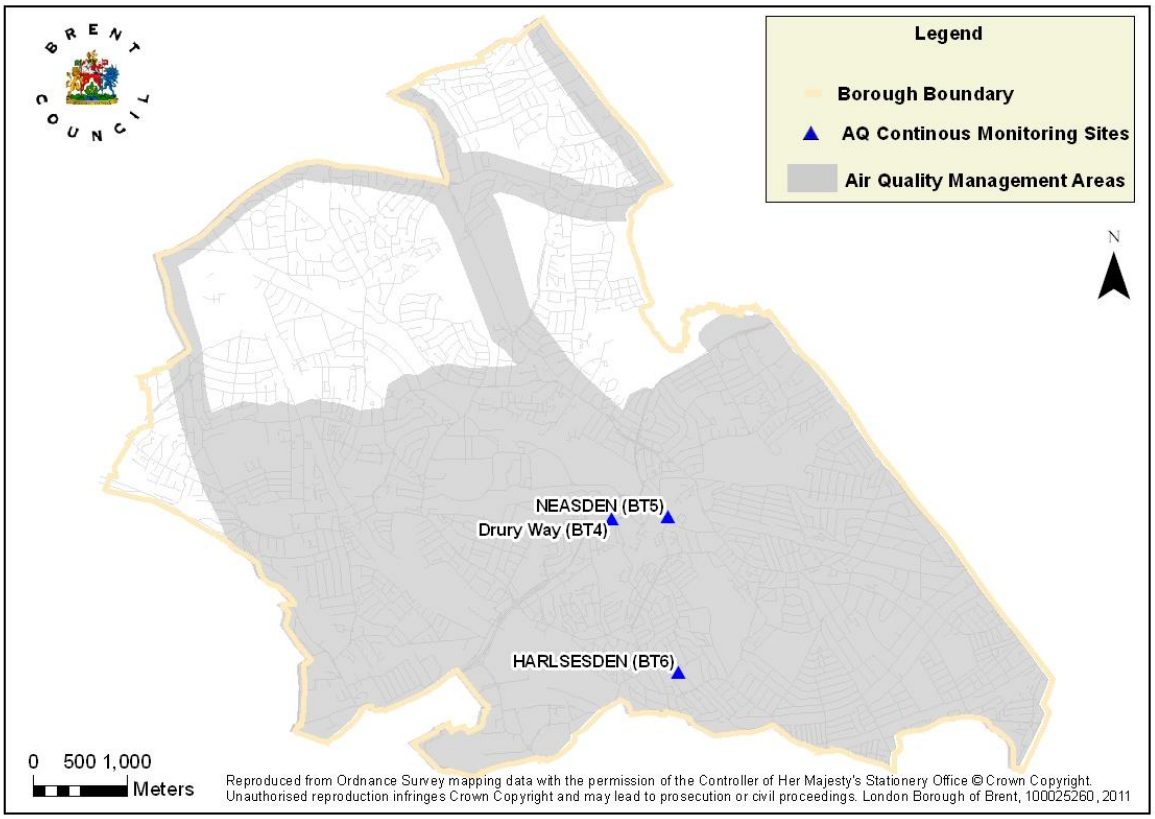

Figure 2.1 Map of Automatic Monitoring Sites

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	Grid Ref (X,Y)	Pollutants Monitored	In AQMA?	Monitoring Tech.	Relevant Exposure	Distance to kerb of nearest road	Worst-case exposure?
BT4 Ikea	Roadside	*520866 185169*	NO_2 PM_{10} $PM_{2.5}$ O_3	Y	TEOM VCM method	Y (38m)	2m	Y
BT5 Neasden Lane	Industrial	*521511 185204*	NO_2 PM_{10}	Y	TEOM VCM method	Y (35m)	4m	N
BT6 John Keble Primary School	Roadside	*521619 183554*	NO_2, PM_{10}	Y	TEOM VCM method	Y (10m)	2m	Y

2.1.2 Non-Automatic Monitoring Sites

The Council monitors NO_2 using 27 passive diffusion tubes at 25 sites across the Borough from 2011 (see Figure 2.2). Diffusion tubes currently include 24 roadside locations and one background location (Id:33A). Three roadside diffusion tubes (Id: 52A, 52B, 52C) have been co-located at BT4 Ikea automatic monitoring station site since July 2009.

Tube locations were selected on the basis they were representative for public exposure, either close to the nearest residential premises on busy roads or at sensitive receptors such as hospitals and schools. Details of all diffusion tube locations are presented in Table 2.2.

All monitoring equipment is collected by the local site operator (LSO) and analysed by Gradko International Ltd Laboratories.

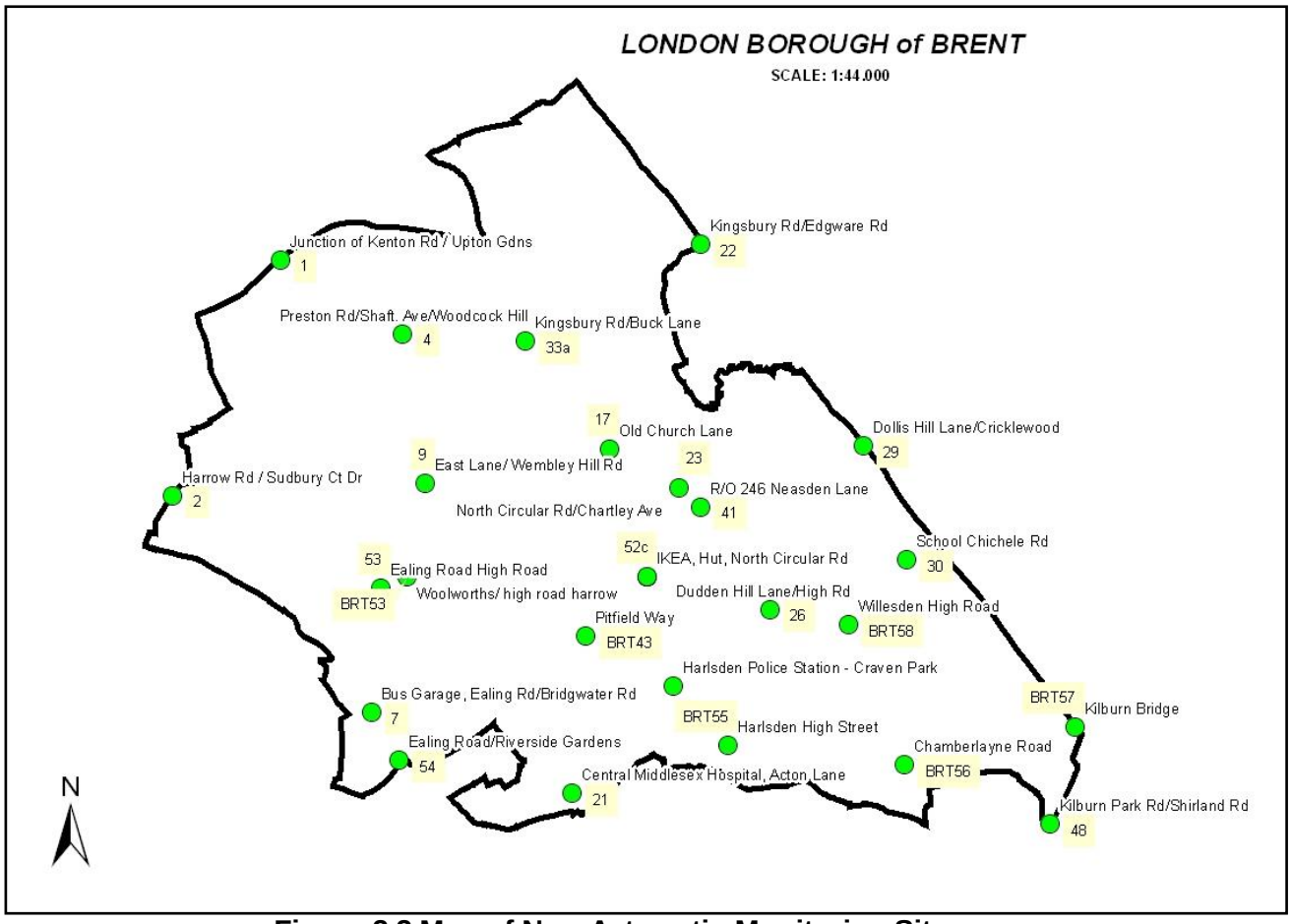

Figure 2.2 Map of Non-Automatic Monitoring Sites

Bias Adjustment

To correct for identified systematic bias, an adjustment factor is applied to the measurement data obtained.

Tubes are supplied and analysed by Gradko International Ltd and the preparation method uses 50% triethanolamine in acetone (TEA).

In 2013 Brent Council has applied the national default bias adjustment factor of 1.00 provided by the Department for Environment Food and Rural affairs (DEFRA).

The National NO_2 Bias correction factors (2011-2013):

Year:	**2011**	**2012**	**2013**
National Bias Factor:	0.93	1.01	1.00

The national factors indicate that whereas the diffusion tube measurements were over-reading in 2011 and under-reading in 2012, in 2013 no bias correction is required.

Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	ID	Site Type	OS Grid Ref (X,Y)	Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to kerb of nearest road
Junction of Kenton Rd / Upton Gardens	**1**	R	516929 188560	NO_2	Y	Y(15)	2m
Harrow Rd, Sudbury Court Drive	**2**	R	515793 186042	NO_2	N	Y(10)	1m
Junction of Shaftesbury Avenue / Woodcock Hill	**4**	R	518254 187771	NO_2	N	Y(6)	1m
Bridgewater Rd / Ealing Road	**7**	R	517921 183716	NO_2	Y	N(17)	2m
Junction of East Lane / Wembley Hill Road	**9**	R	518499 186168	NO_2	Y	Y(20)	2m
Old Church Lane junction with Neasden Lane	**17**	R	520480 186537	NO_2	Y	Y(4)	1m
Central Middlesex Hospital, Central Way	**21a**	R	520078 182857	NO_2	Y	Y(4)	1m
Junction of Kingsbury Road / Edgware Road	**22**	R	521447 188730	NO_2	Y	Y(5)	1m
Junction North Circular Rd / Chartley Avenue	**23**	R	521213 186125	NO_2	Y	Y(10)	2m
Dudden Hill Lane junction with High Road	**26**	R	522191 184821	NO_2	Y	Y(19)	1m
Junction Dollis Hill Lane / Cricklewood	**29**	R	523191 186571	NO_2	Y	Y(12)	1m
Chichele Road near Melrose Ave	**30**	R	523663 185353	NO_2	Y	Y(9.8)	1m
Kingsbury Road/Buck Lane	**33a**	B	519572 187691	NO_2	N	N(500)	1m
R/O 246 Neasden Lane	**41**	R	521455 185920	NO_2	Y	Y(3)	4m
Kilburn Park Rd near junction with Shirland Rd	**48**	R	525196 182517	NO_2	Y	Y(2)	1m
IKEA, North Circular Rd	**52**	R	520874 185173	NO_2	Y	Y(40)	1m
Junction Ealing Road / High Road	**53**	R	518020 185043	NO_2	Y	Y(15)	1m
Junction Ealing Road / Riverside Gardens	**54**	R	518221 183206	NO_2	Y	Y(4)	1m
Police Station, Craven Park	**BRT 42**	R	521155 184002	NO_2	Y	Y(3)	1m
Pitfield Way	**BRT 43**	R	520242 184541	NO_2	Y	Y(20)	2m
High Road Wembley	**BRT 53**	R	518303 185181	NO_2	Y	Y(0)	0.5m
High Street, Harlesden	**BRT 55**	R	521743 183361	NO_2	Y	Y(3)	0.5m
Chamberlayne Road	**BRT 56**	R	523635 183153	NO_2	Y	Y(15)	0.5m
Kilburn Bridge	**BRT 57**	R	525461 183558	NO_2	Y	Y(8)	0.5m
51 High Road, Willesden	**BRT 58**	R	523031 184655	NO_2	Y	Y(2)	0.5m

2.2 Comparison of Monitoring Results with AQ Objectives

Nitrogen Dioxide (NO_2), particulate matter as PM_{10} and $PM_{2.5}$ and Ozone (O_3) are routinely monitored within the borough. The monitoring results are compared with the air quality objectives for each pollutant.

2.2.1 Nitrogen Dioxide (NO_2)

Nitrogen dioxide (NO_2) and nitric oxide (NO) are collectively referred to as nitrogen oxides (NOx). All combustion processes produce NOx emissions, largely in the form of NO, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere.

Exposure to NO_2 can irritate the lungs and lower resistance to respiratory infections such as influenza. Studies indicate that continued or frequent exposure to concentrations much higher than those normally found in ambient air may cause increased incidence of acute respiratory illness in children (Defra Technical Guidance LAQM.TG(09)).

Automatic Monitoring Data

The Council monitors NO_2 in its area continuously using chemiluminescence analysers. There is a short-term objective (one hour mean of 200µg m^{-3} not to be exceeded more than 18 times a year) and a longer term objective (an annual mean not exceeding 40µg m^{-3}) set for this pollutant, to be met every year.

Table 2.3.1 shows the annual average NO_2 concentrations measured at the industrial (BT5) and roadside monitoring sites (BT4 and BT6) from 2009 to 2013.

In 2013, BT5 and BT6, in contrast to 2012, are not exceeding the objective limit of 40µg m^{-3}. It is noted however, that data capture for both sites was less than 90% and that an annualisation procedure was applied to data to estimate annual means for each site; results therefore should be read as indicative only. Due to engineering problems, BT4 monitoring station data for 2013 are not available.

Due to the low data capture at BT5 and BT6, results have been adjusted to provide an estimate of the annual mean using the procedure set out in LAQM.TG(09). Further details on annualisation are provided in Appendix 1. All NO_2 data for 2013 has been fully ratified.

Table 2.3.1 - Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID - Name	Within AQMA?	Data Capture 2013 %	Annual mean concentrations(µg/m^3)				
			2009	2010	2011	2012	2013
BT4 (Ikea)	Y	N/A	**69**	**74**	**70 (64)**	**76**	N/A
BT5 (Neasden Lane)	Y	84	37	39	36	**44**	38.9 (40.3)
BT6 (John Keble Primary School)	Y	47	**51**	**56**	**42 (40)**	**41 (43)**	37.5 (36.6)
Objective Limit			**40**				

-Exceedences of the 40 µg/m^3 annual mean NO_2 objective are highlighted in bold.
-Numbers in brackets: Estimation of annual mean concentrations from a low data capture monitoring data adjusted.

The annual mean NO_2 data trends for all three monitoring sites are illustrated in Figure 2.3. Figure 2.3 shows that BT4 presents a slight upward trend between 2008 and 2012 with values well above the 40µg/m^3 objective; with no data available for 2013. BT5 has a stable trend over the last six years, having exceeded the annual mean objective for NO_2 in 2008 and 2012.

BT6 has exceeded the annual mean objective for NO_2 for the last six years presenting a steady downward trend in annual mean concentrations over the period 2008-2013.

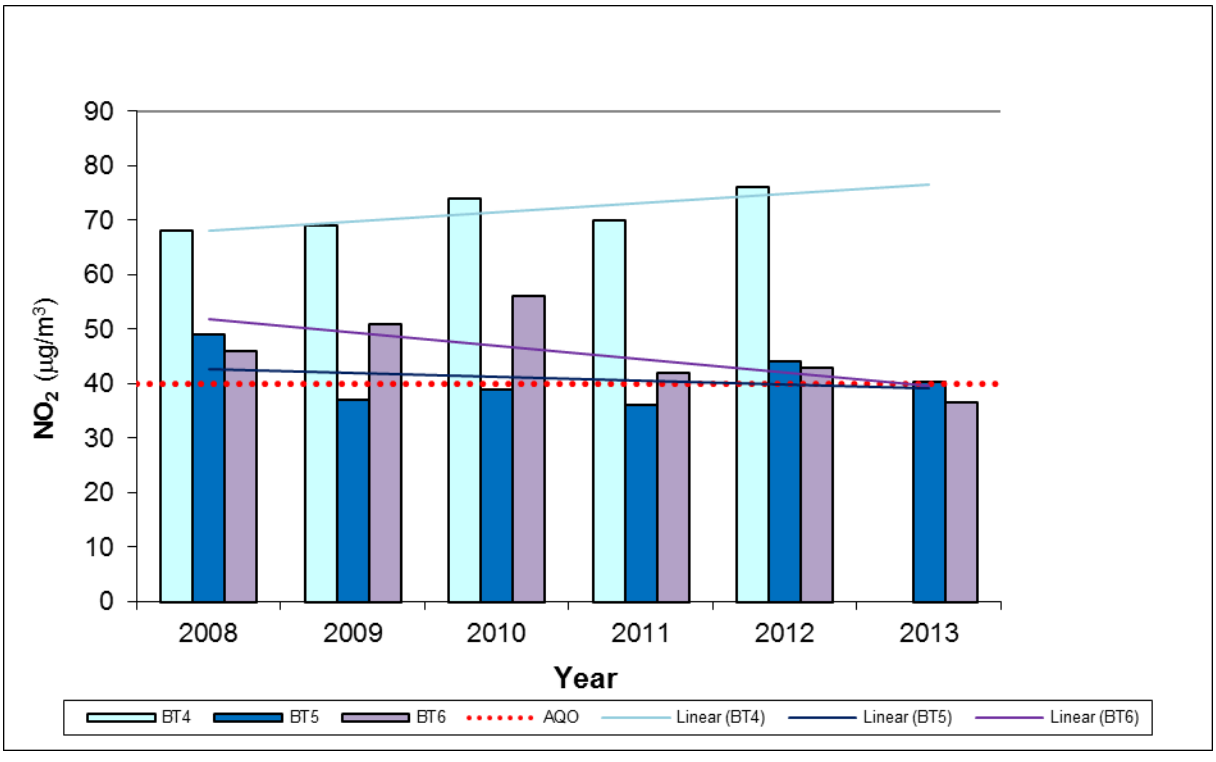

Figure 2.3 - Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Automatic Monitoring Sites (2008-2013)

Table 2.3.2 shows the number of exceedences of the hourly mean objective at BT5 and BT6 from 2009 to 2013. Due to engineering problems BT4 data for 2013 are not available.

In 2013 the short term objective for NO_2 concentrations was achieved at BT5 and BT6 locations. BT4 (Ikea) site recorded 33 exceedences of the 1-hour mean objective in 2012. This continuous monitoring station is located adjacent to the North Circular Road hence the consistently high values in comparison to other sites.

BT6 presented low data capture so the results may not be representative of the full calendar year, and should be used for guidance only.

Table 2.3.2: Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Location	Within AQMA?	Data Capture 2013 %	Number of Exceedences of hourly mean (200 µg/m^3)				
			2009	2010	2011	2012	2013
BT4 (Drury Way)	Y	N/A	14	6	13(199.8)	**33**	N/A
BT5 (Neasden)	Y	83	2	0	1	0	0(119)
BT6 (Harlesden)	Y	47	0	16	0(140)	0 (139)	0(141)
Objective Limit			**18**				

-Numbers in brackets: calculation of the 99.8th Percentile for the sites with a poor data capture.
-Exceedences of the 200 µg/m^3 of hourly mean NO_2 objective are highlighted in bold.

Diffusion Tube Monitoring Data

The diffusion tubes were exposed for one-month periods and the average monthly NO_2 concentrations, from the January 2013 until the end of December 2013, was determined.

Using the national bias correction factor of 1.00, results indicate that NO_2 concentrations for 24 out the 25 diffusion tube locations registered levels above the 40μg/m^3 objective (see table 2.4 and 2.5).

Tube 2 (Harrow Road left from Sudbury Court Drive) and tube 4 (Junction of Shaftesbury Avenue and Woodcock Hill) exceeded the annual mean objective but are not within the AQMA. This is the fifth year in succession where this has been observed.

Tubes 23 and 52 located near to a busy road (North Circular) had a Nitrogen Dioxide annual mean of over 100μg/m^3.

There is no reduction in NO_2 concentrations between 2009 and 2013, with only one background diffusion tube (ID 33A) measuring NO_2 below the annual mean objective of 40 μg/m^3.

14 locations have exceedences over 60μg/m^3, these indicate a potential risk that the 1-hour objective may also be exceeded.

For diffusion tubes 21A, 41 and 48 where data capture was less than 75% of a full calendar year, the mean has being adjusted using the methodology suggested from the LAQM.TG(09) guidance before being compared to annual mean objectives. Further details of the methodology applied and the full diffusion tubes dataset (monthly mean values) are presented in appendices 1 and 2 respectively.

The monitoring data from 2013 continue to justify the conclusions of previous review and assessment to retain and further expand the AQMA.

Table 2.4 Results of Nitrogen Dioxide Diffusion Tubes in 2013

Site ID	Location	Site Type	Within AQMA?	Triplicate Tube?	Data Capture 2013 (%)	OS Grid Ref (X,Y)	Data distance corrected? (Y/N)	Annual mean concentration (Bias Adjustment factor = 1.00) 2013 (µg/m^3)
1	Junction of Kenton Rd / Upton Gardens	Roadside	Y	No	100	516929 188560	N	**41.0**
2	Harrow Rd, Sudbury Court Drive	Roadside	N	No	100	515793 186042	N	**46.9**
4	Junction of Shaftesbury Avenue/Woodcock Hill	Roadside	N	No	100	518254 187771	N	**45.3**
7	Bridgewater Rd / Ealing Road	Roadside	Y	No	100	517921 183716	N	**71.2**
9	Junction of East Lane/Wembley Hill Road	Roadside	Y	No	100	518499 186168	N	**50.5**
17	Old Church Lane junction with Neasden Lane	Roadside	Y	No	92	520480 186537	N	**55.5**
21a	Central Middlesex Hospital, Central Way	Roadside	Y	No	75	520078 182857	N	**49.5 (54)***
22	Junction of Kingsbury Road/Edgware Road	Roadside	Y	No	100	521447 188730	N	**57.9**
23	Junction North Circular Road/Chartley Avenue	Roadside	Y	No	100	521213 186125	N	**104.5**
26	Dudden Hill Lane junction with High Road	Roadside	Y	No	100	522191 184821	N	**65.4**
29	Junction Dollis Hill Lane/Cricklewood	Roadside	Y	No	92	523191 186571	N	**79.0**
30	Chichele Road near Melrose Ave	Roadside	Y	No	100	523663 185353	N	**62.5**
41	R/O 246 Neasden Lane	Roadside	Y	No	75	521455 185920	N	**57.6 (54)***
48	Kilburn Park road near junction of Shirland Road	Roadside	Y	No	67	525196 182517	N	**70.5 (71)***
53	Junction Ealing Road / High Road	Roadside	Y	No	100	518020 185043	N	**64.4**
54	Ealing Road/Riverside Gardens	Roadside	Y	No	92	518221 183206	N	**47.0**
33A	Fryent Park Car Park area	Background	N	No	100	519572 187691	N	26.3
52 A	IKEA, Hut, North Circular Road	Roadside	Y	Triplicate	92	520874 185173	N	**103.2**
52 B	IKEA, Hut, North Circular Road	Roadside	Y	Triplicate	92	520874 185173	N	**103.4**
52 C	IKEA, Hut, North Circular Road	Roadside	Y	Triplicate	92	520874 185173	N	**105.6**
BRT 42	Police Station, Craven Park	Roadside	Y	No	100	521155 184002	N	**48.5**
BRT 43	Pitfield Way	Roadside	Y	No	100	520242 184541	N	**66.9**
BRT 53	High Road Wembley	Roadside	Y	No	100	518303 185181	N	**75.0**
BRT 55	High Street, Harlesden	Roadside	Y	No	100	521743 183361	N	**70.4**
BRT 56	Chamberlayne Road	Roadside	Y	No	92	523635 183153	N	**70.1**
BRT 57	Kilburn Bridge	Roadside	Y	No	50	525461 183558	N	**N/A**
BRT 58	51 High Road, Willesden	Roadside	Y	No	100	523031 184655	N	**65.4**

*data capture is less than 75% of a full calendar year and the mean has being "annualised"

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes (2009 to 2013)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3				
			2009 (Bias Adjustment Factor = 0.98)	2010 (Bias Adjustment Factor = 1.03)	2011 (Bias Adjustment Factor = 0.93)	2012 (Bias Adjustment Factor = 1.01)	2013 (Bias Adjustment Factor = 1.00)
1	Junction of Kenton Rd / Upton Gardens	Y	**47.9**	**44.3**	**44.3**	38.7	**41.0**
2	Harrow Rd, Sudbury Court Drive	N	**49.5**	**46.9**	**47.5**	**42.1**	**46.9**
4	Junction of Shaftesbury Avenue / Woodcock Hill	N	**50.2**	**44.6**	**43.0**	**40.4**	**45.3**
7	Bridgewater Rd / Ealing Road	Y	**68.6**	**68.7**	**70.7**	**56.7**	**71.2**
9	Junction of East Lane / Wembley Hill Road	Y	**52.3**	**50.7**	**49.9**	**44.3**	**50.5**
17	Old Church Lane junction with Neasden Lane	Y	**52.6**	**56.1**	**53.6**	**54.1**	**55.5**
21a	Central Middlesex Hospital, Central Way	Y	N/A	N/A	N/A	**43.1**	**49.5 (54)***
22	Junction of Kingsbury Road / Edgware Road	Y	**68.6**	**66.1**	**60.7**	**51.6**	**57.9**
23	Junction North Circular Rd / Chartley Avenue	Y	**97.3**	**87.0**	**86.8**	**82.1**	**104.5**
26	Dudden Hill Lane junction with High Road	Y	**76.5**	**67.1**	**60.6**	**58.1**	**65.4**
29	Junction Dollis Hill Lane / Cricklewood	Y	**68.5**	**60.5**	**64.1**	**63.5**	**79.0**
30	Chichele Road near Melrose Ave	Y	**79.4**	**68.1**	**68.6**	**59.1**	**62.5**
41	R/O 246 Neasden Lane	Y	**68.3**	**61.0**	**57.8**	**57.8**	**57.6 (54)***
48	Kilburn Park Rd near junction with Shirland Rd	Y	**82.2**	**74.0**	**65.7**	**69.3**	**70.5 (71)***
53	Junction Ealing Road / High Road	Y	N/A	N/A	N/A	**61.2**	**64.4**
54	Ealing Road / Riverside Gardens	Y	N/A	N/A	N/A	**41.9**	**47.0**
33A	Fryent Park Car Park area	N	N/A	N/A	N/A	22.2	26.3
52 A	IKEA, Hut, North Circular Road	Y	N/A	**82.9**	**82.4**	**85.7**	**103.2**
52 B	IKEA, Hut, North Circular Road	Y	N/A	**82.6**	**83.1**	**87.1**	**103.4**
52 C	IKEA, Hut, North Circular Road	Y	N/A	**79.4**	**87.0**	**90.4**	**105.6**
BRT 42	Police Station, Craven Park	Y	35.1	**54.0**	**43.2**	**43.6**	**48.5**
BRT 43	Pitfield Way	Y	**83.6**	**77.7**	**52.2**	**58.1**	**66.9**
BRT 53	High Road Wembley	Y	**76.0**	**57.9**	**46.3**	**48.1**	**75.0**
BRT 55	High Street, Harlesden	Y	**87.0**	**76.6**	**66.9**	**70.6**	**70.4**
BRT 56	Chamberlayne Road	Y	**78.3**	**70.3**	**62.5**	**66.5**	**70.1**
BRT 57	Kilburn Bridge	Y	**119.3**	**84.2**	**76.3**	**81.6**	**N/A**
BRT 58	51 High Road, Willesden	Y	**73.1**	**65.1**	**54.1**	**60.3**	**65.4**

*data capture is less than 75% of a full calendar year and the mean has being "annualised"

2.2.2 PM_{10}

The Council undertakes continuous monitoring of PM_{10} at three continuous monitoring sites. The Council uses TEOMs (Tapered Element Oscillating Microbalances) for monitoring PM_{10}; the results are corrected using the Volatile Correction Model (VCM) to present data as gravimetric equivalent. In 2013 a good data capture was achieved with more than 90% of data being available for the full year at the three continuous air quality stations.

The annual mean results recorded at all three monitoring stations in 2013 were below the annual mean objective of 40μg/m^3 for PM_{10}. There has been a 4μg/m^3 decrease at BT5 (Neasden Lane) site in comparison with 2012 results as reported in Table 2.6. BT6 results in 2013 indicate a 2μg/m^3 increase in comparison to 2012 concentrations.

Figure 2.3 shows that overall PM_{10} levels have not decreased over the long term in the borough but have remained steady, only BT5 in 2013 registered a decrease in concentration levels in comparison with previous years.

Table 2.6 Results of Automatic Monitoring of PM_{10}: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2013 %	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration μg/m^3				
						2009	2010	2011	2012	2013
BT4	Ikea	Y	100	90	Y	32	31	34	32	34
BT5	Neasden Lane	Y	100	98	Y	36	37	38	37	33
BT6	John Keble Primary School	Y	100	95	Y	23	23	25	23	25
Objective Limit					**40**					

*Bold indicates an exceedence of the annual mean objective of 40 μg/m^3.

Table 2.7 presents the 24-hour mean results for PM_{10} for the three continuous monitoring sites.

BT4 (Ikea) recorded 38 exceedences of the 24-hour mean objective during 2013, an increase of 5 in relation to the previous year, and as a consequence has not met the short term objective for PM_{10} (see table 2.7) in 2013.

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BT5 (Neasden Lane) is an industrial site. Daily mean PM_{10} levels for 2013 were greater than the objective level with 48 exceedences which is a significant decrease of 34 exceedences

compared with the previous year. A likely explanation is the impact of continuous improvements to site operations since 2011 at the nearest industrial source – a Waste Transfer Station (WTS). Whereas the daily mean PM_{10} levels at this site are still the highest in the Borough and among the highest in the London Air Quality Network, an improvement has being recorded in 2013.

BT6 (John Keble Primary School) recorded 11 exceedences of the 24-hour mean objective during 2013, this site continues to meet the daily mean national objective for PM_{10}.

Table 2.7 Results of Automatic Monitoring for PM_{10}: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA	Valid Data Capture for monitoring Period %	Valid Data Capture 2013 %	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 μg/m^3)				
						2009	2010	2011	2012	2013
BT4	Drury Way	Y	100	90	Y	**37**	32	**42** (58)*	33	**38**
BT5	Neasden	Y	100	98	Y	**80**	**64**	**77**	**82**	**48**
BT6	Harlesden	Y	100	95	Y	7	8	12 (41)*	10	11
Objective Limit						35				

* if data capture is less than 90%, include the 90th percentile of 24-hour means in brackets
*Bold indicates an exceedence of the 24-hour mean objective of 50 μg/m^3.

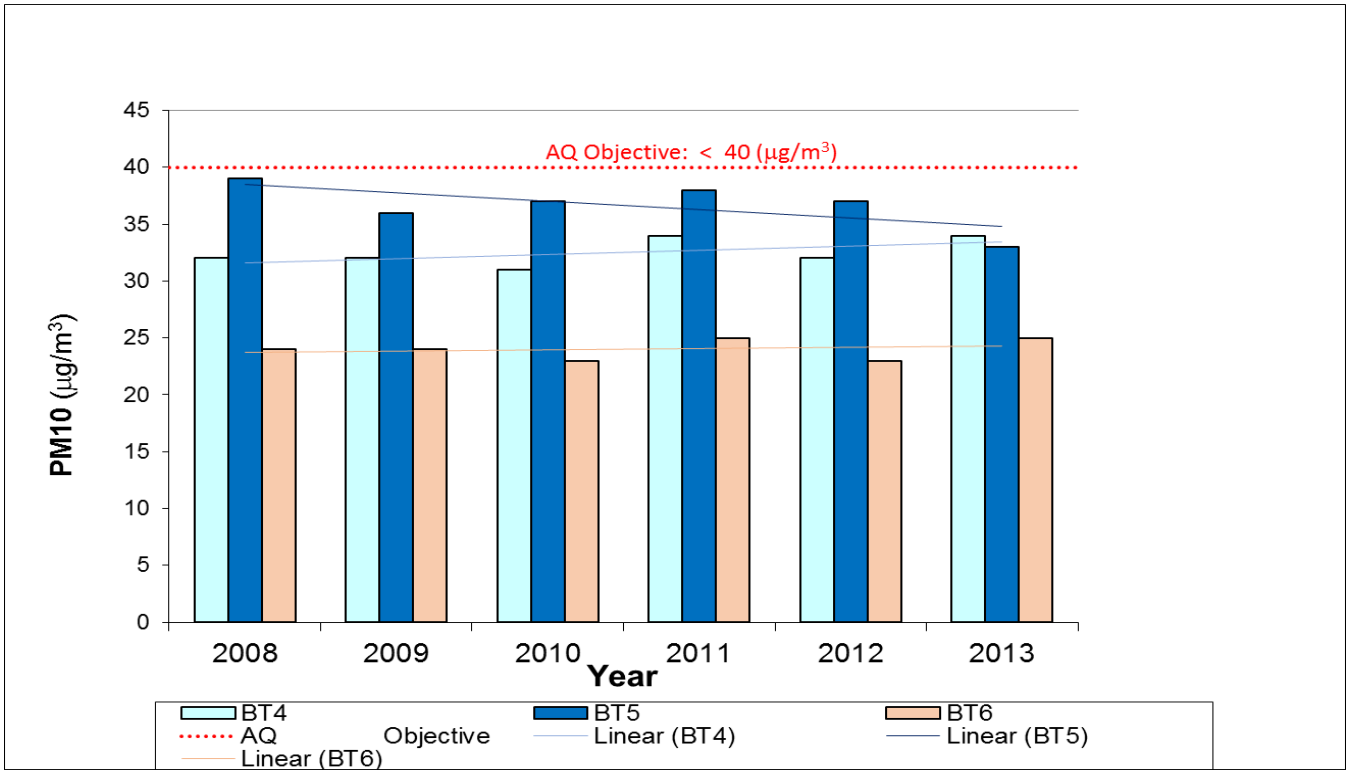

Figure 2.3 Trends in Annual Mean PM_{10} Concentrations

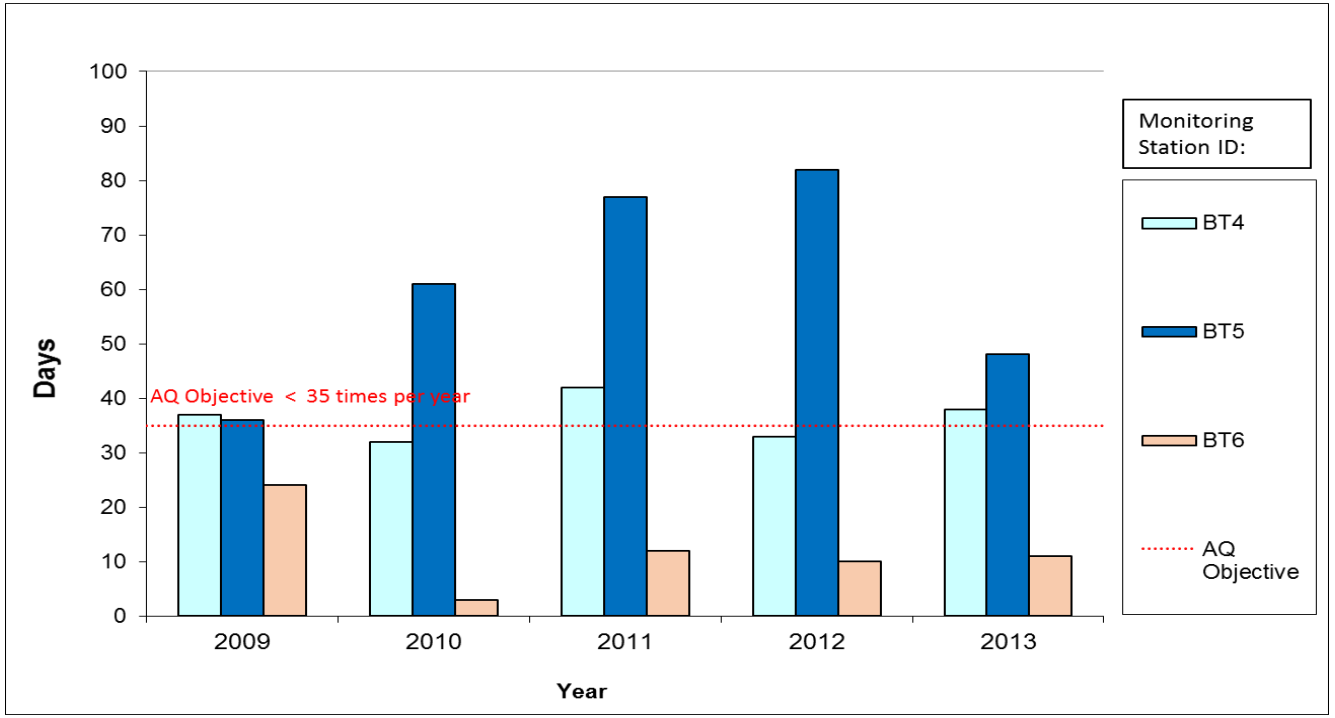

Figure 2.4 Trends in Concentrations of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

2.2.3 Other pollutants monitored

Poly-Aromatic Hydrocarbons (PAHs)

LBB has monitored poly-aromatic hydrocarbons (PAHs) at the Kingsbury site (refer to table 2.8) since 1991 as participants in the London Wide PAH survey. PAHs are organic compounds which are widespread throughout the environment and formed mainly as the result of incomplete combustion. PAHs are found in higher concentrations in urban areas and are known carcinogens. Using benzo[a]pyrene (B[a]P) as the marker PAH and measured from biweekly particulate phase and vapour phase measurements, the air quality objective level has been set provisionally at 0.25ng/m^3 annual average to be met by 2010.

The concentration of B[a]P at Kingsbury site does not exceed the current air quality objective. As reported in table 2.9 B[a]P results have met the UK objective since monitoring began. At the time of this report, the results for 2013 were not available.

Table 2.8: PAHs site location

Site ID - Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road	Does this location represent worst-case exposure?
BT1 (Kingsbury)	Suburban	*519560*	*189271*	PAHs	N	Y (1m)	2m	N

Table 2.9: Summary of Estimated Annual Mean B[a]P Concentration

Pollutant	2006	2007	2008	2009	2010	2011	2012	2013
B[a]P (ng m^{-3})	0.15	0.05	0.12	0.19	0.18	0.16	0.20	N/A

Particulate Monitoring Results ($PM_{2.5}$)

The 2007 air quality strategy set a cap of 25µgm^{-3} for $PM_{2.5}$ and a 15 % reduction in annual mean concentrations at urban background locations by 2020. There is currently no requirement for local authorities to report against these exposure reduction targets. Monitoring for these particles has been undertaken since May 2006 at the Drury Way/ BT4) site in Brent.

The concentrations remained steady for the last two years. These results currently are below the cap level proposed but continuing monitoring over the next six years is essential, providing valuable information for public reporting, temporal representation, health studies, transport studies and background monitoring.

Table 2.10: Annual mean results for $PM_{2.5}$ (µg m^{-3})

Site ID	Type	2008	2009	2010	2011	2012	2013
BT4 (Ikea)	Roadside	16	15	14	16	13.4	13.8

Ozone monitoring (O_3)

In 2010 monitoring for Ozone at BT 1 (Kingsbury) recorded 22 exceedences of the 8-hour running mean objective of 100µg m^{-3} not to be exceeded more than 10 days per year. Ozone is also recorded at Brent 4 although no exceedences of the 8-hour running mean were recorded at this site.

As part of a monitoring network review in response to a lack of funding, BT1 (Kingsbury) was closed in 2011.

2.2.4 Summary of Compliance with AQS Objectives

Automatic and non-automatic monitoring systems within the Borough confirmed that the annual mean NO_2 objective has been exceeded at roadside locations both within and outside the currently declared AQMA.

London Borough of Brent has measured concentrations of Nitrogen Dioxide (NO_2) above the annual mean objective at relevant locations outside of the AQMA, and will need to proceed to a Detailed Assessments, for

1. Harrow Road (left from Sudbury Court Drive); and
2. Junction of Shaftesbury Avenue and Woodcock Hill.

3 New Local Developments

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

London Borough of Brent 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 Action Plan Measures

The London Borough of Brent Air quality Action Plan was originally published in 2005 and revised in 2012. The revised action plan sought to update or remove actions that were no longer relevant or achievable. As well as maintaining fundamental elements of local air quality management such as monitoring and regulation (see F1 to F11 in Table 4.1) the new Air Quality Action Plan set out the strategy for reducing pollutant emissions via 15 new air quality action plan measures (see A1 to A15 in Table 4.1).

The air quality action plan was also revised to identify quantitative measures as well as qualitative. Better integration of air quality into the public health agenda was also a core objective and ambitious targets were set for carbon emissions reduction but progress in achieving these measures was limited by resources. A further revision of the Air Quality Action Plan is scheduled for autumn 2015 and is likely to include those measures in the current plan which have been progressed or where funding/ resources for implementation have already been identified. Table 4.1 summarises the progress made to date.

Table 4.1 Action Plan Progress for London Borough of Brent

No.	Action	Delivery	Progress to date	Estimated Completion Date	Next Steps
A1	Integrate local air quality improvements into Borough public health plan	Review core measures in emerging strategies and quantify potential benefits of air quality actions in areas targeted	**Met** Air quality included in the Borough's Joint Strategic Needs Assessment (Oct 13 and Dec 2014)	**Oct 2013**	This is an ongoing measure and requires annual review and update of all key policy to ensure air quality measures are included emerging plans
A2	Increase the number of suitable tree species planted in new developments	Devise list of most suitable species Create map of planting areas and align with planting programme Devise co-ordinated plan for the maintenance of each tree planted Evaluate environmental impacts of the planting programme	**Met** The council currently uses a list of suitable species (as outlined in the existing Tree Strategy) in the consideration of the re-provision of trees as well as for those proposed in new developments. This includes a targeted programme for planting and future maintenance.	**Oct 2013**	The Development Management Plan document relevant to environmental issues and specifically air quality is currently in draft. A new Tree Strategy is also in draft and scheduled for publication late 2015. Further work is proposed which will align future programmes with areas of significant deficiency.

No.	Action	Delivery	Progress to date	Estimated Completion Date	Next Steps
A3	Develop a cohesive strategy for biomass installations and achieve 20% carbon reduction from renewables.	Devise Strategy for determination of applications for biomass and similar installations. Quantify provision of renewables required to meet target and monitor progress every 6 month	**Ongoing** The original target date for this measure was Mar 2015 but the Strategy is still in draft and will effectively be incorporated into the Development Management Plan document due for publication late 2015. Further work will then be needed to identify options for carbon reduction for renewables. It is likely that this will result in the provision of a more achievable carbon reduction target.	**Dec 2015**	Publication of the Strategy Further compliance monitoring following revision of reduction target It is anticipated that this target will be incorporated into the revised action plan.
A4	Update the Sustainable Development Checklist to reflect the Borough's commitment to reducing the environmental impact of new development	Quantify reduction in air pollution secured by implementation of the Checklist	**Ongoing** The original target date for this measure was Mar 2013. Further work is needed to quantify the reduction in air pollution achieved.	**Dec 2015**	The checklist was incorporated into a supplementary planning guide which will be subject to review in 2016.

No.	Action	Delivery	Progress to date	Estimated Completion Date	Next Steps
A5	Set carbon and nitrogen dioxide reduction targets for regeneration schemes	Published guidance Reduction targets are set for carbon and nitrogen dioxide	**Ongoing** The original target date set at Mar 2015. The council is currently working on enhanced guidance for developers to facilitate this. Further work is needed to establish practical and achievable reduction targets.	**Mar 2013**	Compliance monitoring following revision of reduction target Evaluate impacts of targets set
A6	Review planning policies to safeguard against environmental impacts of new and existing Waste Transfer Stations	Protocol set up for joint approach to monitoring impacts of waste facilities New waste transfer facilities are monitored and appropriately located	**Ongoing.** The council regularly participates in consultations for New Waste Transfer Stations as well as monitoring the impacts of existing stations. The council actively resists applications which are likely to contribute significantly to poor local air quality.	**Mar 2013**	Work is currently in progress to obtain the agreement of a regional waste plan (http://www.wlwp.net/theplan.html) which will include consideration of a cohesive approach to waste management. The adoption of a Joint West London Waste DPD and associated local policies will be confirmed once this has been ratified.

No.	Action	Delivery	Progress to date	Estimated Completion Date	Next Steps
A7	Increase car to non-car (walking and cycling) modal shift	Count number of additional walking schemes implemented, Count number of additional cycling schemes implemented Achieve walking modal share of 31.40% and cycling of 1.05%	**Ongoing.** Additional 7 healthy walks in Brent as well as successful school walking schemes and more than 30 workplace travel plans. A partnership project with Brent council, Brent NHS and Sustrans have been commissioned to lead on this targeted cycling development project	**Mar 2014**	Consideration will be given to the provision of 'healthy' routes – less polluted route planners for walkers and cyclists.
A8	Install electric charging points at strategic locations in Brent	Count, number of points installed	**Ongoing.** Currently 4 publicly accessible electric vehicle charging points.	**Mar 2014**	Consider additional locations for further charging points and options for other low emission vehicles. Confirm target for annual increase in electric vehicle charging points
A9	Reduce congestion associated with new or proposed traffic management schemes	Comparison with baseline congestion map	**No progress**	**Mar 2015**	

No.	Action	Delivery	Progress to date	Estimated Completion Date	Next Steps
A10	Facilitate the delivery of new car clubs in the borough	Facilitate take-up and use via planning policy and actions Review planning and transport policies to require the installation of additional car clubs in key locations Review options for incorporating low emissions vehicles in the fleet	**Ongoing** Provision of car clubs considered for eligible and appropriate new development schemes. Currently 42 on street spaces (and approximately 3000 car club members)	**Mar 2015**	Quantify increase in car clubs and identify optimal areas for future clubs. Consideration to be given to options for requiring a proportion of vehicles to be low emission/ electric fleet.
A11	Work with Brent businesses to achieve 10% emissions reductions from their core operations	Work with Brent Businesses to determine local baselines and measures required to secure reduction Devise Action Plans for achieving target Monitor progress with Action plan	**No progress**	**Mar 2015**	

No.	Action	Delivery	Progress to date	Estimated Completion Date	Next Steps
A12	Secure a 20% decrease of energy use in Council housing stock and 25% reduction in emissions arising from Council service delivery	Survey Council stock and core activities to determine local baseline and measures required to secure reduction Devise Action Plan for achieving target Monitor progress with Action plan	**Ongoing** Established baseline measure from core council activities.	**Mar 2015**	Confirm target reduction following publication of Carbon Reduction Action Plan (no publication date)
A13	Reduce use of fossil fuels in council buildings	Secure target reduction council energy derived from fossil fuels	**No progress**	**Mar 2015**	
A14	Secure 10% reduction in nitrogen dioxide, particulates and carbon dioxide from major commercial fleet operators in Brent	Determine baseline for fleet operators selected Devise Action Plans for achieving target Monitor progress with Action plan	**No progress**	**Mar 2015**	

No.	Action	Delivery	Progress to date	Estimated Completion Date	Next Steps
A15	Lobby government to raise awareness of challenges to implementing waste licensing controls whilst achieving National Air Quality targets	Work with Stakeholders/ Partners to identify key issues Determine mechanism for reporting	**Completed** Worked in Partnership with the Environment Agency to address issues relating to air quality impacts from waste sites in Brent.	**Mar 2012**	

5 Conclusions and Proposed Actions

5.1 Conclusions from New Monitoring Data

This Progress Report fulfils the requirements of the Local Air Quality Management 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 published by Defra.

Monitoring data for 2013 results confirm the retaining of the AQMA for the annual mean nitrogen dioxide (NO_2) objective and the 24-hour mean objective for particulate matter (PM_{10}), and the need to further extend current boundaries to include additional areas exceeding annual mean NO_2 concentrations at Harrow Road (left from Sudbury Court Drive) and at the Junction of Shaftesbury Avenue / Woodcock Hill.

The outcome of 2013 monitoring has also shown that the measured PM_{10} concentrations at two of the three Council's automatic monitoring sites (BT4 and BT5) exceeded the 24-hour mean objective for this pollutant.

5.2 Other Conclusions

The council has reviewed and published a new air quality action plan for 2011-2015 in order to ensure that climate change and potential impacts were incorporated into the plan where appropriate and ensure that action plan measures remained timely and relevant.

A review of the progress of the 2011-2015 air quality action plan was summarised in section 4. Its review has indicated that the London Borough of Brent is unlikely to meet the objectives for NO_2 and PM_{10} in the future without significant intervention measures. A review and update of the Air Quality Action Plan will be undertaken early 2015 to identify additional measures to significantly decrease levels of these pollutants in the borough.

5.3 Proposed Actions

London Borough of Brent has measured concentrations of NO_2 above the annual mean objective at relevant locations outside of the AQMA, and will need to proceed to Detailed Assessments, for the two following areas:

1. Harrow Road (left from Sudbury Court Drive); and
2. Junction of Shaftesbury Avenue and Woodcock Hill.

A Detailed Assessment of annual mean NO_2 will be undertaken near to the monitoring sites above to determine the extent of exceedence of the objective within these areas.

The review of the 2011- 2015 Local Action Plan has indicated that the new 2015-2020 Local Action plan will have to include additional measures that significantly reduce emissions of NO_2 and PM_{10} to the atmosphere across the borough.

6 References

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The Air Quality Standards Regulations 2010:
www.legislation.gov.uk/uksi/**2010**/1001/pdfs/uksi_**2010**1001_en.pdf

The London Air quality Network:
http://www.londonair.org.uk/london/asp/default.asp?la_id=&showbulletins=&width=1024

UK Air Quality Objectives for protection of human health:
http://www.airquality.co.uk/archive/standards.php

West London Air Quality Group
http://www.westlondonalliance.org/WLA/wla.nsf/Pages/WLA-31

Appendices

Appendix 1: QA/QC Data

Diffusion Tube Bias Adjustment Factors

National Bias adjustment factor was used for the nitrogen dioxide diffusion tube across borough survey (March 2014 Version). The reason for this is that the continuous monitoring analyser where nitrogen dioxide diffusion tubes are co-located had a low data capture for 2013. Therefore there was not enough data for the calendar year 2013 in order to determine a representative local bias adjustment factor from this site.

The diffusion tubes are analysed by Gradko International Ltd and the preparation method uses 50% TEA in Acetone. The national bias adjustment tool found 18 studies using the bias adjustment factor spreadsheet that suggests applying a correction factor of 1.01 to diffusion tubes throughout London Borough of Brent for the year 2013.

PM Monitoring Adjustment

The Volatile Correction Model (VCM) has been applied to the TEOM data through the tool http://www.volatile-correction-model.info/. The data are validated and ratified by Kings College as part of the London Air Quality Network.

Short-term to Long-term Data Adjustment

NO_2 – Diffusion Tube

Diffusion Tube Data Adjustment

Estimation of **NO_2** annual mean concentrations from Diffusion Tubes low data capture. The adjustment has been conducted using data from two nearby, long term, diffusion tubes.

Table A1.1: Nitrogen Dioxide - Short-term to Long-term Data Adjustment – ID 21A

ID 21A

Long term site	annual mean 2013 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
ID 1	41	35	1.17
ID 33A	26.3	26	1.01
		Average (R2)	**1.09**
		M x R2 =	**54**

Table A1.2: Nitrogen Dioxide - Short-term to Long-term Data Adjustment – ID 41

ID 41

Long term site	annual mean 2013 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
ID 1	41	42	0.97
ID 33A	26.3	29	0.90
		Average	0.94
		Annualised value	54

Table A1.3: Nitrogen Dioxide - Short-term to Long-term Data Adjustment – ID 48

ID 48

Long term site	annual mean 2013 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
ID 1	41	39	1.05
ID 33A	26.3	27	0.97
		Average	1.01
		Annualised value	71

NO_2 – Continuous monitoring

Two of the automatic monitoring stations (BT5 and BT6) had low data capture (<90% for automatic sites) in 2013 and data for these sites have been annualised (adjusted to represent the annual mean) following the guidance set out in Box 3.2 of TG(09).

The annual mean for three automatic background sites was compared to a "period mean" for the Brent sites for which there was low data capture. The "period mean" is the mean for the period for which there are data. For each background site, a ratio is then calculated between the annual mean and the period mean. The average ratio is used to adjust the short-term results to represent annual means.

The three sites chosen for use in the calculations are North Ken (Kensington and Chelsea), Stanmore (Harrow), Horseferry Road (Westminster), and Bloomsbury (Camden). These are all urban background sites within the LAQN network with relatively high data capture for 2013 (>90% for each). Details of the sites used and the ratios calculated are provided in Tables A1.4.and A.1.5.

For BT5 (Neasden Lane) with an annual data capture of 83%, missing data from 5/11/2013 to 31/12/2013:

Table A1.4: Nitrogen Dioxide - Short-term to Long-term Data Adjustment – BT5

Long term site	Site Type	annual mean 2013 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
North Ken, Kensington	Urban Background	36.9	35.2	1.05
Horseferry Road,	Urban	44.6	43.4	1.03

Westminster	Background			
Bloomsbury, Camden	Background	51.3	49.6	1.03
			Average	**1.04**
			Annualised Value	**40.3**

For BT6 (John Keble Primary School) with a data capture of 47%, missing data from 11/07/2013 to 31/12/2013:

Table A1.5: Nitrogen Dioxide - Short-term to Long-term Data Adjustment – BT6

Long term site	Site Type	annual mean 2013 (Am)	Period Mean (Pm)	Ratio (Am/Pm)
North Ken, Kensington	Urban Background	36.9	36.5	1.01
Horseferry Road, Westminster	Urban Background	44.6	46.2	0.97
Bloomsbury, Camden	Background	51.3	53.9	0.95
			Average	**1.0**
			Annualised Value	**36.6**

QA/QC of Automatic Monitoring

QA/QC for Brent's automatic monitoring stations is provided by ERG King's College London. These stations are calibrated fortnightly by LSO, with audits every 6 months. Calibrations are carried out by the Local Authority. Audits are carried out by the National Physics Laboratory. Audits are UKAS accredited.

QA/QC of diffusion tube monitoring

In the most recent round of Annual Performance Criteria for NO_2 Diffusion Tubes used in LAQM, the Gradko Environmental laboratory demonstrated good performance in a QA/QC scheme for analysis of NO_2 diffusion tubes. Gradko International also participates in the Workplace Analysis Scheme for Proficiency (WASP), which is an independent analytical performance testing scheme. The scheme is an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). The Health and Safety Laboratory (HSL) operate the WASP scheme independently and the cost of operation is borne by the laboratories, which pay an annual fee to HSL. Their NO_2 diffusion tube procedures have been amended to follow the guidelines of the DEFRA Harmonisation document related to the preparation, extraction, analysis and calculation procedures for NO_2 passive diffusion tubes. As most of the procedures were already carried the out before the introduction of the Guidelines, the amendments are minimal. Their internal analysis procedures are assessed by U.K.A.S. on an annual basis for compliance to ISO17025.

Z-Score performance

Performance scores are currently based upon the z-score statistic, a widely used scoring system employed in chemical proficiency testing. More detailed information is available at http://www.hsl.gov.uk/centres-of-excellence/proficiency-testing-schemes/wasp.aspx where the latest version of the WASP participant handbook (February 2013) can be downloaded.

Laboratory summary performance for WASP NO_2

The following table shows that in 2013 Gradko International as a UK laboratory has participated in HSL WASP NO_2 PT rounds and the percentage (%) of results submitted were subsequently determined to be **satisfactory** based upon a z-score of $\leq \pm 2$ as defined above.

WASP Round	WASP R120	WASP R121	WASP R122	WASP R123	
Round conducted in the period	January–March 2013	April–June 2013	July–September 2013	October–December 2013	
Gradko International	100%	100%	100%	100%	

Appendix 2: Raw Nitrogen Dioxide Diffusion Tube Data

Table A 2.1: Unadjusted Results of Nitrogen Dioxide Diffusion Tubes (2013)

ID	Monthly Concentration (not adjusted for bias) ug/m3												Annual Mean
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
1	47	40	44	47	42	42	40	35	40	38	31	45	**41.0**
2	62	45	46	47	50	30	48	42	48	46	55	44	**46.9**
4	51	51	55	43	42	36	44	35	46	43	50	45	**45.3**
7	69	75	65	72	74	56	79	63	69	89	79	65	**71.2**
9	54	47	54	48	52	38	47	48	51	47	60	59	**50.5**
17	62	56	53	35	60	42	58	55	74	57	m	59	**55.5**
21A	53	49	51	50	52	37	45	m	53	m	m	56	**49.0**
22	70	63	54	53	59	43	56	57	66	52	74	49	**57.9**
23	118	93	77	100	115	100	103	101	103	99	138	106	**104.5**
26	70	61	56	66	63	54	72	68	65	68	71	69	**65.4**
29	87	70	75	77	m	76	84	79	82	82	82	76	**79.0**
30	69	58	52	56	69	51	65	67	62	63	78	60	**62.5**
33A	33	31	33	25	22	16	21	21	28	24	33	28	**26.3**
41	m	56	m	63	68	45	68	m	63	26	58	73	**57.6**
48	76	75	62	70	m	56	76	75	73	m	m	m	**70.5**
52A	87	m	99	103	114	93	125	99	110	93	104	106	**103.2**
52B	103	m	98	111	104	81	120	108	105	100	103	105	**103.4**
52C	104	105	102	110	105	m	118	105	m	96	106	103	**105.6**
53	62	56	58	69	70	47	73	66	66	69	65	72	**64.4**
54	60	43	m	43	49	32	29	53	53	75	22	58	**47.0**
BRT 42	50	63	49	51	50	39	47	40	48	45	51	48	**48.5**
BRT 43	79	59	70	74	63	51	71	61	71	66	62	78	**66.9**
BRT 53	71	67	73	85	78	73	86	71	78	73	77	69	**75.0**

ID	Monthly Concentration (not adjusted for bias) ug/m3												Annual Mean
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
BRT 55	70	68	70	77	86	54	75	73	69	68	70	64	**70.4**
BRT 56	85	71	76	77	82	61	m	32	74	73	76	64	**70.1**
BRT 57	m	m	70	90	m	78	102	95	92	m	m	m	**N/A**
BRT 58	67	61	64	77	70	57	71	52	63	62	67	73	**65.4**