



**Greenwich
Council**

**Air Quality and Action Plan Progress Report
for the
Greenwich Council**

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

October 2010



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Executive Summary

This is the Air Quality and Action Plan Progress Report 2010 for the London Borough of Greenwich (“the Council”), which incorporates details for the previous two years. This report fulfils this part of the Council’s commitment to the continuing Local Air Quality Management (LAQM) process. This Report provides an annual update of recent air quality issues in Greenwich, including an update on recent air quality in the Borough, obtained from its monitoring results as well as a focus on the Council’s progress on reducing air pollution through its Air Quality Action Plan.

The Council’s earlier Review and Assessments of air quality confirmed that there were locations across the Borough with relevant public exposure where the Government’s air quality objectives might be exceeded.

The more up to date monitoring of nitrogen dioxide in this report confirms that the Government’s air quality objectives are still being exceeded widely at locations with relevant public exposure. The monitoring further confirms that the PM₁₀ objective is also being exceeded but on a less wider scale. In view of the overlap between emission sources and also importantly the health impact potential for PM₁₀ the Council will maintain its existing AQMA for both of these pollutants.

The Council’s monitoring results for benzene and sulphur dioxide indicate that the objectives for these pollutants are not being exceeded. The report also includes a section on the Council’s ozone and PM_{2.5} monitoring. The monitored results confirm that the ozone objective has been exceeded in the Borough. The Government’s “backstop” objective for PM_{2.5} however has not been exceeded.

The purpose of the Council’s Air Quality Action Plan is to ensure that air quality is considered corporately and to seek to reduce air pollution within the Borough, in pursuit of the Government’s air quality objectives. The Council is however limited in its abilities to influence local air quality, firstly as a result of pollution arising elsewhere in London (and beyond) and secondly because it has limited responsibility for the main sources of emissions within the Borough. Major roads in the Borough are not the responsibility of the Council. The plan however includes measures to seek to reduce traffic flow and vehicle emissions that are consistent with other Council policies.

The Council’s progress on the individual actions is given in Table 13 within the report. The Council is maintaining, as well as seeking to enhance, both its monitoring and dissemination of data for planning and assessment purposes. The Action Plan originally included 62 actions. This report confirms that 18 of these have now been completed. The remaining actions are all on going.

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1 Introduction to Air Quality and Action Plan Progress Report

1.1 Overview

This is the Air Quality and Action Plan Progress Report 2010 for the London Borough of Greenwich. This report fulfils this part of the Council's continuing commitment towards the Local Air Quality Management (LAQM) process. Note – this report also includes an update of progress for the past two years.

1.2 Background – local level

In earlier rounds of review and assessment (R&A) of local air quality management, the Council identified areas where the objectives were exceeded and where there was relevant public exposure.

As a consequence, it designated its whole area an Air Quality Management Area (AQMA) for the annual mean nitrogen dioxide objective and daily mean PM₁₀ objective. It subsequently produced an Air Quality Action Plan.

The Council also completed all previous rounds of LAQM and started the fourth round of review and assessment last year, completing its 2009 Updating and Screening Assessment. The conclusion of that work was that the Council should maintain its AQMA.

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 Local Air Quality Management process.

They are not intended to be as detailed as Updating and Screening Assessment Reports, or to require as much effort. However, if the Progress Report identifies the risk of exceedence of an Air Quality Objective, the local authority should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

The overall aim of the Progress report is to report on progress on implementing LAQM and report progress in achieving, or maintaining concentrations below the air quality objectives. The guidance considers that these aims can be best achieved by reporting on new results, new local developments and on progress with implementation of the Action Plan. This, the 2010 progress report, provides the latest update for the London Borough of Greenwich.

The guidance further suggests the inclusion of information on: local/ regional air quality strategy, planning applications that may be relevant to air quality, air quality planning policies· local transport plans and strategies.

2 New monitoring results in the LB of Greenwich

2.1 Outline of monitoring undertaken

The Council continued monitoring benzene, nitrogen dioxide (NO₂), sulphur dioxide (SO₂), particles (PM₁₀), fine particles (PM_{2.5}) and ozone in its area. The Government's adopted air quality objectives for each of these pollutants as shown in Table 1 below.

The air quality objectives applicable to 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 shown in Table 1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g m}^{-3}$ (for carbon monoxide the units used are milligrammes per cubic metre, mg m^{-3}). The table also includes the number of permitted exceedences in any given year (where applicable).

Table 1 Air quality strategy objectives for benzene, 1,3 butadiene, CO, lead, NO₂, SO₂ and, PM₁₀

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g m}^{-3}$	Running annual mean	31.12.2003
	5.00 $\mu\text{g m}^{-3}$	Annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g/m}^3$	Running annual mean	31.12.2003
Carbon monoxide (CO)	10.0 mg m^{-3}	Maximum daily running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g m}^{-3}$	Annual mean	31.12.2004
	0.25 $\mu\text{g m}^{-3}$	Annual mean	31.12.2008
Nitrogen dioxide (NO ₂)	200 $\mu\text{g m}^{-3}$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu\text{g m}^{-3}$	Annual mean	31.12.2005
Particles (gravimetric)	50 $\mu\text{g m}^{-3}$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu\text{g m}^{-3}$	Annual mean	31.12.2004
Sulphur dioxide (SO ₂)	350 $\mu\text{g m}^{-3}$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu\text{g m}^{-3}$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu\text{g m}^{-3}$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

2.2 Summary of automatic monitoring in Greenwich during 2009

Site	NO _x *	PM ₁₀	PM _{2.5}	SO ₂	Ozone
Greenwich 4	√	√		√	√
Greenwich 5	√	√			
Greenwich Bexley 6	√	√	√		√
Greenwich 7	√	√			
Greenwich 8	√	√	√		√
Greenwich 9	√	√	√		√
Greenwich 10	√	√			
Greenwich 12	√	√			
Greenwich 13	√	√	√		√
Bexley 3		√	√		

(* Includes NO₂)

The Council undertakes continuous monitoring at nine fixed long-term sites in the Borough, plus the Bexley 3 site in the Thamesmead area:

- Greenwich 4 - a suburban background site in Eltham towards the southeast of the Borough. This site has been operating since January 1994 and is affiliated to the government's Automated Urban Rural Network (AURN)
- Greenwich 5 - a roadside site on Trafalgar Road in Greenwich in the west of the Borough (this site started operating since November 1996). The sample inlet is located 5m from the road
- Greenwich 7 - a roadside site in Blackheath in the west of the Borough (monitoring at this site commenced in March 2002). The sample inlet is located 9m from the road
- Greenwich 8 - a roadside site close to the Woolwich Flyover towards the north of the Borough. This site has been operating since July 2004. The sample inlet is located 3m from the road
- Greenwich 9 - a roadside site in Westthorne Avenue towards the south of the Borough. This site opened in October 2004 and the sample inlet is located 5m from the road
- Greenwich 10 - a roadside site on the A206 at Burrage Grove in Thamesmead West towards the north east of the Borough (this site opened in October 2004)
- Greenwich 12 – a background site close to the Millennium Village on Greenwich Peninsula in the north of the Borough (monitoring at this site commenced in August 2004)
- Greenwich 13 - a roadside site on Plumstead High Street in the east of the Borough (monitoring at this site commenced in January 2006)
- Greenwich Bexley 6 - a roadside site on the A2 close to the Borough boundary at Falconwood in the southeast (it is shared with the LB of Bexley and has been operating since October 2000). The sample inlet is located 12m from the road.
- Bexley 3 – this is a suburban background site, located in Thamesmead, very close to the Bexley/ Greenwich boundary.

The above sites are also representative of relevant exposure. All the sites are part of the London Air Quality Network and therefore the standards of QA/QC are similar to those of the Government's AURN sites. Regular calibrations are carried out, with subsequent data ratification undertaken by the ERG at King's College London. In all cases the data are fully ratified unless reported otherwise. Further details of the sites can be found at www.londonair.org.uk

The Council also undertakes non-continuous monitoring at numerous sites across its area.

2.3 Non-automatic monitoring for nitrogen dioxide

The Council also monitored nitrogen dioxide across its area, using passive diffusion tubes. The monitoring survey for 2009 was based on 46 locations, including 8 co-located sites (with triplicate tubes exposed) at the Greenwich continuous sites (as shown in Table 2). This total includes 4 extra sites (GW103 to GW106 inclusive) and 3 sites where monitoring has been re-instated (GW28, GW30 and GW31). The use of the triplicate tubes acts as a quality control measure and the co-located sites enable a comparison at the site and between the two methods of monitoring so that local bias adjustment factors for the diffusion tubes can be calculated.

Table 2 Details of co-located sites

Diffusion tube site	Continuous site	Location
GW39	Greenwich 4	Eltham
GW57	Greenwich 5	Trafalgar Road
GW55	Greenwich Bexley 6	Falconwood A2
GW58	Greenwich 7	Blackheath Hill
GW50	Greenwich 8	Woolwich Road Flyover
GW59	Greenwich 9	Westhorne Avenue
GW60	Greenwich 10	Burrage Grove A206
GW61	Greenwich 12	Millennium Village

The details of the sites are given in Table 3. The diffusion tubes are exposed at locations across the Borough, including roadside and background sites. The site locations are all considered to represent relevant public exposure (apart from GW41, 49 and 53). Figure 1 shows the locations of the diffusion tube monitoring sites.

Table 3 Details of NO₂ diffusion tube sites

Code	Site	Type	Easting	Northing	Kerb dist. (m)	Road/Area
GW23	Siebert Road	Roadside	540420	177706	17.2	A102/SE3
GW24	Plumstead Common Road	Roadside	543806	177951	3	SE18
GW25	Eltham Road	Roadside	540099	174881	3	A20 / SE12
GW26	Footscray Road	Roadside	544015	173139	0.5	A211/SE9
GW27	The Village	Roadside	541645	177874	0.5	B210/SE7
GW28	Well Hall Road	Roadside	542655	176207	1	A205/SE9
GW29	Woolwich Road	Roadside	541167	178512	1	A206 / SE7
GW30	Shooters Hill Road	Roadside	541325	177052	11	A207/SE3
GW31	Deansfield School, Rochester Way	Roadside	543377	175665	6.5	A209/SE9
GW32	Old Dover Road	Roadside	540664	177235	17.1	A102/SE3
GW33	Blackheath Hill (9)	Roadside	537971	176776	1.5	A2 / SE10

GW34	Bannockburn School	Roadside	545490	178543	3	A206 / SE18
GW35	Greenwich Mini Town Hall	Roadside	539529	178280	1.5	A206 / SE10
GW36	Blackwall Lane Lorry Park	Roadside	539322	179235	30	A102/ SE10
GW37	De Lucy School, Cookhill Rd	Background	546630	179557	215	A2016 / SE2
GW38	Westthorne Avenue (579)	Intermediate	541885	175045	30	A205 / SE9
GW39	Bexley Road (ECC) (Triplicate)	Background	543986	174660	30	A210 / SE9
GW40	Shrewsbury House	Background	544065	176996	575	A207 / SE18
GW41	Sidcup Road (691)	Roadside	543384	172773	3	A20 / SE9
GW42	Greenwich Church Street (46)	Roadside	538329	177651	2	A200/6 / SE10
GW43	Creek Road / McMillan St	Roadside	537353	177632	6	A200 / SE8
GW44	Eltham High Street (Library)	Roadside	543096	174439	3.6	A210/SE9
GW45	General Gordon Place	Roadside	543641	178781	5	A205/SE18
GW48	Greenwich South Street (60)	Roadside	538044	176960	2.5	A2211 / SE10
GW49	Woolwich High Street (RSH)	Roadside	543472	179217	1	A206 / SE18
GW50	Peartree Way (Triplicate)	Roadside	540203	178367	3.5	A102/ SE10
GW51	Bugsby's Way	Roadside	539730	178948	2	A2211 / SE10
GW52	Woolwich Road	Roadside	542842	179108	1.5	A206 / SE18
GW53	Shooters' Hill Road	Roadside	542181	176878	1.5	A207 / SE3
GW54	Westthorne Avenue (579)	Roadside	541915	175039	2.5	A205 / SE9
GW55	Crown Woods Way (Triplicate)	Roadside	545005	175097	1.5	A2 / SE9
GW56	Felhampton Road	Roadside	543679	172598	1.5	A20 / SE9
GW57	Trafalgar Road (Triplicate)	Roadside	538965	177952	7	A206 / SE10
GW58	Maidenstone Hill	Roadside	538143	176710	4	A2 / SE3
GW59	Westthorne Avenue (Triplicate)	Roadside	541883	175016	13	A205 / SE9
GW60	Burrage Grove AEI (Triplicate)	Roadside	544086	178882	17	A206 / SE18
GW61	Millenium Village (Triplicate)	Aggregate Zone	540175	179000	n/a	SE10
GW62	Welton Road (Duplicate)	Roadside	545325	177034	1	Suburban
GW63	Begbie Road	Roadside	541128	176900	1	Suburban
GW64	Eastbrook Road	Roadside	540960	176807	1	Suburban
GW101	Plumstead Road (136)	Roadside	544727	178884	1	A206 / SE18
GW102	Burrage Grove AEI	Roadside	544075	178898	1	A206 / SE18
GW103	Wricklemarsh Road	Roadside				A102/SE3
GW104	Sun Lane	Roadside				A2/A102/SE3
GW105	Clifton's Roundabout	Roadside				A20/A205/SE12
GW106	Grand Depot Road	Roadside				

The diffusion tubes used were supplied by Bureau Veritas and analysed by Gradko International using a preparation method of 50% TEA in acetone. In the most recent round of Annual Performance Criteria for NO₂ Diffusion Tubes used in LAQM (Defra, 2010), the laboratory demonstrated good performance in a QA/QC scheme for analysis of NO₂ diffusion tubes. Gradko International 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.

The 2009 unbiased results of the diffusion tube monitoring in the Borough are given in the Appendix (see Table 20).

Monitoring using diffusion tubes has advantages over continuous monitoring in that it is far cheaper and therefore more sites can be established and assessed. The main disadvantage is that the method is less precise and accurate than continuous monitoring. The recommended methods to reduce these errors include the use of good QA/QC practices and bias adjustment factors that are derived from co-location studies between continuous analysers and diffusion tubes.

The bias adjustment factors are specific to each year, analysing laboratory, method of analysis and location. The factors are therefore also limited to the data supplied. The Review and Assessment website advises that “in many cases, using an overall correction factor derived from as many co-location studies as possible will provide the ‘best estimate’ of the ‘true’ annual mean concentration, it is important to recognise that there will still be uncertainty associated with this bias adjusted annual mean. One analysis has shown that the uncertainty for tubes bias adjusted in this way is $\pm 20\%$ (at 95% confidence level). This compares with a typical value of $\pm 10\%$ for chemiluminescence monitors subject to appropriate QA/QC procedures.”

A default bias adjustment factor for 2009 has been obtained from the government’s Review and Assessment website (based on the September 2010 spreadsheet). The default factor is based on statistical analyses of reported data provided by other local authorities. The factor for 2009, based on 16 studies, indicates that the diffusion tube results slightly over estimate continuously monitored concentrations.

From the default spreadsheet, the precision for the 2009 studies indicates good performance from all but one of the co-location studies that are included. The term “precision” indicates how well the diffusion tubes produce similar results from the duplicate and triplicate studies undertaken. The criterion is somewhat arbitrary and it reflects both the laboratory’s performance in preparing and analysing the tubes, plus the handling of the tubes in the field. The precision is based on an assessment of the coefficient of variation. “Good” precision is defined as achieving a coefficient of variation less than 20% for eight or more periods in a year and the average is less than 10%.

The local co-location studies using triplicate tubes were undertaken over 12 months at the Greenwich sites listed earlier. The diffusion tubes were all located within 0.5m of the inlet sampler of the chemiluminescent analysers at the continuous sites. The studies compared equivalent exposure periods, although the continuous results are provisional. The bias adjustment factors are as follows:

2009	Bias adjustment factor
Mean Greenwich	0.95
Default	0.97

The results of a nation-wide survey of nitrogen dioxide diffusion tube co-location studies were further used to improve current understanding of diffusion tube bias (AQC, 2006). The data suggested that tubes close to a road were more likely to underestimate concentrations, once they have been adjusted for laboratory bias, and conversely tubes further away from roads were more likely to overestimate concentrations. (Note this is similar to the above local findings reported here).

Further analysis of the results suggested that it was not the distance from roads that mattered; rather it was the different concentrations of nitric oxide, nitrogen dioxide and ozone in the atmosphere. The different concentrations influenced the chemistry taking place within the diffusion tube, in particular the formation of additional nitrogen dioxide from a reaction of ozone with nitric oxide.

A relationship was identified between diffusion tube bias and the measured annual mean nitrogen dioxide concentration that can be used to further adjust the diffusion tube result. The effect of this ‘tube-chemistry’ adjustment depends on the measured concentration: thus a laboratory bias adjusted result of 20.0 would become 18.1 $\mu\text{g m}^{-3}$ after adjustment for bias due to tube chemistry.

A value of $40.0 \mu\text{g m}^{-3}$ would remain at $40.0 \mu\text{g m}^{-3}$ and $60.0 \mu\text{g m}^{-3}$ would become $65.1 \mu\text{g m}^{-3}$. As shown the effect of this adjustment is minimal at concentrations close to the objective of $40.0 \mu\text{g m}^{-3}$ and so it will not have a material effect on exceedences of the objective identified using diffusion tubes. Although adjusting for tube chemistry can reduce the uncertainty of diffusion tube results, it was not however recommended that this adjustment be applied routinely for the reporting of results.

An examination of the locally derived and default bias factors shows that they are both similar and therefore the 2009 local factor has been used for this report.

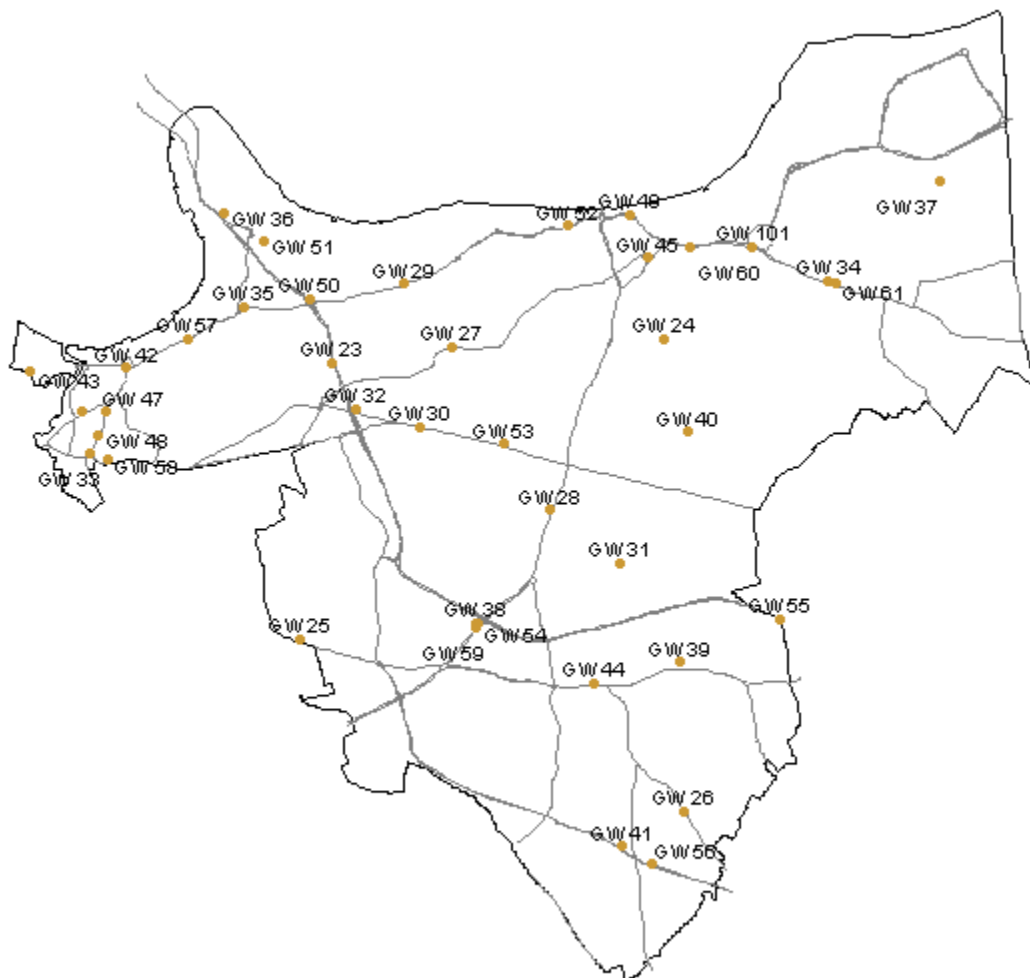


Figure 1 Map showing location of Greenwich diffusion tube sites

2.4 Benzene monitoring

In addition to the NO_2 diffusion tube monitoring the Council also undertakes the monitoring of benzene using passive diffusion tubes. These are co-located at eleven of the above sites (ten of which are roadside and the other is a background site). The tubes are supplied and analysed by Bureau Veritas, a UKAS accredited laboratory. The Council does not operate continuous analyser for benzene and hence no bias correction has been undertaken. The locations of the monitored sites are GW 29, 33, 34, 35, 39 (four tubes), 41, 42, 50, 51, 54 and 55 as shown in Table 3.

2.5 NO₂ Monitoring

The Council monitors NO₂ in its area using both continuous chemiluminescence analysers and diffusion tubes.

2.5.1 Continuous NO₂ and NO_x monitoring in LB of Greenwich

The annual mean results for the continuous sites are presented in Table 4 and Figure 2. The data capture exceeded 90% during 2008 and 2009 at all sites (see Appendix 1), other than at Greenwich 9 (86%) in 2009. In all cases the data were fully ratified.

Table 4 Annual mean NO₂ concentrations for the LB of Greenwich (2002 – 2009 inclusive) (µg m⁻³)

LAQN site	2002	2003	2004	2005	2006	2007	2008	2009
Greenwich 4 (suburban)	29	38	31	29	30	30	26	24
Greenwich 5 (roadside)	54	50	47	48	56	66	53	48
Greenwich 7 (roadside)		59	<i>50</i>	47	47	49	46	43
Greenwich 8 (roadside)			<i>78</i>	75	71	71	70	82
Greenwich 9 (roadside)			<i>51</i>	44	<i>43</i>	45	42	<i>45</i>
Greenwich 10 (roadside)			<i>54</i>	51	52	<i>58</i>	51	49
Greenwich 12 (background)			<i>38</i>	<i>34</i>	<i>35</i>	<i>38</i>	<i>36</i>	<i>36</i>
Greenwich 13 (roadside)					43	45	44	44
Greenwich Bexley 6 (roadside)	48	55	44	41	44	48	41	45

(Note - italics indicates < 90% data capture; bold indicates > objective)

The monitoring results for the long-term sites have consistently been above the annual mean objective, for all years at all sites, other than the two background sites in Eltham (GR4) and the Millennium village (GR12).

Figure 2 highlights inter annual variability for the sites arising as a result of the varying meteorological conditions, as well as the release of atmospheric emissions. The results confirm that the annual mean objective continued to be exceeded close to roads where there is relevant exposure in the Borough.

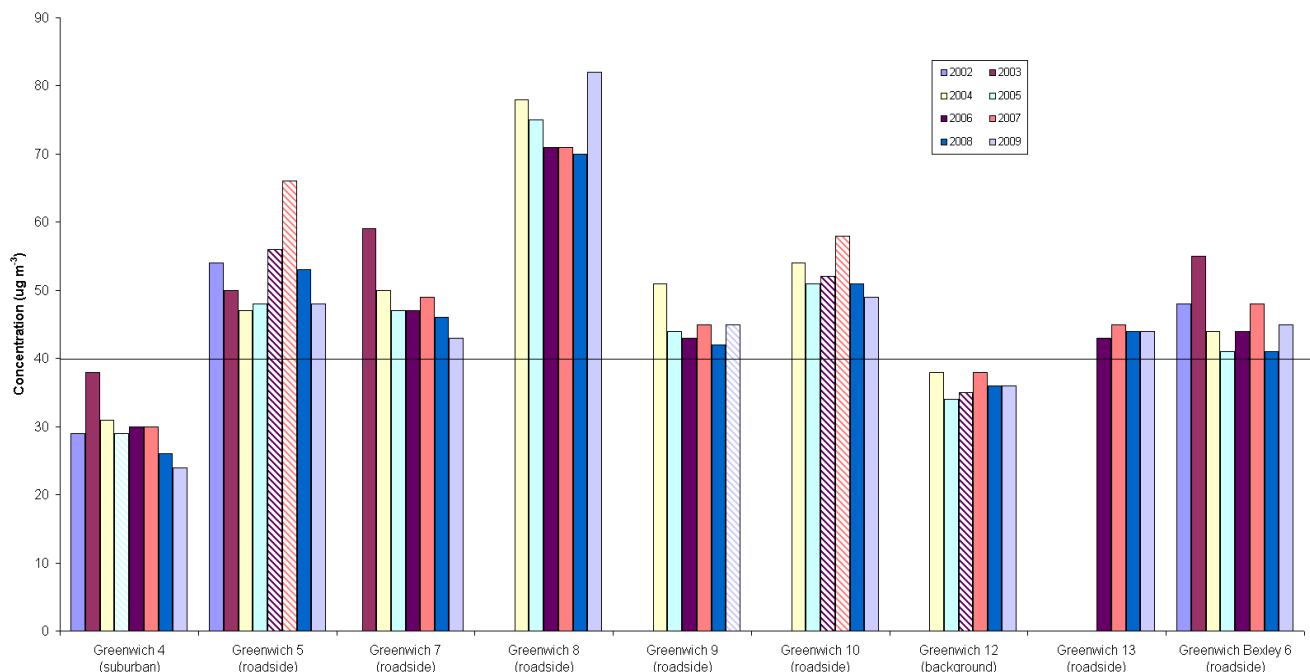


Figure 2 Annual mean NO₂ concentrations in the LB of Greenwich (2002 – 2009)

The number of periods that the hourly standard of 200 µg m⁻³ was exceeded at the Greenwich sites is given in Table 5. The only roadside sites in 2008 and 2009 not to exceed the 200 µg m⁻³ standard were the Greenwich 7 and Greenwich 13. All other sites recorded periods when this standard was exceeded. The highest number of periods exceeding this standard also arose during 2007 for all sites.

The Greenwich 8 roadside site close to the Woolwich flyover was the only site to exceed the Government’s hourly objective of not more than 18 such periods, for the period of monitoring reported, with 58 periods exceeding the 200 µg m⁻³ standard. This is compared to the objective of not more than 18 periods. The number of periods exceeding the standard at the Greenwich 8, 10 and Greenwich Bexley 6 site was higher in 2009 than 2009. The results continue to provide evidence confirming that emissions of NO₂ directly emitted from road vehicles have increased.

Table 5 Hourly mean NO₂ periods > 200µg m⁻³ for the LB of Greenwich (2002 – 2009 inclusive)

LAQN site	2002	2003	2004	2005	2006	2007	2008	2009
Greenwich 4 (suburban)	0	0	0	<i>0</i>	0	0	0	0
Greenwich 5 (roadside)	0	0	0	<i>0</i>	0	6	2	2
Greenwich 7 (roadside)		0	0	<i>0</i>	0	5	0	0
Greenwich 8 (roadside)			12	42	14	58	41	53
Greenwich 9 (roadside)			<i>0</i>	<i>0</i>	<i>0</i>	3	1	0
Greenwich 10 (roadside)			3	2	2	7	1	3
Greenwich 12 (background)			<i>0</i>	<i>0</i>	2	5	2	0
Greenwich 13 (roadside)					2	4	0	0
Greenwich Bexley 6 (roadside)	0	2	0	0	1	0	0	6

(Note - italics indicates < 90% data capture; bold indicates > hourly mean objective)

2.5.2 NO₂ and NO_x trends in the LB of Greenwich

Rolling annual mean plots can be used to indicate changing concentrations over time. The use of rolling annual mean concentrations, based on averaged hourly means, largely removes seasonal influences and provides a guide to changing trends. The plots have been produced for both NO₂ and NO_x. NO₂ is a mainly secondary pollutant formed by chemical reactions in the atmosphere from NO_x emissions produced by combustion sources. These reactions also involve ozone, which is scavenged by NO. The relationship between NO_x and NO₂ is non linear and it is also further complicated by changes in direct emissions of NO₂ from some road vehicles.

The rolling annual mean plots of both NO_x and NO₂ concentrations at the Greenwich sites are shown in Figure 3 for NO_x and Figure 4 for NO₂. This analysis is for the period from 1994 through to the beginning of 2009.

For all roadside sites, rolling mean concentrations of NO_x were higher than those at the background sites (Greenwich 4 and 12). The rolling annual mean concentrations of NO_x indicate a steady downward trend at the Greenwich 4 suburban background site over time in line with reductions in emissions since the site opened in 1994. The reduction of NO_x as the primary emission was approximately 40 µg m⁻³, down from 80 µg m⁻³ over the period from 1995 to 2008, with very little change during the past year.

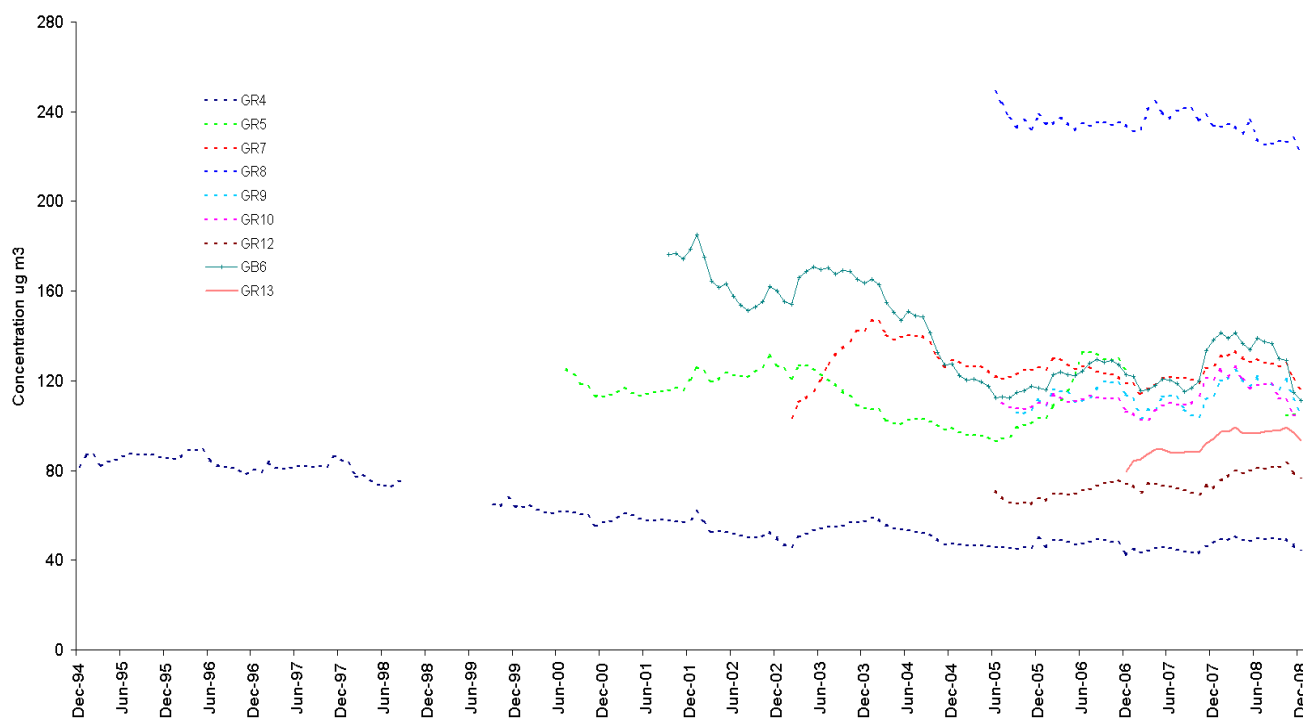


Figure 3 Rolling annual mean NO_x concentrations for continuous monitoring sites in LB of Greenwich

None of the other Greenwich sites have operated as long as Greenwich 4. Of those that have been open the longest, the Greenwich 5 and 7 sites show differing reductions of NO_x over the periods of site operation. Greenwich 5 showed a slight increase between 2000 and 2003, before reducing to its lowest concentration in June 2005. From this time however rolling mean concentrations increased again, with concentrations rising. More recent results indicate that concentrations have fallen back to 2006 levels; this followed a period of low data capture due to

instrument problems. Similarly concentrations at Greenwich 7 increased during 2008 to slightly higher levels than those that arose during 2005. By the end of the year levels had dropped back to the level at the end of the previous year.

Other sites that had increases in rolling mean concentration during 2008 included the Greenwich Bexley 6 site and the Greenwich 10 site. The Greenwich Bexley 6 site concentrations were particularly noticeable, however the level was reduced from their peak close to the start of the monitoring in 2001. By the end of 2008 the level had reduced to the 2005 level. The rolling mean concentrations at the Greenwich 9 site were similar to Greenwich 10. By the end of 2008 the levels at both sites were similar to those at the end of 2006. The Greenwich 8 roadside site indicated a slight reduction over 2008, although concentrations remained easily in excess of $220 \mu\text{g m}^{-3}$.

The rolling annual mean plots of NO_2 concentrations of the Greenwich sites are shown in Figure 4 for the period from 1994 through to the end of 2008.

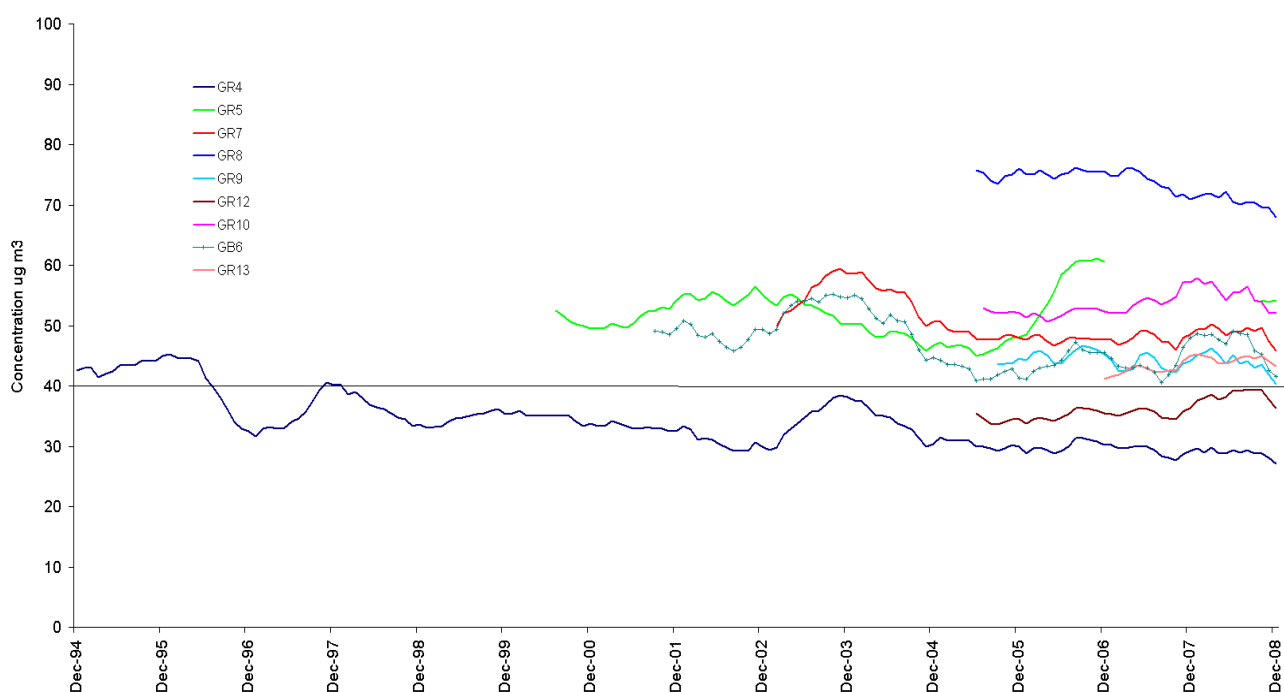


Figure 4 Rolling annual mean NO_2 concentrations for continuous monitoring sites in LB of Greenwich

The changes in rolling annual mean concentrations of NO_2 are, as expected for the secondary pollutant, less than for NO_x as the main primary pollutant. The rolling annual mean concentrations of NO_2 largely indicate a downward trend at the Greenwich 4 suburban background site over time, with reductions in concentration over the period from 1994 approximately $14 \mu\text{g m}^{-3}$. The reduction of NO_2 was not even over time and most recently for the period since 2004 there has been little change. The concentration at the end of 2008 was less than $1 \mu\text{g m}^{-3}$ lower than that from a year earlier (and therefore it was easily within the range of inter year variability that might be expected). The equivalent rolling mean concentration at the other background site, Greenwich 12 was just more than $1 \mu\text{g m}^{-3}$ higher by the end of 2008.

The Greenwich roadside sites were all greater than the objective for all of the period shown. Concentrations at the Greenwich 5 site decreased post 2003, but subsequently increased in 2005 and this continued during 2006, although data were not available due to instruments problems during late 2006 and early 2007. The data reported at the end of 2008 indicate that levels were lower than the 2006 peak, but only slightly less than 2003.

Increases in levels also arose at the Greenwich 7, 9, 10, 12, 13 and Greenwich Bexley 6 sites during 2008, before falling back again by the end of the year. The rolling mean concentrations at the Greenwich 7, 9 and 10 reduced below the corresponding levels of the previous year by around 1 to 2 than $1 \mu\text{g m}^{-3}$. The levels at Greenwich 13 and Greenwich Bexley 6 sites increased very slightly from the previous year's levels by a similar amount. Again these changes are well within the range of inter year variability that might be expected, although importantly the expected reductions on levels forecast by models do not appear to have materialised at these locations during the period reported.

Concentrations of NO_2 at the Greenwich 9 site were more than $10 \mu\text{g m}^{-3}$ lower than equivalent concentrations at Greenwich 10, despite having similar NO_x concentrations as noted above. This further highlights the complexity and non-linear nature of the relationship between NO_x and NO_2 .

Rolling mean concentrations at the Greenwich 8 roadside site dropped approximately $2 \mu\text{g m}^{-3}$ during 2008, although overall concentrations easily exceeded the objective at around $70 \mu\text{g m}^{-3}$ during 2008.

These changes continue to illustrate the difficulty in reducing NO_2 concentrations, which is mostly a secondary pollutant that is largely determined by the oxidising capacity of the atmosphere. The effect of the increased direct NO_2 emissions was also more pronounced at the roadside sites and consequently any reduction was reduced.

As reported previously (Greenwich, 2009) the graphs indicate that the annual mean objective is likely to continue to be exceeded into the future at roadside sites in the Borough unless additional actions are undertaken.

2.5.3 Diffusion tube monitoring of NO_2 in LB of Greenwich

The data capture for the 2009 diffusion tube survey was good exceeding 90%. As reported above the local factor of 0.95 was used for the bias correction. The values for the triplicate sites are all reported as the mean of the three sets of exposed tubes. Those 2009 concentrations exceeding the annual mean objective are shown in **bold**.

Table 6 Bias adjusted annual mean NO_2 concentrations ($\mu\text{g m}^{-3}$) for Greenwich sites (2003 - 2009)

Site	Type	2003	2004	2005	2006	2007	2008	2009
GW23	Roadside	57.6	46.6	48.9	47.5	52.5	45.7	42.8
GW24	Roadside	66.6	59.4	56.2	61.6	60.4	56.2	51.1
GW25	Roadside	65.3	55.1	54.1	56.2	55	53.1	53.6
GW26	Roadside	56.3	47.7	47.8	49.7	46.2	44.1	42.8
GW27	Roadside	69.1	58.3	60.3	61.6	56.3	50.3	51.6
GW28	Roadside							38.8
GW29	Roadside	74.2	60.4	67.6	72.4	66.7	67.4	70.7
GW30	Roadside							38.1
GW31	Roadside							32.0

GW32	Roadside	62.7	55.1	53	51.8	52.7	44.2	48.3
GW33	Roadside	66.6	63.6	65.5	67	70.9	63.0	59.8
GW34	Roadside	57.6	54.1	49.9	54	48.7	47.6	51.3
GW35	Roadside	93.4	86.9	78	96.1	80.3	71.9	74.4
GW36	Roadside	66.6	59.4	56.2	59.4	53.4	54.2	54.2
GW37	Background	35.8	29.7	30.2	29.2	27	25.7	28.0
GW38	Background	56.3	37.1	41.6	41	45.7	37.2	36.9
GW39 mean	Background	32	27.6	26.3	27	25.7	23.5	25.1
GW40	Background	32	25.4	25	29.2	26.2	24.2	22.5
GW41	Roadside	61.4	47.7	47.8	47.5	46.7	45.1	45.0
GW42	Roadside	75.5	58.3	63.4	63.7	63.4	55.8	58.1
GW43	Roadside	73	63.6	61.4	65.9	62.1	57.5	59.1
GW44	Roadside	61.4	45.6	48.9	51.8	58.8	55.4	61.1
GW45	Roadside		57.2	54.1	55.1	54.2	47.4	43.1
GW48	Roadside	65.3	54.1	52	54	56.6	49.4	47.1
GW49	Roadside	65.3	50.9	52	55.1	47.5	42.4	50.3
GW50 mean	Roadside	64	62.5	70	79.2	69.9	67.6	75.3
GW51	Roadside	56.3	47.7	48.9	50.8	49.8	48.2	50.5
GW52	Roadside	69.1	50.9	45.8	51.8	51.1	47.4	44.8
GW53	Roadside	57.6	47.7	45.8	49.7	50.3	43.8	46.3
GW54	Roadside	67.8	57.2	57.2	59.4	55.7	56.7	60.6
GW55 mean	Roadside	64.9	53	51.3	52.9	53.7	49.1	51.0
GW56	Roadside	55	45.6	44.7	54	49.8	58.6	56.1
GW57 mean	Roadside	48.6	47.7	45.1	48.6	48.9	42.3	43.6
GW58 mean	Roadside	63.1	49.5	53.4	54.4	51.8	48.8	47.0
GW59 mean	Roadside			45.4	49	45.6	43.9	44.6
GW60 mean	Roadside			45.4	48.6	51.8	43.3	41.6
GW61 mean	Background					42.5	42.4	42.2
GW62 mean	Roadside							39.5
GW63	Roadside							42.8
GW64	Roadside							48.0
GW101	Roadside	61.4	66.8	65.5	84.2	77.6	77.3	78.7
GW102	Roadside	66.6	67.8	66.6	70.2	72.9	67.4	67.6
GW103	Roadside							44.7
GW104	Roadside							50.3
GW105	Roadside							54.9
GW106	Roadside							43.5

(Note – bold indicates 2009 results that exceed the AQS objective)

The bias adjusted 2008 annual mean concentrations for four of the Greenwich background sites indicate that the government's air quality objective of $40 \mu\text{g m}^{-3}$ was met in 2009; however concentrations at the GW61 background site at the Millennium Village exceeded the objective. In previous years GW38 also exceeded the objective, but concentrations since 2008 have reduced below $40 \mu\text{g m}^{-3}$, having previously exceeded in the earlier years shown. (The GW38 site is located at a school and was previously described as an intermediate site).

The other Greenwich sites are all sited at roadside locations and all of them recorded bias adjusted concentrations that exceeded the objective, apart from GW28, GW30, GW31 and GW62. Although all of these other than GW31 approached within $2 \mu\text{g m}^{-3}$ of the objective. The sites that exceeded the objective also included the newly monitored sites. The extent that the sites exceeded the objective ranged from $41.6 \mu\text{g m}^{-3}$ to $78.7 \mu\text{g m}^{-3}$. The GW101 site on Plumstead Road, which is located 1m from the A206, recorded the highest 2009 concentration of all the roadside sites at $78.7 \mu\text{g m}^{-3}$. It was one of the four sites recording annual mean concentrations greater $70 \mu\text{g m}^{-3}$. The nearest façade is 3.8m from the site and the predicted concentration at the façade is $64 \mu\text{g m}^{-3}$.

Of the other sites, almost twenty-one of the forty-six sites monitored concentrations greater than $50 \mu\text{g m}^{-3}$. Eleven other sites recorded concentrations less than $45 \mu\text{g m}^{-3}$ (but more than the objective).

The results for all of the sites are also shown in , along with the results for 2007 and 2008. This shows that for the majority of roadside and background sites, the bias adjusted concentrations in 2009 were slightly higher than 2008. This increase in concentrations is consistent with the results from most of the continuous sites, however this change is likely to be due to inter annual variation rather than any overall reduction in emissions.

The main overall conclusion is that the majority of monitoring sites throughout the Borough (including sites with relevant exposure) continued to record annual mean concentrations in excess of the air quality objective.

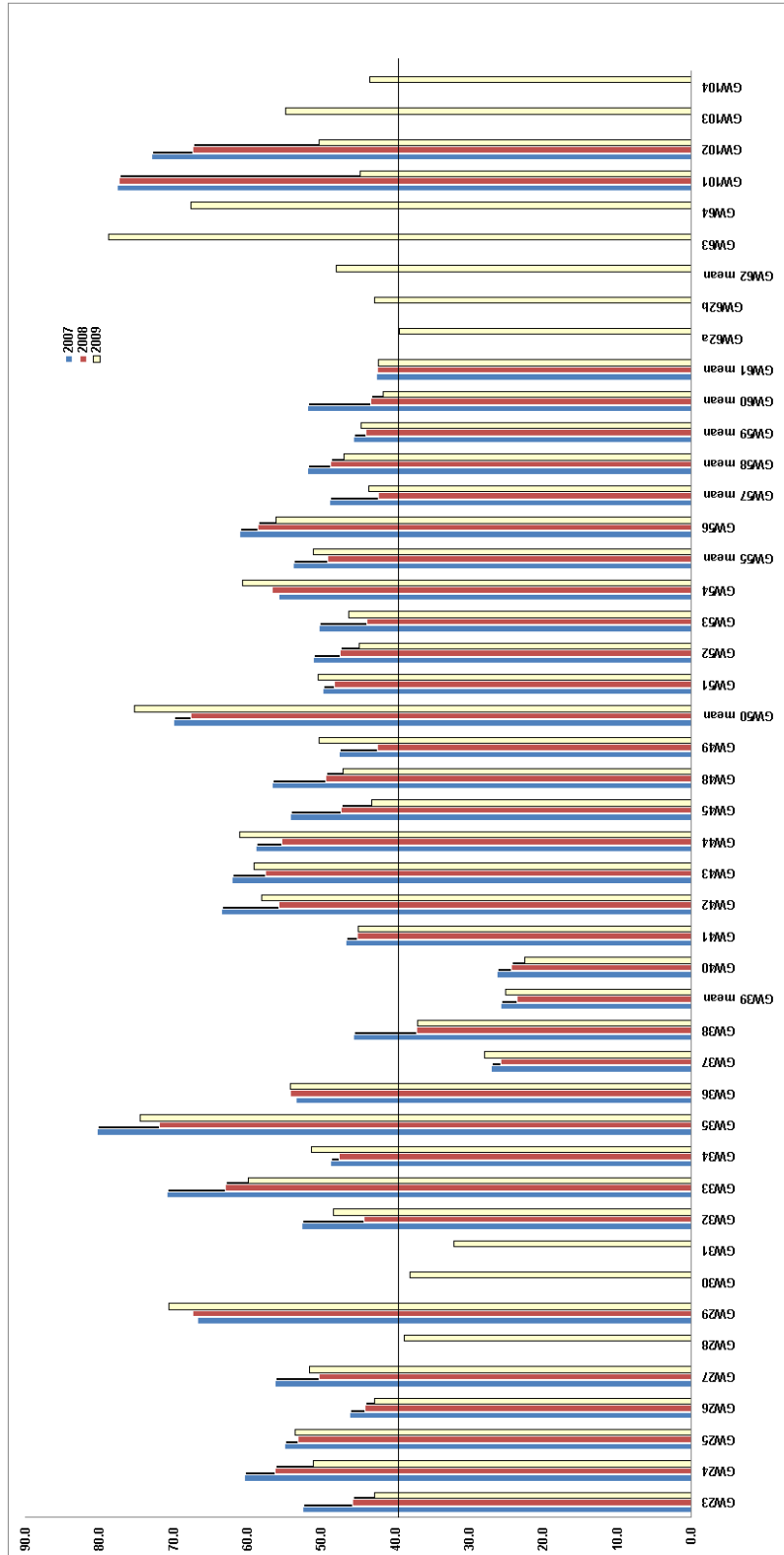


Figure 5 Chart of bias adjusted annual mean NO₂ concentrations (µg m⁻³) for Greenwich sites (2007-2009)

2.6 PM₁₀ monitoring

The Council has undertaken continuous monitoring of PM₁₀ at all of its continuous monitoring sites. The sites however were not all operational for all years. The Council uses reference equivalent methods for monitoring PM₁₀ that meet EU monitoring requirements and many of the sites were upgraded with a Filter Dynamics Measurement System (FDMS) analyser between 2006 and 2008.

The Greenwich 4 site first monitored PM₁₀ in 1994 at a suburban background site in Eltham. The Greenwich 5 site in Trafalgar Road (near the west of the Borough) then opened in 1997. It is sited at a roadside location. The Greenwich 7 site is also a roadside site, also in the west of the Borough, bordering Lewisham. The other Greenwich sites (8, 9, 10, 13 and Greenwich Bexley 6) are all sited at roadsides, whereas the Greenwich 12 site is located at a background site in the Millennium Village. The sites are all part of the London Air Quality Network and therefore the standards of QA/QC are similar to those of the government's AURN sites, with subsequent data ratification undertaken by the ERG at King's College London. In all cases the data are fully ratified.

The monitoring results for the sites are given in Table 7. Full details of data capture are given in Appendix 1.

Table 7 PM₁₀ monitoring (FDMS) at the long-term LB of Greenwich sites (2005 - 2009)

Site	2005	2006	2007	2008	2009
No. of days					
GR4 (suburban)	12	10	3	13	11
GR5 (roadside)	19	14	23	13	12
GR7 (roadside)	26	23	27	15	5
GR8 (roadside)	79	68	59	81	44
GR9 (roadside)	25	16	10	22	13
GR10 (roadside)	17	17	19	13	0
GR12 (background)	23			18	12
GR13 (roadside)			1	14	6
GB 6 (roadside)	30	29	25	22	3
Annual mean					
GR4 (suburban)	22	21	18	21	26
GR5 (roadside)	25	24	23	22	24
GR7 (roadside)	28	28	26	26	21
GR8 (roadside)	39	39	37	41	37
GR9 (roadside)	27	29	25	23	23
GR10 (roadside)	25	24	23	26	25
GR12 (background)	30			23	20
GR13 (roadside)			23	20	20
GB 6 (roadside)	27	27	26	24	28

(Note - italics indicates < 90% data capture)

The results confirmed for each year of monitoring that there were days when the daily mean standard of 50 µg m⁻³ was exceeded. The 2004 daily mean objective was exceeded at the Greenwich 8 site only, as it had for all previous years of operation. The number of days that exceeded the standard in 2009 was less than 2008 for all sites, including this site that exceeded the objective. The daily mean objective was also approached at the Greenwich Bexley 6, Greenwich 7 and Greenwich 9 roadside sites with at least one year at each site recording 25 or more days greater than the standard. The results are also shown in Figure 6 and Figure 7.

The 2004 annual mean objective was exceeded at the Greenwich 8 site in 2008; in other years the objective was approached but not exceeded. The results for Greenwich are consistent with the monitoring elsewhere in London for this period (ERG, 2009), with the sites along major roads exceeding (or approaching) the objectives. In both 2008 and 2009 there were wintertime episodes during settled conditions that reduce pollutant dispersion.

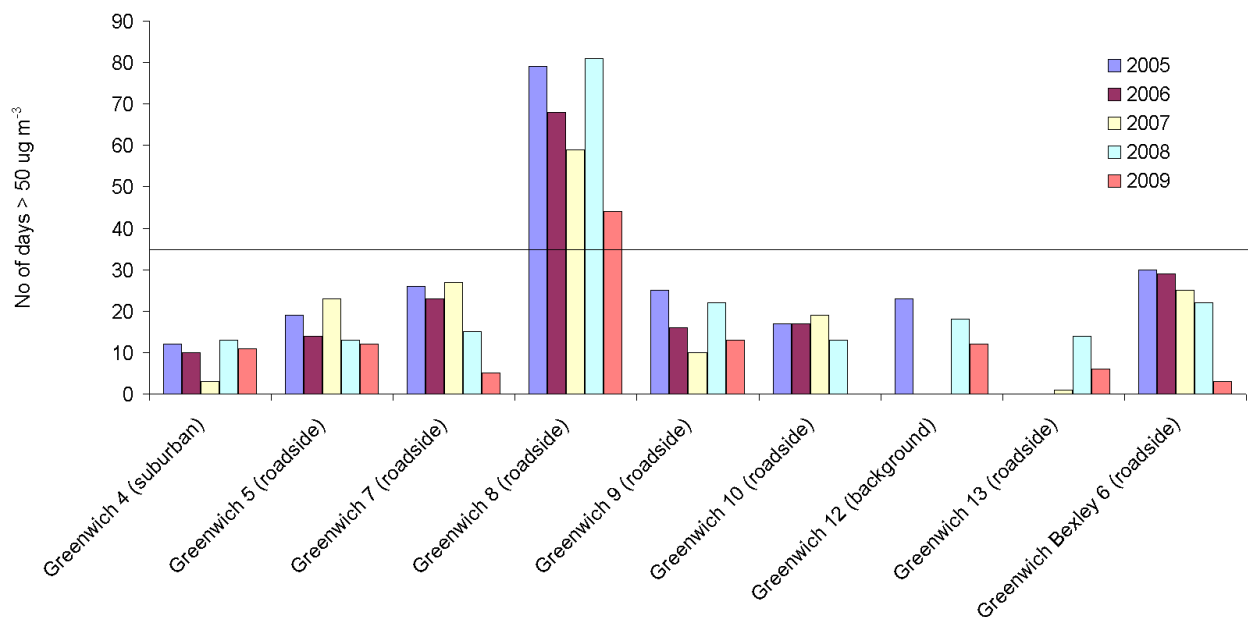


Figure 6 Number of days PM₁₀ greater than 50 µg m⁻³ at the LB of Greenwich sites (2005 to 2009)

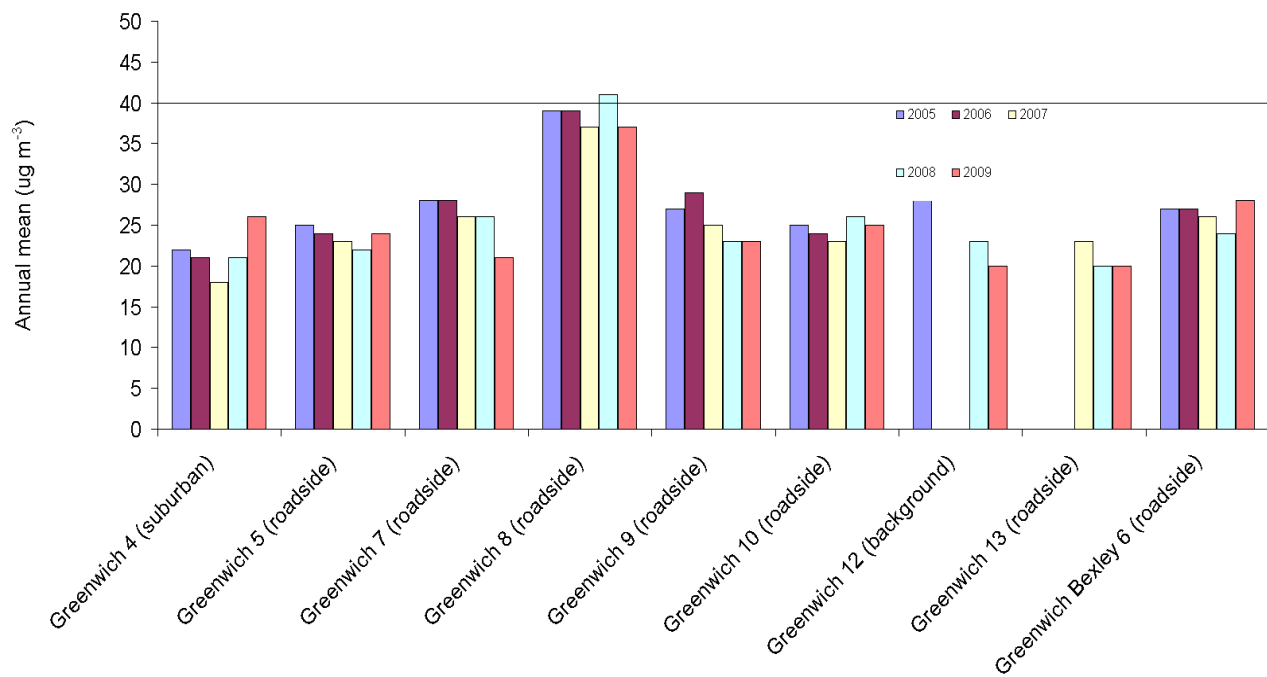


Figure 7 Annual mean PM₁₀ (µg m⁻³) at the LB of Greenwich sites (2005 to 2009)

Across a selection of monitoring sites in London, the LAQN index value for annual mean PM₁₀ has shown no statistically significant trend. Although the PM₁₀ concentration has fallen since the start of the index in 1997, the decrease in annual mean concentrations was achieved in the period up to 2001. The index has shown evidence of a steady increase since this time at a mean rate of around 0.4 % per year. During 2006 the PM₁₀ index increased by 3.5% and then fell by 2.5% during 2007 to give a mean increase of 0.5% per year in line with the mean rate of change from 2000 (ERG, 2009).

Evidence from monitoring across London indicates an increase in PM₁₀ concentrations at roadside sites since 2000-1 and an increase in the difference between roadside and background concentrations. These changes suggest an increase in PM₁₀ concentration arising from London's emissions. Source apportionment of annual mean PM₁₀ concentrations also suggest an increase in the concentration of primary PM₁₀ emissions in London between 1999 and 2004 and that this is most likely due to increases in emissions from road transport.

2.7 PM_{2.5} monitoring

The Council undertook the continuous measurement of PM_{2.5} at its Greenwich 4, 8, 9, 10, 12, 13 and Greenwich Bexley 6 and Bexley 3 sites in 2009. PM_{2.5} monitoring enhances understanding of the health impact potential of particulate matter. The Greenwich Bexley 6 site opened first in 2000, with a subsequent FDMS site opening in 2009. The Greenwich 9 and 12 sites opened in 2004; Greenwich 8 and 13 sites in 2006; Greenwich 4 and 10 sites in 2008 and Bexley 3 in 2005. The Greenwich Bexley 6, Greenwich 8 and Bexley 3 sites use TEOM instruments, whereas the other sites use FDMS instruments.

The unadjusted annual mean results for the monitoring sites are given in Table 8.

Table 8 PM_{2.5} annual mean results (µg m⁻³) at the long-term LB of Greenwich sites (2002 - 2009)

Site	2002	2003	2004	2005	2006	2007	2008	2009
Greenwich 4							13.8	17.6
Greenwich 8					20.5	19.3	18.8	18.6
Greenwich 9			9.8	18	18.4	18.7	16.1	15.5
Greenwich 10							17.2	19.6
Greenwich 12			13	19.2	22.6		15.1	15.5
Greenwich 13					14.3	17.5	15.9	14.3
Greenwich Bexley 6	14.2	15.6	13.5	13.5	13.8	13.7	13.5	14
Greenwich Bexley 6 FDMS								16.8
Bexley 3 (Thamesmead)				11.8	12.3	12	11	9.7

(Note - italics indicates < 90% data capture)

Recent reviews by the WHO and the Committee on the Medical Effects of Air Pollutants (COMEAP) suggested exposure to PM_{2.5} gives a stronger association with the observed ill-health effects of particles. It is also noted that there is evidence that the coarse fraction between (PM₁₀ – PM_{2.5}) has some effects on health (Defra, 2007).

As a consequence of this a PM_{2.5} objective was included in the 2007 Air Quality Strategy. This is based on the health advice for PM_{2.5}, which shows that there is no accepted threshold effect, i.e. there is no recognised safe level for exposure to fine particles. As a result in its strategy, the Government adopted an 'exposure reduction' approach for PM_{2.5} to seek a more efficient way of achieving further reductions in the health effects of air pollution. This is intended to provide a driver

to improve air quality everywhere in the UK rather than just in a small number of localised hotspot areas.

The exposure reduction approach is based on the principle that for a pollutant with a low or no threshold for adverse effects, it will generally be more beneficial to public health, and potentially more cost-effective to reduce pollutant levels across the whole population of an urban area or region rather than in a small area or “hotspot”. The framework of delivering this approach contains two inseparable parts:

- Air quality objectives/limit values (often called “backstop objective” or “concentration cap”) to ensure some basic level or quality of air which all citizens should experience, embodying the “environmental justice” concept
- An objective based on reducing average exposures across the most heavily populated areas of the country (often called “percentage reduction” or “exposure reduction” objective), to generate further cost effective public health improvements over and above the basic level of protection generated by the objective above.

While the percentage reduction objective is a relative measure of improvement (in this strategy, it is a 15 per cent reduction in average concentrations in urban background areas across the UK between 2010 and 2020), the backstop objective (or concentration cap) is designed to deliver a minimum level of protection applicable to all areas i.e. $25\mu\text{g m}^{-3}$ as an annual mean.

The above results for the Greenwich sites include results from both TEOM and FDMS instruments. As there is currently no agreed scaling factor for $\text{PM}_{2.5}$, the $\text{PM}_{2.5}$ data are reported without adjustment to a gravimetric equivalent (Defra 2007).

Based on this proviso, the results for all years and sites indicate that the backstop objective was not exceeded.

2.8 SO₂ monitoring

The Council undertakes SO₂ monitoring using a continuous analyser at its Greenwich 4 suburban background site in Eltham. Details of data capture for the period 2002 to 2009 are given in Appendix 1. The 15-minute mean standard of $266\mu\text{g m}^{-3}$ was not exceeded at the site over this period, although this standard was approached in 2004 and 2008. The maximum 15-minute mean for each year of monitoring is shown in Table 9.

Table 9 Maximum 15 minute mean concentrations of SO₂ monitoring ($\mu\text{g m}^{-3}$) (2002-2009)

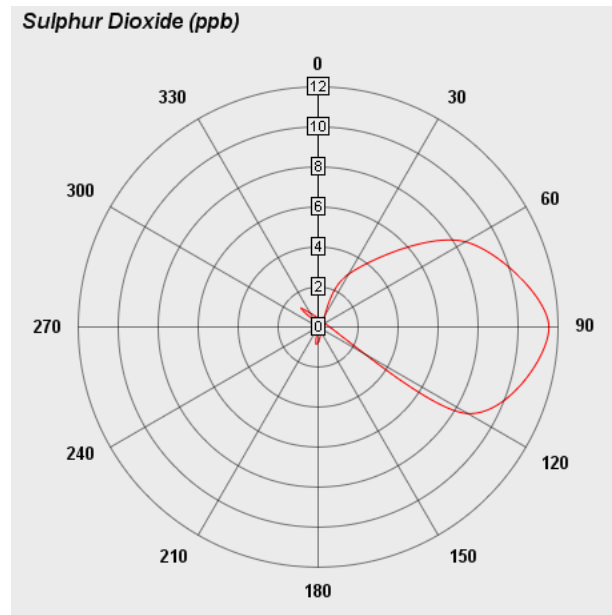
LAQN Site	2002	2003	2004	2005	2006	2007	2008	2009
GR4	173.5	192.2	251	162.9	186.9	116.8	238.3	186

(Note - italics indicates < 90% data capture)

The 15-minute mean objective is the most stringent of the three SO₂ objectives; accordingly there were no recorded periods where the hourly and daily mean standards were exceeded. The results confirm that the SO₂ objectives were met at the Greenwich 4 monitoring site in the Borough.

The 2008 episode may have been due to large combustion sources towards the east of the site as suggested by the wind rose plot for period (see Figure 8).

Figure 8 Wind rose plot at GR4 for 18th to 20th February 2008



The SO₂ objectives and standards relate to short periods of high concentrations based on the impact of episodes of high pollution on human health. The relationship between annual mean concentrations and the standards however is not straightforward, but examination of annual mean concentrations over time can provide an insight to changes that are taking place. Figure 9 shows that annual mean concentrations have reduced over the past 15 years as a result of reductions in SO₂ emissions. This has arisen from the burning of gas rather than oil in industrial/ commercial and domestic settings, as well as reductions in S levels in the petrol and diesel fuels used by road vehicles.

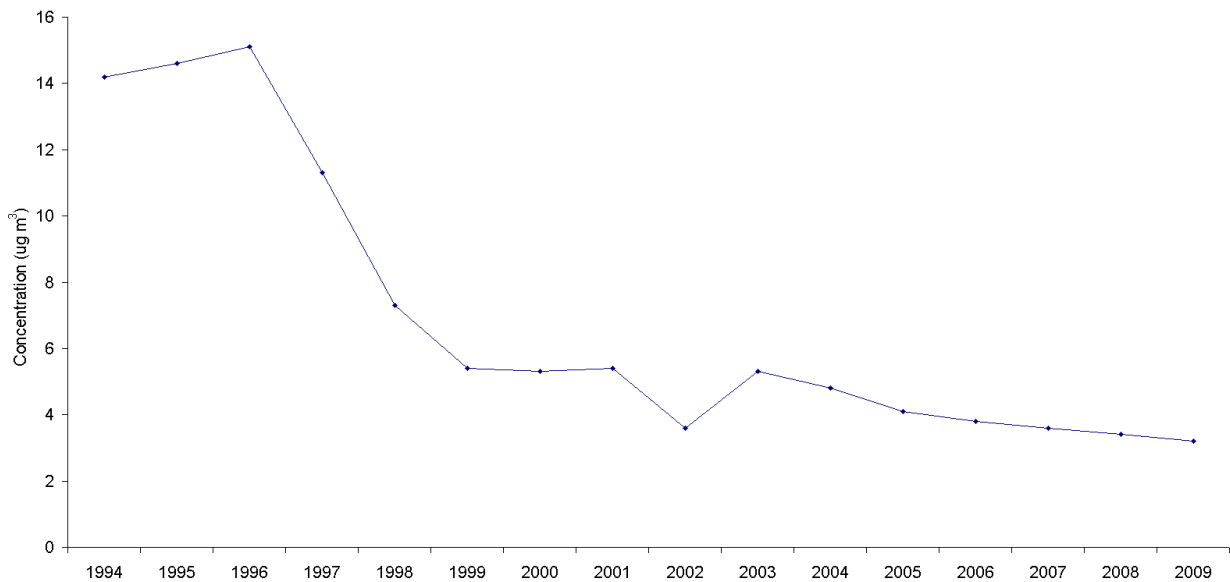


Figure 9 Annual mean SO₂ concentrations monitored at the Greenwich 4 site (1994 – 2009)

2.9 Ozone monitoring

The Council undertook the continuous measurement of ozone at its Greenwich 4 site in Eltham, Greenwich Bexley 6 roadside site at Falconwood, Greenwich 8 site near the Woolwich Flyover, Greenwich 9 at Westhorne Avenue and Greenwich 13 in Plumstead High Street. The Greenwich 8 and 9 sites opened in 2007. All sites are located at roadsides other than the Greenwich 4 site.

The results for the period 2002 – 2009 are given in Table 10. The data capture for all years exceeded 90%; except 2004 for the Greenwich Bexley 6 site and Greenwich 9 site in 2009. Full details for the site are given in Table 17 in Appendix 1.

Table 10 Number of daily maxima exceeding $100 \mu\text{g m}^{-3}$ based on 8-hour running mean (2002-2009)

Objective	2002	2003	2004	2005	2006	2007	2008	2009
GR4	11	31	11	15	33	15	16	9
GB6			0	11	14	3	5	0
GR8						4	10	0
GR9						2	0	0
GR13					26	10	15	0

The Government's air quality objective, not to exceed 10 periods in a calendar year, was exceeded for all years in Greenwich other than 2009, although it was approached at the Greenwich 4 site. The most notable year was 2003, when there was a very hot dry summer conducive to the formation of ozone; hence the much higher of periods during that particular year. In 2004 the weather was less conducive to the formation of ozone as was 2005. However the 2003 total number of periods was exceeded during 2006 at Greenwich 4. Since then summers have been less conducive, with consequent lower frequency of periods exceeding the standard.

The LAQN annual mean index for ozone (which is based on an average of selected sites dependant on type and availability of data) has also shown that since 1996 through to the end of 2007 a 37% increase in levels (ERG, 2009). Thus this confirms that concentrations of ozone have increased across London.

The only roadside site to exceed the objective was Greenwich 13 in 206 and 2008. Lower ozone concentrations are normally expected at roadside sites as higher concentrations of NO_x lead to a local depletion of ozone concentrations. However the decrease in NO_x emissions within London has lead to an increase in ozone concentrations. With diminishing NO_x concentrations, it is likely that future ozone concentrations in London will more closely resemble those in surrounding rural areas (AQEG 2008). It is this decrease in NO_x concentrations in London that is thought to be the main cause of the increase in annual mean ozone. The roadside sites monitoring ozone provide an understanding of oxidation close to polluted areas and also future changes over time.

2.10 Benzene monitoring

The Council monitors benzene using diffusion tubes at ten roadside sites and one background site (using 4 tubes) in the Borough. The sites are co-located with the nitrogen dioxide tube sites described earlier. The annual mean results for the period 2003 to 2009 are given in Table 11. Data capture for the sites in 2009 was 96%.

The monitored results indicate that the 2003 AQS objective (of $16.25 \mu\text{g m}^{-3}$) was not exceeded during the period of monitoring. The benzene monitoring also confirms that the stricter objective of $5 \mu\text{g m}^{-3}$ (to be achieved by the end of this year) was also not exceeded at any of the sites over this period.

Overall the monitoring indicates that concentrations have mostly decreased over time. Concentrations dropped from a mean of just over $15 \mu\text{g m}^{-3}$ at the three roadside sites monitored in 1995 to $2.2 \mu\text{g m}^{-3}$ in 2009 at the same sites. The background site also exhibited a reduction from $3.2 \mu\text{g m}^{-3}$ to a mean of $1.6 \mu\text{g m}^{-3}$ for the same period. This reduction is due to stricter emission controls, particularly with regard to road transport sources.

Table 11 Annual mean benzene concentrations ($\mu\text{g m}^{-3}$) monitored in Greenwich (2003 to 2009)

Site	Type	2003	2004	2005	2006	2007	2008	2009
GW29	Roadside	3.9	2.4	2.4	2.8	2	2.1	2.4
GW33	Roadside	4.3	2.9	2.7	3.6	2.9	2.6	2.5
GW34	Roadside	3.2	1.6	1.7	1.9	1.9	1.6	1.9
GW35	Roadside	4.2	2.8	2.6	2.6	2.5	2.8	2.4
GW39A	Background	2.7	1.2	1.1	1.5	1.3	1.4	1.8
GW39B	Background	-	1	1.3	1.7	1.3	1.4	1.7
GW39C	Background	-	1	1.2	1.7	1.4	1.5	1.5
GW39D	Background	-	0.9	1.2	1.1	1.4	1.6	1.6
GW41	Roadside	3.2	1.7	1.8	1.9	2	1.9	1.9
GW42	Roadside	3.6	2.1	2.1	2.4	2.3	2.0	2.2
GW50	Roadside	4	2.6	2.7	2.8	2.8	2.4	2.7
GW51	Roadside	2.6	1.4	1.6	1.7	1.7	1.8	1.9
GW54	Roadside	3.4	1.9	2.1	2.2	2.2	2.2	2.4
GW55	Roadside	2.5	1.5	1.5	1.6	1.7	1.6	1.7

3 New local developments

This section outlines those local developments that have taken place that may affect air quality. These are not for consideration now but are listed for a more thorough assessment during the next round of Review and Assessment. The guidance identifies the following developments that should be considered:

- New industrial installations with the potential to impact on air quality;
- New biomass boilers that have been granted planning permission;
- New developments with an impact on air quality, especially those that will significantly change traffic flows. Only those developments with planning permission granted are included;
- New landfill sites, quarries, etc with planning permission granted and nearby relevant exposure.

Table 12 New Local Developments since 2009

Development	Location
Road Traffic Sources	None
Other Transport Sources	None
Industrial Sources	See below
Commercial and Domestic Sources	See below
New Developments with Fugitive or Uncontrolled Sources	None

3.1 Part A/ B industrial processes

There have been no changes to industrial sources other than the closure of two permitted installations.

3.2 New developments and the use of biomass

The London Plan, which is the capital's spatial strategy produced by the Mayor of London requires greener development. A replacement was consulted upon in 2009 and is still to be agreed. This replacement advises (paragraph 5.43) that there is a presumption that all major development proposals will seek to reduce carbon dioxide emissions by at least 20 per cent through the use of onsite renewable energy generation wherever feasible. Development proposals should seek to utilise renewable energy technologies such as: biomass heating; cooling and electricity; renewable energy from waste; photovoltaic systems; solar water heating; wind and heat pumps.

A report produced in 2008 by London Councils assessed the potential impact of widespread wood-fuelled biomass use across London and provided guidance for dealing with applications from developers to install biomass burners. Of specific concern to the London Boroughs was that although many biomass burners meet Clean Air Act requirements, the switch to gas over the last few decades has meant from an air quality perspective, boiler emissions have been significantly lower than the Act's minimal requirements. Therefore biomass boilers have the potential to produce emissions that are worse than the current gas equivalent.

The Mayor's draft air quality strategy (due for publication this Autumn) intends under Policy 8 (Better use of the planning process) to introduce the following implementation plans in respect of biomass boilers:

- 1) Requiring new biomass boilers in PM₁₀ AQMAs to be fitted with suitable emissions reduction technology.
- 2) Applying emissions limits for biomass boilers across London.

Greenwich Council as a result of the regeneration in its area has received many applications for biomass plant and is considering its position on these proposals.

3.3 Key development sites in Greenwich

The key development sites in the Borough include:

- 1) The Greenwich Peninsula/ Millennium Village. The peninsula area lies to the north of Greenwich and consists of a 121 hectare site, which is one of the UK's largest development sites of its type in recent years. A major landmark is the Millennium Dome, which is central to regeneration of the area. As well as the 26,000-capacity arena, there are new homes, leisure, retail, and office developments. The development will also provide 24,000 jobs over a fifteen-year period.
- 2) Woolwich regeneration, which included the DLR extension and a proposed major private sector investment in Woolwich town centre, will create 46,450 square metres of new retail floor space, 1,500 new homes and over 1,000 new jobs in the next five years. These will be supplemented by a further 2,700 homes, shops and leisure areas on the Royal Arsenal, plus a rapid bus-based transit system linking Abbey Wood, Thamesmead, Woolwich, the Peninsula and Greenwich.
- 3) Tripcock Point/ Thamesmead, which will be a mixed-use development that will include: 2,000 new homes, live work units, offices, shops, hotel, community facilities and a new school. There is an emphasis on regenerating the area by including new public transport, environmental improvements and community facilities.
- 4) White Hart Triangle, the Borough's biggest industrial development, which is being transformed with the help of European funding and will, when completed, create about 2,000 new jobs. The site will provide space for various types of business on 161,900 square metres of formerly derelict land between Thamesmead and Woolwich. A new infrastructure has been developed to include a new access road and bridge, and the land has been decontaminated.

3.4 Greenwich beacon status

Greenwich Council is committed to improving air quality. This has led to the Council becoming one of only four Beacon Authorities for air quality in the country. The Borough has been at the forefront of air pollution control for many years. Programmes implemented include:

Smoke Control Areas in the 1950s

Research into the accumulation of lead in children in the 1980s (leading to government action to introduce lead-free petrol).

The Council achieved Beacon status 2007 for its work on Section 106 agreements. As part of its beacon status the Council ran a very successful seminar on planning and air quality for other local authorities and produced a video that can be viewed at the following website (<http://www.greenwich.gov.uk/Greenwich/YourEnvironment/Pollution/AirQuality/CleanerAirGreenerGreenwich.htm>)

The Council has further sought to improve air quality and reduce emissions that can harm the environment. Other notable achievements to date include:

- Successfully campaigning to bring new public transport to the Borough, including the Docklands Light Railway link to Woolwich
- Being the first local authority to implement a Low Emission Zone
- Promoting greener transport within the Council and around the Borough

- Promoting sustainable transport in schools
- Holding an annual Car Free Day in Greenwich town centre
- Speeding up the uptake of low emission fuels and technologies in new developments - Greenwich is part of the Low Emission Strategies partnership.

3.5 Low Emission Strategies (LES) Partnership

The Council is a key member of the Low Emission Strategies (LES) Partnership, which is a group of local authorities working together to reduce transport emissions of air pollutants and greenhouse gases. The LES work programme focuses on supporting and profiling good practice. The Partnership specifically seeks to accelerate the deployment and penetration of low emission transport fuels and technologies through supporting local authorities in adopting and implementing low emission policies, strategies and measures. A major achievement was the adoption of the Low Emissions Strategies Good Practice Guidance by Defra in 2010. This document shows how the planning system can be used to reduce transport emissions.

3.6 Greenwich Local Development Framework (LDF)

The Planning & Compulsory Purchase Act 2004 introduced a new development plan system. This is intended to streamline the local planning process and enable a Local Development Framework (LDF) to replace the previous Unitary Development Plans (UDP).

The 2006 Greenwich Unitary Development Plan (UDP) remains the key document in the current Greenwich Local Development Framework (LDF). It was adopted on 20 July 2006 and comprises a collection of planning documents that together provide the land development strategy, policies and site proposals for Greenwich. Together with the London Plan, which provides strategic policies, it forms the development plan for the Borough. The UDP sets out the Council's vision for providing new homes, jobs, transport and local services, while also protecting the environment. The 2006 Adopted UDP will itself be replaced by mid 2011.

The Local Development Documents that will comprise the Greenwich LDF are:

- The Local Development Scheme;
- Development Plan Documents;
- Supplementary Planning Documents;
- The Statement of Community Involvement; and
- The Annual Monitoring Report.

The Local Development Scheme (LDS) is a work programme for the production of a range of new planning policy documents about the use of land in the Borough. The Scheme sets out the planning policy documents that the Council will produce in the three-year period from 2008 to the end of 2010 and an indication of the LDF work programme for the three years following to 2013. This period covers completion of the Unitary Development Plan, and commencement of a new Local Development Framework to replace it.

The Development Plan Documents that form the main basis of the LDF are the:

Core (Spatial) Strategy DPD
 Development Control Policies DPD
 Site Allocations DPD
 Proposals Map
 Area Action Plans

The Development Plan Documents (DPDs), starting with the Core Strategy, are to be assessed in an Examination by an independent Inspector, appointed by the Secretary of State.

The Supplementary Planning Documents do not form part of the statutory development plan but will provide further detail on the implementation of particular policies and proposals contained in a Development Plan Document. Supplementary Planning Documents must relate to policies or proposals in a development plan document.

The Statement of Community Involvement outlines how the Council intends to involve the public and other stakeholders in the preparation, alteration and continuing review of all Local Development Documents. It will also set out the Council's arrangements for consultation on planning applications for major development proposals. This was adopted in March 2009.

The role of Annual Monitoring Reports is to assess the major effects of planning policies in Local Development Documents (including the UDP), their effectiveness in achieving key national and local planning policy objectives such as housing provision, and to assess progress with the production of planning documents against milestones in the LDS. The Annual Monitoring Reports are submitted to the Secretary of State. The third AMR was submitted on time and the key AMR finding is that the revised UDP was adopted on schedule.

4 Action Plan Progress Report

4.1 Introduction

The LB of Greenwich Air Quality Action Plan was published in 2002. The Air Quality Action Plan sets out what the Council will be doing to improve air quality over the next few years. The plan focuses on measures to reduce traffic flow and vehicle emissions that are consistent with other Council wide policies, principally in relation to both transport and planning. The main aim is to reduce NO_x and PM₁₀ emissions. Other actions include reducing emissions from buildings and industry, measures to raise public awareness of air pollution and greener travel. The Council through its Action Plan, and other policies, will also support other initiatives proposed and undertaken by other authorities to reduce emissions in the Borough.

This report provides an update for the period from 2007 to 2010.

4.2 Achievement of objectives

Greenwich Council is committed to improving air quality. This has led to the Council becoming one of only four Beacon Authorities for air quality in the country and a key member of the Low Emission Strategies Partnership.

The Council's Action Plan applies to the Air Quality Management Area, which covers the whole of the Borough of Greenwich. It is the intention of the Action Plan is to reduce pollution levels and where there are concentrations that exceed the air quality objectives the reduction will be in pursuit of the achievement of the objectives.

4.3 Summary of key measures

This section provides a brief summary of some of the key measures included in the Action Plan and also the Council's progress on these actions. An Action Plan Status table of the actions listed in the plan is provided in Table 13.

4.3.1 Monitoring air quality

The Council has maintained its commitment to monitoring air quality in the Borough and reporting to other bodies, including Defra and GLA since release of its plan. As reported earlier the Council monitors air quality using real-time monitoring stations, as well as with passive diffusion tubes which are located around the Borough. It is also leading the use of new PM gravimetric equivalent monitoring instruments in its area. The Council is therefore a key part of the London Air Quality Network and current monitoring data and historic data for the sites can be viewed on the www.londonair.org.uk site.

4.3.2 Planning Policy and Control

The Council is using the planning system to bring air quality benefits, through imposing planning conditions and through using section 106 agreements for new developments, which are car free developments and demonstrate other air quality improvements.

The Council also supported the APPLE working group (Air Pollution Planning and the Local Environment) that produced guidance to be used across London.

4.3.3 Traffic control and management

The Mayor of London approved the Greenwich Local Implementation Plan (LIP) on 17 September 2007. It sets out how the Council proposes to implement the Mayor of London's Transport Strategy within the Borough. The Actions undertaken and proposed include: reducing speed limits and the

introduction of Home Zones and 20mph areas, maintaining the Lorry Ban in Trafalgar Road/Romney Road and working with Transport for London (TfL).

Funding was awarded to Greenwich to spend on local transport improvements to make the Borough safer, greener and more accessible. The Council allocated funding towards highways and transport improvements, including bus priority, support for road renewal, bus priority, safer routes to schools, walking, cycling and the London Cycle Network and other improvements to support the Mayor's Transport Strategy.

Greenwich Council continues to promote Car Free Day, now in its ninth year, in Greenwich town centre to emphasise greener and sustainable travel, with a strong focus on cycling.

4.3.4 Travel Plans in Greenwich

Major travel plan initiatives include a community bus, funded from S106 money, servicing Greenwich Blackheath and the Herbert Hospital Site, and a car club using Government grants, situated in the Greenwich CPZ area. The Council produced a School Travel Plan Toolkit for schools and gives advice and information specifically on travel plans for larger employers.

4.3.5 Greenwich fleet

The Council promotes and encourages the uptake of cleaner fuels and technologies in its fleet and in other fleets operating in Greenwich. The Council has been greening its own vehicle fleet and many vehicles now run on a bio-diesel fuel mixture, which reduces carbon dioxide emissions.

4.3.6 Low Emission Zone

The Council in its Action Plan recognised that the London-wide Low Emission Zone (LEZ) would play an important part in benefiting air quality in the Borough. The London-wide LEZ was introduced to cut harmful emissions from the most polluting lorries, coaches and buses from February 2008.

4.3.7 Greenwich Council actions

These are shown in Table 13.

Table 13 Air Quality Action Status Table

No.	Action	Status	Follow – up Action
1	Greenwich Council will continue to implement all measures required of London Boroughs in the Mayor's Air Quality Strategy	Completed	The latest MAQS is due to be released this Autumn
2	Greenwich Council fully supports the Low Emission Zone Study.	Completed	The LEZ was introduced in February 2008. The LEZ includes a phased implementation for different category vehicles
3	Should a Low Emission Zone for London prove viable, Greenwich Council will work with Transport for London and the London Boroughs in implementing appropriate schemes	Completed	As above
4	Greenwich Council will promote and encourage the uptake of cleaner fuels and technologies.	On-going	ULS diesel requirement on construction sites. Council vehicles currently run on ULS diesel. All Council vehicles Euro III compliant.
5	Greenwich Council will encourage the 'greening' of commercial vehicles through the promotion of funding available from the Energy Savings Trust	Completed	Grants ended March 2005
6	Greenwich Council will implement the Mayor's Transport Strategy at a local level through the Local Implementation Plan.	On-going	Current LIP ends 2011
7	Greenwich Council will work with Transport for London and The Highways Agency in seeking significant reductions in vehicle emissions on the A102 and the Transport for London Road Network (TLRN)	On-going	Now only TfL. Working towards demand management in Greenwich Town Centre
8	Greenwich Council will continue to work within SELTRANS to secure improvements in public transport so as to reduce car dependency.	On-going	A public transport accessibility programme is in progress. This has resulted in improved access to stations and bus stops using funding provided by TfL
9	Greenwich Council will support Thames Gateway London Partnership measures that will improve air quality in and around Greenwich.	On-going	Greenwich is a member of TGLP. Crossrail, DLR and public transport modernisation is important to TGLP success.

10	Greenwich Council promotes walking as a healthy and viable alternative to car transport.	On-going	Walking strategy implemented under LIP. Including improved crossings/riverside footpaths/signage The programme aims to improve the walking experience by improving lighting and surfacing and therefore usage on all new developments and existing walking routes
11	Greenwich Council will promote cycling as a viable alternative to the car, including the provision of appropriate routes and facilities.	On-going	The Council continues to support the LCN and LCN+ programmes. Improvements to cycle parking facilities are also being made. The Council supports a cycle training programme with Bikeability.
12	Greenwich Council will seek to reduce the number of car trips made during the school term by encouraging alternative modes of transport, through the Safer Routes to School Programme	Completed	Programme ended and replaced by Sustainable School Travel.
13	Greenwich Council will continue to implement Home Zones and 20 mph areas, both as a traffic restraint to prevent 'rat running' and to put the needs of the pedestrian, mobility impaired, cyclists and children before those of the motorist.	On-going	One Home Zone installed. Now only 20 mph zones. The Council has an ongoing programme of 20 mph zones in existing residential areas. Opportunities are taken on new developments to introduce the Home Zone concept.
14	Greenwich Council will develop and implement a Green Transport Plan for the Borough.	Completed	Brochure "Green Transport Plan for Greenwich" produced in 2003
15	Greenwich Council will work in developing and implementing Green Transport Plans for large employers in the Borough.	On-going	All major planning approvals incorporate sustainable modes of travel issues such as travel planning, car clubs and monitoring.
16	Greenwich Council will hold a Car Free Day each year to promote alternative forms of transport to the car.	On-going	Successful annual event
17	Greenwich Council will continue to work with Transport for London and the London Boroughs in promoting and expanding the London Bus Priority Network.	Completed	Successful implementation of bus priority and bus accessibility schemes continues.
18	Greenwich Council will continue to work in partnership to promote bus travel as part of the London Bus Initiative	Completed	See above.
19	Greenwich Council will seek the further promotion of bus travel through Bus Quality Partnerships	On-going	Ongoing - The Council works closely with TfL on the provision of bus services

20	Greenwich Council will continue to work with Railtrack and rail operators to secure continuing improvements of the rail service provided to the Borough, including the development of a Metro Service.	On-going	Lobbying e.g. includes for Crossrail.
21	Greenwich Council believes that the River Thames is an under used sustainable transport resources and will continue to promote the transport of people and goods by the river.	On-going	Pier at Woolwich (LIP) working - and the Council have facilitated the only commuter boat service on the river from Woolwich to Central London.
22	Greenwich Council is committed to the development of the Greenwich Waterfront Transit system and will continue to work with Transport for London towards the ultimate development of a tram system.	On-going	Tram-like low-emission hybrid bus will be operating by 2011
23	Greenwich Council will work with Docklands Light Railway Ltd in securing Ministerial approval for the development of the DLR extension to Woolwich Arsenal Station.	Completed	Now open
24	Greenwich Council fully supports the Cross Rail Scheme and will lobby the Government to choose the Charlton line option to Woolwich Arsenal.	Completed.	Awaiting Government decision
25	Greenwich Council will seek to meet the requirements of the Road Traffic Reduction Act in the Borough through the variety of measures discussed in the Council Local Implementation Plan.	On-going	The LIP ongoing to 2011 – will be reviewed
26	Greenwich Council will use its Parking Strategy to control parking on new developments whilst also discouraging commuter parking and other less essential trips.	On-going	The Council's Parking Enforcement Plan contained in the LIP sets policies to control commuter parking, limit onsite parking on new developments thus discouraging car use. The Council has also kick started a successful car club in the West of the Borough and has investigated how this can be extended to give social inclusion benefits. Consider limiting resident parking to one per household
27	Greenwich Council will maintain the Trafalgar Road/Romney Road 7.5 tonne Lorry Ban in order to protect Greenwich Town Centre from air pollution and vibration.	On-going	Continuous AQ monitoring station installed since 1997
28	Greenwich Council will continue to implement traffic restraint measures to help create optimum driving conditions for the prevention of air pollution.	On-going	The Council is ensuring that road space is maximised for the benefit of all road users i.e. pedestrians, cyclists, public transport freight as well as private motor vehicles.

29	Greenwich Council will continue to use traffic restraint measures to direct heavy goods vehicles away from residential areas and onto the main primary and secondary roads.	On-going	An ongoing programme of restrictions is in place
30	Greenwich Council will seek to develop Freight Quality Partnerships in line with guidance produced by the Mayor for London.	On-going	The Council supports the Mayor's Freight Plan.
31	Greenwich Council will seek to work with Transport for London, London Councils and the London Boroughs in reviewing the London Night Time Lorry Ban, looking at the possibility of alleviating daytime road congestion whilst avoiding nighttime sleep disturbance.	On-going	Still in force - the Council is participating in TfL reviews.
32	Greenwich Council will continue to protect river wharves, where viable, for the shipment of freight.	On-going	Current part of planning process included in the UDP (LDF)
33	Greenwich Council will seek to significantly reduce traffic levels in Greenwich Town Centre with the aim of a part-pedestrian only Town Centre	On-going	Planned long-term. The Council is examining the feasibility of demand management.
34	Greenwich Council will continue to consult widely on significant transport schemes and measures	On-going	
35	Greenwich Council will continue to monitor transport schemes for their impact on air quality.	On-going	
36	Greenwich Council will enforce the new powers laid down in The Road Traffic (Vehicle Emissions)(Fixed Penalty)(England) Regulations 2002, in conjunction with the Vehicle Inspectorate, Association of London Government and the London Boroughs	On-going	Designation has not been sought
37	Greenwich Council will continue to work with the Vehicle Inspectorate in vehicle emissions testing and awareness programmes carried out in the Borough. The Council will also work in conjunction with the Mayor for London in implementing vehicle maintenance awareness schemes	Completed	In 1998/1999 Fleet Management worked collaboratively with the Vehicle Inspectorate. This could be repeated if necessary.
38	Greenwich Council will work with the Vehicle Inspectorate, London Councils and the London Boroughs in publicising roadside emissions testing powers.	Completed	See 37
39	Greenwich Council will enforce powers to prevent motorists from leaving their engines running unnecessarily whilst stationary	Completed	Not pursued as problems with enforcement role
40	Greenwich Council will continue to regularly service and maintain all fleet vehicles to a high standard	On-going	Vehicles are subject to service schedules that comply with Operators Licence requirements and also some manufacturers recommendations

41	Greenwich Council will replace all pre-Euro II vehicles by 2005, with all Euro II heavy diesel vehicles fitted with particulate abatement technology, where possible, ensuring Euro III classification for these vehicles.	Completed	
42	Greenwich Council will purchase LPG powered vehicles and examine the potential for providing a LPG fuelling facility at Birchmere.	Completed	Not pursued at this time
43	Greenwich Council will use a non-metallic fuel additive with Ultra Low Sulphur Diesel to improve fuel efficiency and reduce emissions of PM ₁₀ and NO ₂ .	Completed	Implemented in 2003
44	Greenwich Council will continue to clean Borough roads which will help to remove dirt with the potential for re-suspension	On-going	
45	Greenwich Council will continue to operate a free-collection, community composting scheme which has the potential for reducing the level of garden bonfires in the Borough	On-going	Greenwich achieved level of excellence and aim to increase the recycling rate beyond 40 per cent.
46	Greenwich Council will examine the viability of potential schemes to remove older, more polluting vehicles from the road	Completed	The Council has a successful programme of removal of abandoned vehicles and disposals of unwanted vehicles free on request.
47	Greenwich Council will continue to prevent air pollution and seek more sustainable forms of development through policies and measures contained in the Unitary Development Plan.	On-going	UDP published in 2006 which has specific references to air quality issues. Now LDF
48	Greenwich Council will continue to require ameliorating measures such as Green Transport Plans and vehicle fleet improvements via section 106 planning agreements.	On-going	Council achieved Beacon status 2007 for its work on Section 106 agreements
49	Greenwich Council will continue to seek financial contributions for air quality monitoring in the Borough via section 106 planning agreements, in line with the revised draft PPG 23.	On-going	See 48 above
50	Greenwich Council will continue to implement the Housing Energy Conservation Act thus improving energy efficiency in the Council's housing stock.	On-going	15-year programme. Currently in thirteenth year of the strategy. The target is to achieve a 30% improvement in the overall energy efficiency of the housing stock. Our ten-year report to Defra showed a 22.75% improvement. Council accredited with Good performance.
51	Greenwich Council is implementing an Energy Strategy that will reduce the overall emissions of nitrogen dioxide and PM ₁₀ particulates by using non-fossil fuel energy sources.	On-going	6 th largest non-fossil energy user in London. 65% electricity is "new" renewable energy 5% biodiesel fleet. PM ₁₀ & NO ₂ emissions reduction concomitant with a reduction of 19000t of CO ₂

52	Greenwich Council will implement a Corporate Procurement Strategy that will seek to reduce transport related emissions by using the influence of the Council's purchasing procedures.	Completed	Not vigorously pursued. To be re-examined. Since October 2006, all vehicles purchased for the Council's fleet are Euro IV compliant
53	Greenwich Council will continue to enforce Clean Air Act legislation	On-going	
54	Greenwich Council will continue to support the Environment Agency in ensuring that all Part A Processes in the Borough utilise the Best Available Techniques in controlling polluting emissions.	On-going	
55	Greenwich Council will continue to ensure that all Part B Processes in the Borough utilise the Best Available Techniques and also meet emission limits that are tighter than guidance values, wherever possible.	On-going	
56	Greenwich Council will continue to enforce the Statutory Nuisance provisions under the Environmental Protection Act 1990, particularly where there is a risk due to emissions of dust.	On-going	
57	Greenwich Council will control dust emissions from large scale development sites by ensuring that our Protocol on Dust is followed	On-going	Now use GLA/London Councils "the control of dust and emissions from construction and demolition"
58	Greenwich and Lewisham Councils will continue to work closely in controlling dust emissions from large scale developments affecting both Boroughs	On-going	
59	Greenwich Council will monitor nitrogen dioxide and PM ₁₀ particulate levels throughout the Borough and especially in areas of concern	On-going	NO ₂ diffusion tube survey. PM ₁₀ and NO ₂ at nine sites
60	Greenwich Council will continue to expand the automatic monitoring network to 7 stations by 2004	Completed	4 stations at end of 2002. 8 stations at end of 2004.
61	Greenwich Council continues to fully support and participate in the London Air Quality Network and National Automatic Urban and Rural Network of air quality monitoring stations	On-going	
62	Greenwich Council will work in partnership with the Greenwich Primary Care Trust in sharing information, cutting inequalities and improving health	On-going	

5 Conclusion

This Air Quality and Action Plan Progress Report for 2010 fulfils the requirements of the latest Defra guidance and has updated monitoring results in the Borough and noted new relevant local developments and other initiatives.

The up to date monitoring results continue to indicate that the Government's current air quality objectives for NO₂ and PM₁₀ are being exceeded widely at locations across the Borough where there is relevant public exposure. The Council's monitoring results for benzene and sulphur dioxide indicate that the objectives are not being exceeded. Based on the findings in this report there is no need to progress to a Detailed Assessment either to revoke its existing AQMA or determine whether any new AQMAs are required.

The report also includes a section on the Council's ozone and PM_{2.5} monitoring. The monitored results confirm that the ozone objective has been exceeded in the Borough. The Government's "backstop" objective for PM_{2.5} however has not been exceeded.

The purpose of the Council's Air Quality Action Plan is to ensure that air quality is considered corporately and to seek to reduce air pollution within the Borough, in pursuit of the Government's air quality objectives. The Council is however limited in its abilities to influence local air quality directly mainly as a result of pollution arising elsewhere in London (and beyond) and also because it has limited responsibility for the main sources of emissions within the Borough. The major roads in the Borough are the responsibility of Transport for London and the Highways Agency, rather than the Council. The Action Plan does however include measures to seek to reduce traffic flow and vehicle emissions that are consistent with other Council policies.

The Council's progress on the individual actions was given in Table 13. The Action Plan originally included 62 actions. The report confirms that 18 were completed. The remaining actions are all on going.

The Council will continue its air quality monitoring programme and prepare for the next AQ progress report.

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Appendix 1

Table 14 NO₂ data capture for year (%)

LAQN site	Type	2002	2003	2004	2005	2006	2007	2008	2009
Greenwich 4	S	98	97	97	84	93	96	95	85
Greenwich 5	R	99	99	99	95	76	27	99	99
Greenwich 7	R		90	88	92	96	99	99	99
Greenwich 8	R			45	96	96	95	99	97
Greenwich 9	R			11	97	81	99	98	86
Greenwich 10	R			28	98	98	88	97	98
Greenwich 12	U			41	99	89	98	99	99
Greenwich 13	R					92	98	99	98
Greenwich Bexley 6	R	98	92	100	99	97	99	97	100

Table 15 SO₂ data capture for year (%)

LAQN site	Type	2002	2003	2004	2005	2006	2007	2008	2009
Greenwich 4	S	95	98	99	94	93	92	81	93

Table 16 PM₁₀ data capture for year (%)

LAQN site	Type	2002	2003	2004	2005	2006	2007	2008	2009
Greenwich 4	S	94	99	91	78	96	77	93	87
Greenwich 5	R	95	98	99	97	99	99	99	76
Greenwich 7	R	92	92	90	98	99	99	63	98
Greenwich 8	R			47	98	98	98	95	95
Greenwich 9	R			3		77	36	90	84
Greenwich 10	R			23	97	99	94	43	26
Greenwich 12	U			36				89	90
Greenwich 13	R					87		88	97
Greenwich Bexley 6	R	94	94	99	98	95	94	97	20

Table 17 Ozone data capture rate for year (%)

LAQN site	Type	2002	2003	2004	2005	2006	2007	2008	2009
Greenwich 4	S	97	91	96	98	93	98	96	96
Greenwich Bexley 6	R			25	99	96	95	100	100
Greenwich 8	R						86	99	98
Greenwich 9	R						99	98	86
Greenwich 13	R					92	99	99	98

Table 18 Benzene diffusion tube sites in LB of Greenwich

Code	Site	Type	Road /Area
GW29	Woolwich Road	Roadside	A206 / SE7
GW33	Blackheath Hill (9)	Roadside	A2 / SE10
GW34	Bannockburn School	Roadside	A206 / SE18
GW35	Greenwich Mini Town Hall	Roadside	A206 / SE10
GW36	Blackwall Lane Lorry Park	Roadside	A102 (M) / SE10
GW38	Westhorne Avenue (579)	Intermediate	A205 / SE9
GW39	Bexley Road (ECC) (Triplicate)	Background	A210 / SE9
GW41	Sidcup Road (691)	Roadside	A20 / SE9
GW42	Greenwich Church Street (46)	Roadside	A200/6 / SE10
GW43	Creek Road / McMillan St	Roadside	A200 / SE8
GW50	Pear tree Way (Triplicate)	Roadside	A102 (M) / SE10
GW51	Bugsby's Way	Roadside	A2211 / SE10
GW54	Westhorne Avenue (579)	Intermediate	A205 / SE9
GW55	Crown Woods Way (Triplicate)	Roadside	A2 / SE9

Table 19 PM_{2.5} data capture for year (%)

Site	2002	2003	2004	2005	2006	2007	2008	2009
Greenwich 4							62	96
Greenwich 8					64	99	99	97
Greenwich 9			3	68	79	91	87	82
Greenwich 10							46	74
Greenwich 12			31	96	83		83	99
Greenwich 13					87	84	85	97
Greenwich Bexley 6	100	99	99	99	97	95	98	37
Greenwich Bexley 6 FDMS								46
Bexley 3				31	100	100	100	98

Table 20 Uncorrected annual mean NO₂ diffusion tube results for LB of Greenwich ($\mu\text{g m}^{-3}$)

Year	2003	2004	2005	2006	2007	2008	2009
GW23	45	44	47	44	54	50	45
GW24	52	56	54	57	62	61	54
GW25	51	52	52	52	57	58	56
GW26	44	45	46	46	48	48	45
GW27	54	55	58	57	58	55	54
GW28							41
GW29	58	57	65	67	69	73	74
GW30							40
GW31							34
GW32	49	52	51	48	54	48	51
GW33	52	60	63	62	73	68	63
GW34	45	51	48	50	50	52	54
GW35	73	82	75	89	83	78	78
GW36	52	56	54	55	55	59	57
GW37	28	28	29	27	28	28	29
GW38	44	35	40	38	47	40	39
GW39a	29	28	28	26	28	26	28
GW39b	26	26	25	25	27	26	26
GW39c	20	24	23	24	25	24	25
GW40	25	24	24	27	27	26	24
GW41	48	45	46	44	48	49	47
GW42	59	55	61	59	65	61	61
GW43	57	60	59	61	64	63	62
GW44	48	43	47	48	61	60	64
GW45		54	52	51	56	52	45
GW48	51	51	50	50	58	54	50
GW49	51	48	50	51	49	46	53
GW50a	50	59	72	76	76	78	85
GW50b			68	73	72	74	80
GW50c			62	71	69	68	73
GW51	44	45	47	47	51	52	53
GW52	54	48	44	48	53	52	47
GW53	45	45	44	46	52	48	49
GW54	53	54	55	55	57	62	64
GW55a	56	53	52	52	58	57	58
GW55b	51*	50	49	49	56	53	55
GW55c	45	47	47	46	52	50	49
GW56	43	43	43	50	63	64	59
GW57a	43	49	46	47	54	48	48
GW57b	37	45	43	45	51	46	46
GW57c	34	41	41	43	46	44	44
GW58a	57	50	54	52	57	57	52
GW58b	49	47	51	51	54	53	49

GW58c	42	43	49	48	50	50	48
GW59a			47	48	49	51	49
GW59b			44	46	47	48	47
GW59c			40	42	46	45	45
GW60a			47	47	55	50	46
GW60b			44	45	54	48	44
GW60c			40	43	51	44	41
GW61a					46	48	47
GW61b					44	46	45
GW61c					42	44	41
GW62A							42
GW62B							41
GW63							45
GW64							51
GW101	48	63	63	78	80	84	83
GW102	52	64	64	65	75	73	71
GW103							47
GW104							53
GW105							58
GW106							46

Table 21 NO₂ diffusion tube site locations and distance to kerb

Code	Site	Type	OS Grid Ref. TQ	Kerb dist. (m)	Road/Area
GW23	Siebert Road	Roadside	540420-177706	17.2	A102/SE3
GW24	Plumstead Common Road	Roadside	543806-177951	3	SE18
GW25	Eltham Road	Roadside	540099-174881	3	A20 / SE12
GW26	Footscray Road	Roadside	544015-173139	0.5	A211/SE9
GW27	The Village	Roadside	541645-177874	0.5	B210/SE7
GW29	Woolwich Road	Roadside	541167-178512	1	A206 / SE7
GW32	Old Dover Road	Roadside	540664-177235	17.1	A102/SE3
GW33	Blackheath Hill (9)	Roadside	537971-176776	1.5	A2 / SE10
GW34	Bannockburn School	Roadside	545490-178543	3	A206 / SE18
GW35	Greenwich Mini Town Hall	Roadside	539529-178280	1.5	A206 / SE10
GW36	Blackwall Lane Lorry Park	Roadside	539322-179235	30	A102/ SE10
GW37	De Lucy School, Cookhill Rd	Background	546630-179557	215	A2016 / SE2
GW38	Westhorne Avenue (579)	Intermediate	541885-175045	30	A205 / SE9
GW39	Bexley Road (ECC) (Triplicate)	Background	543986-174660	30	A210 / SE9
GW40	Shrewsbury House	Background	544065-176996	575	A207 / SE18
GW41	Sidcup Road (691)	Roadside	543384-172773	3	A20 / SE9
GW42	Greenwich Church Street (46)	Roadside	538329-177651	2	A200/6 / SE10
GW43	Creek Road / McMillan St	Roadside	537353-177632	6	A200 / SE8
GW44	Eltham High Street (Library)	Roadside	543096-174439	3.6	A210/SE9
GW45	General Gordon Place	Roadside	543641-178781	5	A205/SE18
GW48	Greenwich South Street (60)	Roadside	538044-176960	2.5	A2211 / SE10
GW49	Woolwich High Street (RSH)	Roadside	543472-179217	1	A206 / SE18
GW50	Peartree Way (Triplicate)	Roadside	540203-178367	3.5	A102/ SE10
GW51	Bugsby's Way	Roadside	539730-178948	2	A2211 / SE10
GW52	Woolwich Road	Roadside	542842-179108	1.5	A206 / SE18
GW53	Shooters' Hill Road	Roadside	542181-176878	1.5	A207 / SE3
GW54	Westhorne Avenue (579)	Roadside	541915-175039	2.5	A205 / SE9
GW55	Crown Woods Way (Triplicate)	Roadside	545005-175097	1.5	A2 / SE9
GW56	Felhampton Road	Roadside	543679-172598	1.5	A20 / SE9
GW57	Trafalgar Road (Triplicate)	Roadside	538965-177952	7	A206 / SE10
GW58	Maidenstone Hill	Roadside	538143-176710	4	A2 / SE3
GW59	Westhorne Avenue (Triplicate)	Roadside	541883-175016	13	A205 / SE9
GW60	Burrage Grove AEI (Triplicate)	Roadside	544086-178882	17	A206 / SE18
GW61	Millennium Village (Triplicate)	Background	540175-17900		A102 / SE10
GW62	Welton Road (Duplicate)	Roadside	545325-177034	1	Suburban
GW63	Begbie Road	Roadside	541128-176900	1	Suburban
GW64	Eastbrook Road	Roadside	540960-176807	1	Suburban
GW101	Plumstead Road (136)	Roadside	544727-178884	1	A206 / SE18
GW102	Burrage Grove AEI	Roadside	544075-178898	1	A206 / SE18
GW104	Sun Lane	Roadside	540743-177072	12.5	A2/A102/SE3
GW105	Clifton's Roundabout	Roadside	541143-174294	5	A20/A205/SE12
GW106	Grand Depot Road	Roadside	543505-178576	1	A205

Table 22 Relevant Part A processes in the Greenwich Council area

AUTHORISATION ID	OPERATOR NAME & SITE ADDRESS	INDUSTRY NAME	PROCESS NAME
AL8509	EUROPEAN COLOUR (PIGMENTS) LTD, NATHAN WAY, WEST THAMESMEAD BUSINESS PARK, LONDON SE28 0AY	THE CHEMICAL INDUSTRY	ACID PROCESSES
YP3830LF (previously AH1552)	EDF POWERLINK LTD, GREENWICH GENERATING STATION, OLD WOOLWICH ROAD, LONDON SE10 9NY	FUEL AND POWER PRODUCTION AND ASSOCIATED PROCESSES	COMBUSTION PROCESSES

Table 23 Part B installations in LB Greenwich

Ref	Reg. Category	Name	Address	Postcode	Status
102	Cremation of Human Remains	Eltham Crematorium	Crown Woods Way, Eltham	SE9 2RF	Permitted
110	Concrete Batching	Tarmac	Murphy's Wharf, Lombard Wall, Charlton	SE7 7SH	Permitted
112	Roadstone Coating	Aggregate Industries (UK) Ltd	Angerstein Wharf, Horn Lane, Greenwich	SE100RT	Permitted
126	Ferrous and Non-Ferrous Metal Processing	Essex Replica Castings (Basildon) Ltd	108-112 Westmoor Street, Charlton	SE7 8NQ	Permitted
130	Ferrous and Non-Ferrous Metal Processing	Stone Foundries	Woolwich Road, Woolwich	SE7 8SL	Permitted
138	Roadstone Coating	Tarmac	Riverside Wharf, Herringham Road, Charlton	SE7 8SJ	Permitted
140	Manufacture of Printing Inks	Apollo Colours Ltd	127 Nathan Way, West Thamesmead Business Park, London	SE28	Permitted
141	Concrete Batching	London Concrete	Angerstein Wharf, Horn Lane, Greenwich	SE10	Permitted
144	Fixed Concrete Crusher	Day Aggregates	Murphy's Wharf, Lombard Wall, Charlton	SE7 7SH	Permitted
145	Concrete Batching	Hanson Premix	303 Tunnel Avenue, Greenwich	SE100QE	Permitted
147	Fixed Concrete Crusher	Murphy's (Waste) Ltd	Transfer Station, Horn Lane, Greenwich	SE100RT	Permitted
148	Concrete Batching	CEMEX	Angerstein Wharf, Horn Link Way, Greenwich	SE100RT	Permitted
150	Concrete Batching	Euromix Concrete Ltd	Brewery Wharf, Norman Road, Greenwich	SE109QZ	Permitted
152	Vehicle Respraying	Southside Accident Repair centre	123/125 Nathan Way, Thamesmead	SE280AB	Permitted
153	Mobile Concrete Crusher	O'Keefe Construction	St. Andrew's House, 1	SE10	Permitted

	Greenwich) Ltd	Dreadnought Street, Greenwich	0PU	
201 Petrol Station	Asda Petrol Station	Bugsby Way, Charlton	SE7 7ST	Permitted
202 Petrol Station	Total Fina	176 Footscray Road, New Eltham	SE9	Permitted
203 Petrol Station	Morrison Petrol Station	Thamesmere Drive, Thamesmead	SE288RE	Permitted
204 Petrol Station	J Sainsbury plc	Messeter Place, Eltham	SE9	Permitted
205 Petrol Station	Star Lee Service Station	1 Sidcup Road, Lee	SE128BL	Permitted
206 Petrol Station	Snax 24 Ltd PFS	79 Kidbrooke Park Road, Blackheath	SE3	Permitted
208 Petrol Station	JET Service Station	177-189 Creek Road, Deptford	SE8 3OU	Permitted
210 Petrol Station	Trafalgar Filling Station	43-45 Trafalgar Road, Greenwich	SE109TT	Permitted
211 Petrol Station	Hexagon Service Station	340 Woolwich Road, Charlton	SE7	Permitted
213 Petrol Station	Thamesmead Service Station	1-3 Bostall Hill, Abbey Wood	SE2 0RB	Permitted
215 Petrol Station	Eltham Service Station	39-41 Eltham High Street, Eltham	SE9 1DH	Permitted
216 Petrol Station	Shell Service Station	160-168 Plumstead Common Road, Plumstead	SE18 2UL	Permitted
217 Petrol Station	Lakedale Service Station	190-214 Plumstead High Street, Plumstead	SE18 1JH	Permitted
218 Petrol Station	Blackheath Service Station	37A Shooters Hill Road, Blackheath	SE3 7HS	Permitted
219 Petrol Station	Shell Service Station	165 Shooters Hill Road, Blackheath	SE3	Permitted
220 Petrol Station	Shell Service Station	Next to 551 Sidcup Road, Eltham	SE9 3AF	Permitted
221 Petrol Station	Shell Service Station	728 Sidcup Road, Eltham	SE9	Permitted
223 Petrol Station	Shell Service Station	7-9 Tudor Parade, Well Hall Road, Eltham	SE9 5SX	Permitted
224 Petrol Station	Clifton Service Station	59 Sidcup Road, Lee	SE12 8BL	Permitted
230 Petrol Station	WJ King (Garages) Ltd	40 Artillery Place, Woolwich	SE184AE	Permitted
231 Petrol Station	J Sainsbury plc	Bugsby Way, Charlton	SE10	Permitted
232 Petrol Station	Crown Woods S/stn	Bexley Road	SE9 2NL	Permitted
301 Dry Cleaners	The Village Dry Cleaners	135 Lee Road	SE3 9DS	Permitted
302 Dry Cleaners	Panache Dry Cleaners	192 Court Road, Eltham	SE9 4EW	Permitted
303 Dry Cleaners	Westmount Dry Cleaners	146 Westmount Road, Eltham	SE9 1XA	Permitted
304 Dry Cleaners	Greenwich Dry Cleaners	25 Woolwich Road, Greenwich	SE10 0RA	Permitted
305 Dry Cleaners	Taylor's Cleaners	68 Herbert Road, Plumstead	SE18 3SH	Permitted
306 Dry Cleaners	Westcombe Dry Cleaners	74 Westcombe Hill	SE3 7DY	Permitted
307 Dry Cleaners	Morrisons Supermarket	2 Twin Tumps Way	SE28 8RD	Permitted
308 Dry Cleaners	Cleantech Dry Cleaners	213 Eltham High Street	SE9 1TX	Permitted
309 Dry Cleaners	Elegance Dry Cleaners	172 Westcombe Hill	SE3 7DH	Permitted
310 Dry Cleaners	Collins Cleaners	3 Stratheden Parade	SE3 7SX	Permitted
311 Dry Cleaners	Well Hall Express	18 Well Hall Parade, Eltham	SE9 6SP	Permitted
312 Dry Cleaners	Woolwich Express	59 Woolwich New Road	SE18 6ED	Permitted
313 Dry Cleaners	Cleaners of Eltham	10 Well hall Road, Eltham	SE9 6SF	Permitted
314 Dry Cleaners	Tailored Press	130 Plumstead Common Road	SE18	Permitted

315 Dry Cleaners	Soma Dry Cleaners	237 Greenwich High Road	2UL SE10 8NB	Permitted
316 Dry Cleaners	Collins Dry Cleaners	168 Trafalgar Road, Greenwich	SE10 9TZ	Permitted
318 Dry Cleaners	Spotless Dry Cleaners	168 Shooters Hill Road	SE3 8RP	Permitted
319 Dry Cleaners	Early Bird Dry Cleaners	139 Plumstead High Street	SE18 1SE	Permitted
320 Dry Cleaners	Sew Clean	252 Plumstead High Street	SE18 1JN	Permitted
321 Dry Cleaners	Rosam Dry Cleaners	173 Trafalgar Road	SE10 9TX	Permitted
322 Dry Cleaners	Unique Dry Cleaners	6 Frances Street, Woolwich	SE18 5EF	Permitted
323 Dry Cleaners	Court Yard Dry Cleaners	29 Court Yard, Eltham	SE9 5PR	Permitted
324 Dry Cleaners	Victory Dry Cleaners	196 Bexley Road	SE9 2PH	Permitted
325 Dry Cleaners	Asik Dry Cleaners	88 Plumstead High Street	SE18 1SL	Permitted
326 Dry Cleaners	Attrill's	413, Footscray Road	SE9 3UL	Permitted
327 Dry Cleaners	Village Dry Cleaners	1 The Village, Charlton	SE7 8UG	Permitted
328 Dry Cleaners	Royal Dry Cleaners	27 Lewisham Road	SE13 7QS	Permitted