

2015 Updating and Screening Assessment for Royal Borough of Greenwich

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

July 2015

Local Authority Officer	Chris Banks
Department	Environmental Health
Address	Royal Borough of Greenwich
Telephone	020 8854 8888
e-mail	Chris.banks@royalgreenwich.gov.uk
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Executive Summary

The Royal Borough of Greenwich Council is committed to improving air quality in the Borough. As such the Council is demonstrating its political leadership; taking action; leading by example; monitoring air quality; using the planning system; integrating air quality into the public health system; and informing the public. This 2015 Updating and Screening Assessment fulfils one further aspect of this ongoing commitment.

This 2015 Updating and Screening Assessment for Greenwich reviews and assesses air quality against the objectives in the Air Quality Regulations 2000 and amendment regulations. The air quality objectives to be assessed by local authorities are for the following seven pollutants: carbon monoxide, benzene, 1,3-butadiene, lead, nitrogen dioxide, sulphur dioxide and particles (PM₁₀).

The role of the Review and Assessment process is to identify any relevant areas in the Borough where it is considered that the government's air quality objectives for the above air pollutants will be exceeded. The Council has previously undertaken the earlier rounds of Review and Assessment of local air quality management and identified areas where some of the objectives are exceeded and where there is relevant public exposure.

This report concerns the sixth round Updating and Screening Assessment of air quality in the Royal Borough of Greenwich. For this, pollution sources have been re-examined and recent air quality monitoring checked in the Borough in accordance with Defra LAQM guidance.

The report identifies that:

For carbon monoxide, benzene, 1,3-butadiene, lead and sulphur dioxide there is not a significant risk of the objectives being exceeded in the Council's area.

For nitrogen dioxide and particles (specifically PM₁₀) the Council has previously designated an AQMA across the Borough. The findings from this report indicate that the AQMA should be maintained.

In view of the findings from the report the Council will undertake the following actions:

1. Undertake consultation with the statutory and other consultees as required.
2. Maintain the existing monitoring programme.
3. Review the Air Quality Action Plan in pursuit of the AQS objectives.
4. Prepare for the submission of its next Air Quality report.
5. Respond to changes to the air quality regime following the DEFRA consultation in 2014
6. Respond to the GLA proposals for changing the London Local Air Quality Management Framework and the format of the Air Quality Action Plan
7. Respond to the proposed DEFRA consultation in September with regard to an updated submission to the European Commission by DEFRA at the end of the 2015

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I Introduction

I.1 Description of Local Authority Area

The Royal Borough of Greenwich lies to the south east of the centre of London within Inner London. The river Thames borders to the north with the London Boroughs of Tower Hamlets and Newham on the opposite bank, Lewisham to the west, Bexley to the east and Bromley to the south. The Royal Borough covers an area of about 5,000 hectares and includes the major district centres of Greenwich (a World Heritage site), Woolwich, Eltham, Charlton and Thamesmead. Royal Greenwich was also a host borough for the 2012 London Olympics. The estimated 2013 population was 264,000 (from the Office of National Statistics (ONS)).

The main sources of atmospheric pollutants are road transport, although there are important industrial sources to the north of the Royal Borough and close to its boundaries. The principal roads through the Royal Borough include the A102 (M), A2, the A20, the A205, A206 and A207. The southern portal of the Blackwall tunnel is also within the Royal Borough.

I.2 Purpose of Report

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

The objective of this Updating and Screening Assessment is to identify any matters that have changed which may lead to risk of an air quality objective being exceeded. A checklist approach and screening tools are used to identify significant new sources or changes and whether there is a need for a Detailed Assessment. The USA report should provide an

update of any outstanding information requested previously in Review and Assessment reports.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table I.1. This table shows the objectives in units of microgrammes per cubic metre $\mu\text{g m}^{-3}$ (milligrammes per cubic metre, mg m^{-3} for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table I.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g m}^{-3}$	Running annual mean	31.12.2003
	5.00 $\mu\text{g m}^{-3}$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu\text{g m}^{-3}$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg m^{-3}	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu\text{g m}^{-3}$	Annual mean	31.12.2004
	0.25 $\mu\text{g m}^{-3}$	Annual mean	31.12.2008
Nitrogen dioxide	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 (PM_{10}) (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	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

I.4 Summary of Previous Review and Assessments

The Royal Borough of Greenwich has previously completed all earlier stages of air quality review and assessment as required under the LAQM regime. As part of its earlier duties the Council completed a Detailed Assessment for nitrogen dioxide (NO₂) and particles (PM₁₀) in 2000. The aim of this was to determine with reasonable certainty whether or not there is a likelihood of the AQ objectives being achieved. The assumptions used were therefore in depth and the data used were quality assured to a high standard. This allowed the Council to have confidence in reaching a decision whether to declare an Air Quality Management Area or not. When carrying out its Detailed Assessment the Council applied its best estimates to all components used to produce the estimated future concentrations.

Modelled predictions confirmed that the annual mean NO₂ and PM₁₀ objectives were exceeded. These predictions highlighted that the objectives were exceeded in areas close to busy roads and junctions throughout the Borough. Relevant public exposure was identified in these areas and on the basis of the findings **the Council designated the whole Borough an Air Quality Management Area (AQMA) for the NO₂ and PM₁₀ in 2001.**

The Council's subsequent Updating and Screening Assessments and Progress reports were also completed and the findings remain in accordance with those of the earlier Detailed Assessment; this is despite improvements in air quality.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

The Borough undertakes extensive monitoring at the following fixed long-term sites. The automatic sites in operation during 2014 include:

- **Eltham (GR4)** - a suburban background site in the east of the Borough (this site has been operating since 1995) and is part of the government's AURN. (See http://www.londonair.org.uk/london/asp/publicdetails.asp?region=0&site=GR4&bulletin=hourly&la_id=11&bulletindate=26/03/2014&postcode=&MapType=Google&VenueCode=&zoom=11&lat=51.4744&lon=0.055573699999968085&Species=All&laEdge=Y&WhoBulletin=)
- **Trafalgar Road (GR5)** – roadside site located next to a leisure centre (this site started operating during 1996). (See http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GR5&Maptype=Google&mapview=All&la_id=11&zoom=11&lat=51.47963397740143&lon=0.023712610116266575&laEdge=Y&details=)
- **Blackheath Hill (GR7)** - a site located next to a block of flats close to Blackheath Hill (monitoring at this site commenced in 2002). The sample inlet is located 15m from the road. (See http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GR7&Maptype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.055573699999968085&laEdge=Y&details=)
- **Woolwich Flyover (GR8)** – a site located under the flyover of the A102 and next to a busy roundabout. The sample inlet is 3m high and in line with the façade of the nearest house. It is approximately 3m from the kerb. This site commenced operating in 2004. (See http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GR8&Maptype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.055573699999968085&laEdge=Y&details=)

- **Westhorne Avenue (GR9)** – a site located near to housing in the grounds of a community centre (monitoring at this site commenced in 2004). The sample inlet is approximately 12m from the kerb of the A205. (See http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GR9&Mapttype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.0555736999999968085&laEdge=Y&details=)
- **Burrage Grove (GN0)** – a roadside site located on the A206 in Thamesmead West. Monitoring started in 2004. The sample inlet is approximately 3m from the kerb. (See http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GN0&Mapttype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.0555736999999968085&laEdge=Y&details=)
- **Millennium Village (GN2)** – a background site (close to industry) towards the north of the Borough on the Greenwich Peninsula; monitoring commenced in 2004. (See http://www.londonair.org.uk/london/asp/publicdetails.asp?region=0&site=GN2&details=general&mapview=All&la_id=11&network=All&VenueCode=)
- **Plumstead High Street (GN3)** – a roadside site located, towards the northeast of the Royal Borough. Monitoring started in 2006. The site is adjacent to housing and the sample inlet is approximately 3m from the kerb. (See http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GN3&Mapttype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.0555736999999968085&laEdge=Y&details=general)
- **Falconwood (GB6)** - a roadside site on the A2 close to the Borough boundary (it is shared with the London Borough of Bexley and has been operating since 2000). The sample inlet is located 12m from the road. GB0 is also located at this site (it monitors PM10 using a FDMS analyser). (See http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GB6&Mapttype=Google&mapview=All&la_id=3&zoom=11&lat=51.4608&lon=0.142382999999999526&laEdge=Y&details=)
- **Fiveways, Sidcup Road (GN4)** - a roadside site on the A20 that started operating in late January 2011. The sample inlet is located 2m from the road. (See

http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GN4&Maptype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.055573699999968085&laEdge=Y&details=general)

- **Thamesmead (BX3)** – a suburban background site that opened in 1998, located at a school. $PM_{2.5}$ is currently the only monitored pollutant at this site. (See http://www.londonair.org.uk/london/asp/publicdetails.asp?region=0&site=BX3&details=general&mapview=All&la_id=11&network=All&VenueCode=)

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

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	Easting	Northing	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Eltham (GR4)	Suburban	543978	174655	NO ₂ PM ₁₀ PM _{2.5} SO ₂ (and O ₃)	Y	FDMS	Y (0)	N/A	N
Trafalgar Road (GR5)	Roadside	538960	177954	NO ₂ PM ₁₀	Y	TEOM	Y (0)	5	Y
Blackheath Hill (GR7)	Roadside	538141	176710	NO ₂ PM ₁₀	Y	FDMS	Y (0)	20	N
Woolwich Flyover (GR8)	Roadside	540200	178367	NO ₂ PM ₁₀ PM _{2.5} (and O ₃)	Y	TEOM	Y (0)	3	Y

Site Name	Site Type	Easting	Northing	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Westhorne Avenue (GR9)	Roadside	541879	175016	NO ₂ PM ₁₀ PM _{2.5} (and O ₃)	Y	FDMS	Y (0)	12	N
Burrage Grove (GN0) note - previously GR10	Roadside	544084	178881	NO ₂ PM ₁₀ PM _{2.5}	Y	FDMS	Y (1)	3	Y
Millennium Village (GN2) note - previously GR12	Background	540169	178999	NO ₂ PM ₁₀ PM _{2.5}	Y	FDMS	Y (0)	N/A	Y
Plumstead High St (GN3) note - previously GR13	Roadside	545560	178526	NO ₂ PM ₁₀ PM _{2.5} (and O ₃)	Y	FDMS	Y (0)	5	Y

Site Name	Site Type	Easting	Northing	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Falconwood (GB6)	Roadside	544997	175098	NO ₂ PM ₁₀ PM _{2.5} O ₃	Y	TEOM	Y (5)	12	Y
Fiveways Sidcup Rd (GN4)	Roadside	543582	172653	NO ₂ PM ₁₀	Y	FDMS	Y (5)	2	Y
Thamesmead (BX3)	Suburban	547323	181231	PM _{2.5}	Y	TEOM	Y (0)	N/A	N

2.1.2 Non-Automatic Monitoring Sites

The Royal Borough of Greenwich also undertakes an extensive Greenwich diffusion tube monitoring survey to supplement and extend its understanding of air quality. The survey site locations have remained broadly the same since 2000. During 2014, the diffusion tube network was at 42 locations, with seven of these being triplicate sites co-located with continuous monitoring stations.

The diffusion tubes were exposed as a part of the London Wide Environment Programme (LWEP). The locations of the diffusion tubes for 2014 are illustrated in Figure 2.1. Further details of the areas are given in Table 2.2 below.

The diffusion tubes were supplied and analysed by Gradko International Ltd, with a preparation method using 50% TEA in acetone. Gradko participates in the AIR NO₂ PT, which is an independent analytical proficiency-testing scheme, operated by LGC Standards and supported by the Health and Safety Laboratory (HSL). AIR PT is a new scheme, started in April 2014, which combines two long running PT schemes (LGC Standards STACKS PT scheme and the HSL WASP PT scheme). Gradko achieved a 100% “Satisfactory” in the laboratory performance testing rounds 121-124 for WASP and AIR NO₂ PT rounds AR001, 3, 4 and 6.

A major disadvantage of undertaking monitoring using diffusion tubes is that the method is less precise and accurate than continuous monitoring. The recommended methods to reduce 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 local bias adjustment factor (i.e. the LWEF factor) was derived to apply bias correction to the raw diffusion tube results. Triplicate tubes were co-located alongside seven Greenwich continuous NO₂ monitoring sites, plus other sites in the LWEF in 2014. The measurement data used from the continuous monitoring sites covered the same period of diffusion tube monitoring. Period mean NO₂ concentrations were calculated for each diffusion tube exposure period. Data capture statistics for the same periods were also determined.

The continuous monitoring data and raw triplicate tube concentrations were inputted into the Bias Adjustment Calculator tool to calculate bias adjustment factors. This was carried out for each of the above continuous monitoring sites. An average was taken to obtain the mean local bias adjustment factor.

Separate bias correction factors were obtained from the most recent default factor spreadsheet from Defra’s helpdesk (version 03/15) for comparison purposes. The 2014 tube precision was good for 8 of the 9 studies. These default factors were based on statistical analyses of reported data provided by other local authorities.

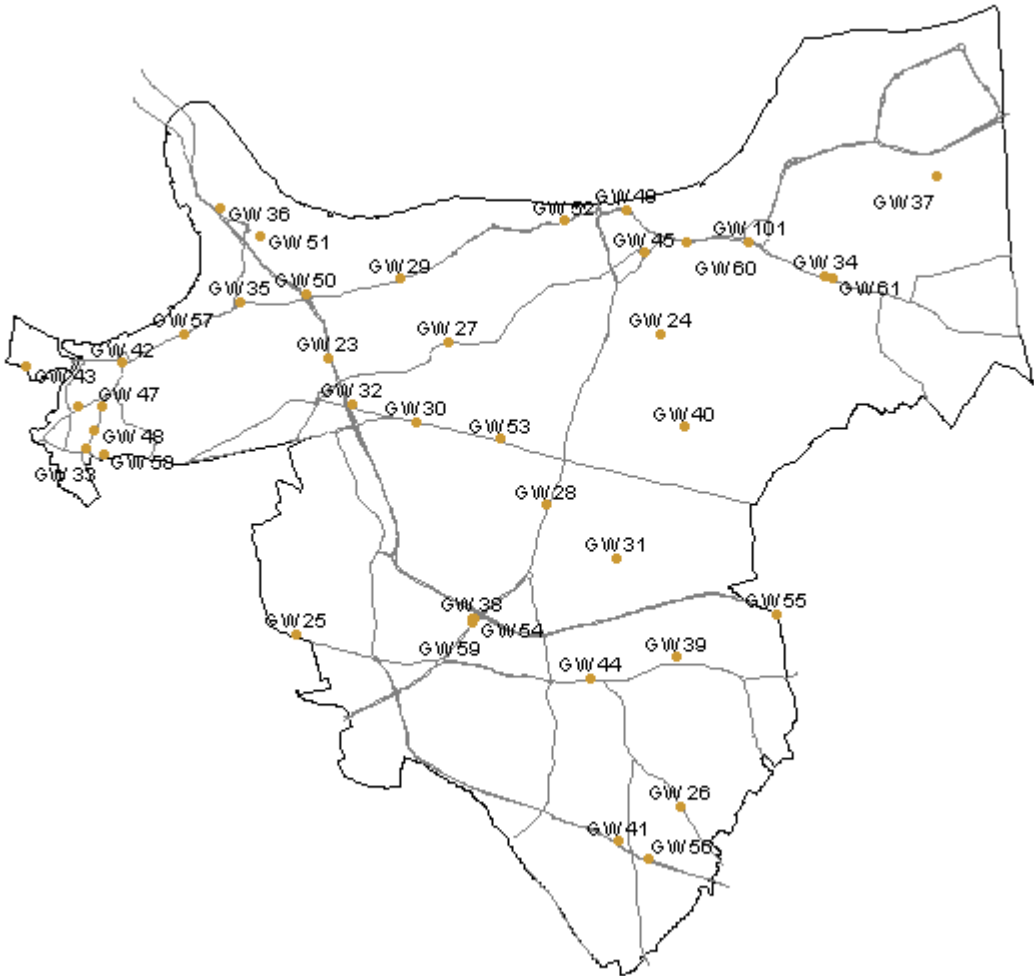
Year	Bias Default factor	LWEF Bias factor
2010	1.03 (16 studies)	1.06
2011	0.95 (25 studies)	1.02
2012	1.02 (21 studies)	1.04
2013	1.01 (20 studies)	0.96
2014	0.97 (9 studies)	0.95

There was reasonable agreement between the two sets of default factors, albeit with some variation between years. There are many potential reasons for these discrepancies. The local triplicate studies however indicated good precision.

The choice of bias factors is discussed in the TG09 guidance and this suggests that both precision and QA/QC procedures are important, although the final choice is down to the

local authority concerned. In line with previous Council air quality reports, the LWEP bias factors were used. The LWEP factor for 2014 indicates that the diffusion tube results slightly overestimate continuously monitored concentrations.

Figure 2.1 Map of Greenwich Diffusion Tube Sites



Site ID	Location	Site Type	Site ID	Location	Site Type
GW23	Siebert Rd	Roadside	GW44	Eltham High St	Roadside
GW24	Plumstead Common Rd	Roadside	GW48	Greenwich South St	Roadside
GW25	Eltham Rd	Roadside	GW49	Woolwich High St	Roadside
GW26	Foots Cray Rd	Roadside	GW50	Woolwich Flyover	Roadside

GW27	Charlton Village	Roadside	GW51	Bugsbys Way	Roadside
GW28	Dunblane Rd	Roadside	GW52	Woolwich High St	Roadside
GW29	Woolwich Rd Charlton	Roadside	GW53	Shooters Hill Rd	Roadside
GW30	Indus Rd	Roadside	GW54	Westhorne Av	Roadside
GW31	Deansfield School	Roadside	GW55	Crowns Wood Way	Roadside
GW32	Banchory Rd	Roadside	GW56	Sidcup Rd	Roadside
GW33	Blackheath Hill	Roadside	GW57	Trafalgar Rd	Roadside
GW34	Bannockburn School	Roadside	GW58	Blackheath Hill	Roadside
GW35	Woolwich Rd Greenwich	Roadside	GW59	Westhorne Av	Roadside
GW36	Boord St	Roadside	GW60	Burrage Grove	Roadside
GW37	De Lucy School	Background	GW61	Millennium Village	Intermediate
GW38	Westhorne Av	Intermediate	GW101	Plumstead Rd	Roadside
GW39	Bexley Rd ECC	Intermediate	GW102	Plumstead Rd	Roadside
GW40	Shrewsbury House	Background	GW103	Wricklemarsh Rd	Roadside
GW41	Sidcup Rd	Roadside	GW104	Sun Lane	Roadside
GW42	Greenwich Church St	Roadside	GW105	Cliftons Roundabout	Roadside
GW43	Creek Rd	Roadside	GW106	Ground Depot Rd	Roadside

Table 2.2 Details of Non-Automatic Monitoring Sites

Ref (Tube no.)	Address	Easting	Northing	Location	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
GW23 (1)	Siebert Rd	540420	177706	Roadside	Y	17.2	Y
GW24 (2)	Plumstead Common Rd	543806	177951	Roadside	Y	3.0	Y
GW25 (3)	Eltham Rd	540099	174881	Roadside	Y	3.0	Y
GW26 (4)	Foots Cray Rd	544015	173139	Roadside	Y	0.5	Y
GW27 (5)	Charlton Village	541645	177874	Roadside	Y	0.5	Y
GW28 (58)	Dunblane Rd	542656	176207	Roadside	Y	7.5	Y
GW29 (6)	Woolwich Rd Charlton	541167	178512	Roadside	Y	1.5	Y
GW30 (53)	Indus Rd	541372	177070	Roadside	Y	5.0	Y
GW31 (57)	Deansfield School	543383	175664	Roadside	Y	3.0	Y
GW32 (7)	Banchory Rd	540664	177235	Roadside	Y	17.1	Y
GW33 (8)	Blackheath Hill	537971	176776	Roadside	Y	1.5	Y
GW34 (9)	Bannockburn School	545490	178543	Roadside	Y	3.0	Y
GW35 (10)	Woolwich Rd Greenwich	539527	178281	Roadside	Y	1.5	Y
GW36 (11)	Boord St	539320	179234	Roadside	Y	30.0	Y
GW37 (12)	De Lucy School	546630	179557	Background	Y	215.0	N
GW38 (13)	Westhorne Avenue	541885	175045	Background	Y	30.0	N
GW39 (14,15,16)	Bexley Rd ECC (Triplicate co-located site)	543986	174660	Background	Y	65.0	N
GW40 (17)	Shrewsbury House	544065	176996	Background	Y	575.0	N

GW41 (18)	Sidcup Rd	543391	172765	Roadside	Y	3.0	Y
GW42 (19)	Greenwich Church St	538317	177652	Roadside	Y	2.0	Y
GW43 (20)	Creek Rd	537353	177632	Roadside	Y	2.0	Y
GW44 (21)	Eltham High St	543096	174439	Roadside	Y	3.6	Y
GW48 (23)	Greenwich South St	538044	176960	Roadside	Y	2.5	Y
GW49 (24)	Woolwich High St	543472	179217	Roadside	Y	1.0	Y
GW50 (25,26,27)	Woolwich Flyover (Triplicate co-located site)	540203	178367	Roadside	Y	3.5	Y
GW51 (28)	Bugsbys Way	539638	179024	Roadside	Y	2.0	Y
GW52 (29)	Woolwich High St	542842	179108	Roadside	Y	1.5	Y
GW53 (30)	Shooters Hill Rd	542181	176878	Roadside	Y	1.5	Y
GW54 (31)	Westhorne Av	541915	175039	Roadside	Y	2.5	Y
GW55(32,33,34)	Crown Woods Way (Triplicate site)	545005	175097	Roadside	Y	1.5	Y
GW56 (35)	Sidcup Rd	543679	172598	Roadside	Y	1.5	Y
GW57 (36,37,38)	Trafalgar Rd (Triplicate co-located site)	538968	177955	Roadside	Y	7.0	Y
GW58 (39,40,41)	Blackheath Hill (Triplicate co-located site)	538143	176712	Roadside	Y	4.0	Y
GW59 (42,43,44)	Westhorne Av (Triplicate co-located site)	541883	175016	Roadside	Y	13.0	Y
GW60 (45,46,47)	Burrage Grove (Triplicate co-located site)	544086	178882	Roadside	Y	16.9	Y
GW61 (50,51,52)	Millennium Village (Triplicate co-located site)	540175	179000	Background	Y	n/a	N
GW101 (48)	Plumstead Rd	544727	178884	Roadside	Y	1.0	Y
GW102 (49)	Plumstead Rd	544075	178898	Roadside	Y	1.0	Y
GW103 (54)	Wricklemarsh Rd	540935	176575	Roadside	Y	9.0	Y
GW104 (55)	Sun Lane	540743	177072	Roadside	Y	12.5	Y
GW105 (56)	Cliftons Roundabout	541143	174294	Roadside	Y	5.0	Y
GW106 (22)	Grand Depot Rd	543505	178576	Roadside	Y	1.0	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

The monitoring reported below represents the 2014 continuous results along with recent years' monitoring from 2010. The results are reported in accordance with the requirements of TG09. Further details of the automatic sites, including site maps and photographs can also be found on the King's London Air Quality Network website (See <http://www.londonair.org.uk/london/asp/lahome.asp>).

2.2.1 Nitrogen Dioxide

The results for nitrogen dioxide are reported separately for the Council's automatic sites and diffusion tube network. The automatic results are directly compared to the annual mean and hourly mean objectives, whereas the diffusion tube results are compared to the annual mean objective and also to an annual mean of $60 \mu\text{g m}^{-3}$, which is used to represent an indicative value for the hourly mean objective. This is line with TG09 guidance.

Automatic Monitoring Data

The following tables (Tables 2.3 and 2.4) provide results for the period from 2010 to 2014 inclusive for the annual mean and hourly mean objectives. The data are fully ratified for all years, other than 2014, which still includes some provisional data. The sites locations are typical of public exposure in much of the Borough. However it is the roadside areas within the Borough that have the highest concentrations.

Data capture for 2014 at the sites was good (with an overall average of 91.1%). Only one site the GR4 site of Eltham had a reduced data capture of 65%. For previous years the data capture at all sites was also mostly good, as reported previously (see earlier Council reports).

The suburban Eltham (GR4) background site, located in parkland, met the AQS annual mean objective of $40 \mu\text{g m}^{-3}$ for 2014, with an (annually) adjusted concentration of $20.5 \mu\text{g m}^{-3}$; this

adjusted concentration was very slightly lower than previous years at this site. The other background site in the Borough (i.e. the site at Millennium Village (GN2) on the Greenwich Peninsula) also met the objective for all years when monitoring was undertaken, recording concentrations in 2014 that were border line with the objective, at $36 \mu\text{g m}^{-3}$. This site is located closer to industry, the Blackwall Tunnel Approach road (A102M) and also central London.

The GN3 roadside site in Plumstead High Street also met the objective and it too was border line with the objective for 2014. This site has exceeded the objective during the previous years reported.

Annual means at two roadside sites; GR5 at Trafalgar Road and GN0 at Burrage Grove, met the objectives in 2014 with concentrations of $38 \mu\text{g m}^{-3}$. These two sites both exceeded the objectives for all previous years reported.

There were very high concentrations recorded at the GR8 site by the Woolwich Flyover, easily exceeding the objective ($75 \mu\text{g m}^{-3}$). High concentrations were also recorded for all previous years at this site. The monitoring site is close to the roundabout under the flyover and nearest residential façade is located at a similar distance back from the kerb; thus this concentration is considered representative of relevant exposure, indicating the highly polluted nature of this site, caused by congested and slow moving vehicles thought to be from other parts of the South East heading for Central London on the TfL road network.

The sites at Blackheath Hill (GR7), Westthorne Avenue (GR9), Falconwood (GB6) and Fiveways (GN4) also exceeded the objective for all years reported, monitoring annual mean concentrations in 2014 that ranged between 43 and $53 \mu\text{g m}^{-3}$. Concentrations at all of these sites were mostly lower in 2014 compared to 2013. The facades of the nearest receptors to the GR7 and GR9 sites are close to the monitoring sites and thus the measured concentrations represent relevant public exposure, also caused by congested and slow moving vehicles. They are thought to mainly arise from parts of the South East, beyond the Royal Borough of Greenwich, as they head for Central London on the TfL road network.

The GB6 Falconwood and GN4 Fiveways Sidcup Road sites are both located closer to the roadside. The estimated concentration at the nearest façades using the NO_2 with distance

calculator (provided by Defra) at GB6 and GN4 is 41.6 and 43.5 $\mu\text{g m}^{-3}$ respectively; this indicates that the nearest facades at both sites exceed the objective. (Note - the GR4 site was used to represent background concentrations).

Table 2.4 provides a comparison with the AQS hourly mean objective, which requires that the number of periods that exceed a one-hour mean of 200 $\mu\text{g m}^{-3}$ does not arise more than 18 times over a calendar year. These episodic periods arise during meteorological conditions that are conducive e.g. such as settled conditions in the wintertime when there is reduced dispersion from local sources.

The 2014 results show that none of the sites exceeded the hourly mean objective except the GR8 roadside site at the Woolwich Flyover with 26 days of exceedance. This site had already exceeded the objective in 2012 and 2010.

The sites at GR5 Trafalgar Road, GR9 Westhorne Avenue, GB6 Falconwood and GN4 Fiveways all recorded periods that exceeded the hourly standard on at least one occasion during 2014. There were no exceedances of the standard at Trafalgar Road in the previous four years.

To understand changes in NO_2 concentrations it is necessary to also consider concentrations of NO_x , which is the primary precursor pollutant of NO_2 . For NO_x , concentrations have fallen across London generally and more specifically fallen fastest at roadside sites, although this rate of decline has decreased in recent years. This overall decrease in NO_x concentrations reflects the abatement of vehicle emissions; however, the recent trend showing the stability of concentration levels across London gives rise to concern regarding control of NO_2 . These measurements confirm that NO_x and NO_2 concentrations are not responding as expected to the projected decreases in vehicle emissions (KCL, 2012). See Figure 2.2 for the trends at the Greenwich sites.

Table 2.3 Results of Automatic Monitoring of Nitrogen Dioxide: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQM A?	Valid Data Capture for period of monitoring %	Valid Data Capture 2014 % ^a	Annual Mean Concentration $\mu\text{g m}^{-3}$				
					2010	2011	2012	2013	2014 ^b
GR4 Eltham	Suburban	Y	N/a	65	24	23	22	21	20 (20.5)
GR5 Trafalgar Rd	Roadside	Y	N/a	98	47	42	44	41	38
GR7 Blackheath Hill	Roadside	Y	N/a	97	43	48	48	48	44
GR8 Woolwich Flyover	Roadside	Y	N/a	98	73	67	71	64	75
GR9 Westthorne Av	Roadside	Y	N/a	96	46	43	44	46	43
GN0 Burrage Grove	Roadside	Y	N/a	99	53	43	45	45	38
GN2 Millennium Village	Background	Y	N/a	80	36	33	37	38	36
GN3 Plumstead High St	Roadside	Y	N/a	89	42	42	39	37	37
GB6 Falconwood	Roadside	Y	N/a	92	51	42	47	51	45
GN4 Fiveways	Roadside	Y	N/a	97	-	47	52	58	53

^a Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

^b Means “annualised” as in Box 3.2 of TG(09), where monitoring not carried out for the full year.

Figure 2.2 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at the Greenwich Automatic Monitoring Sites (2003 - 2014)

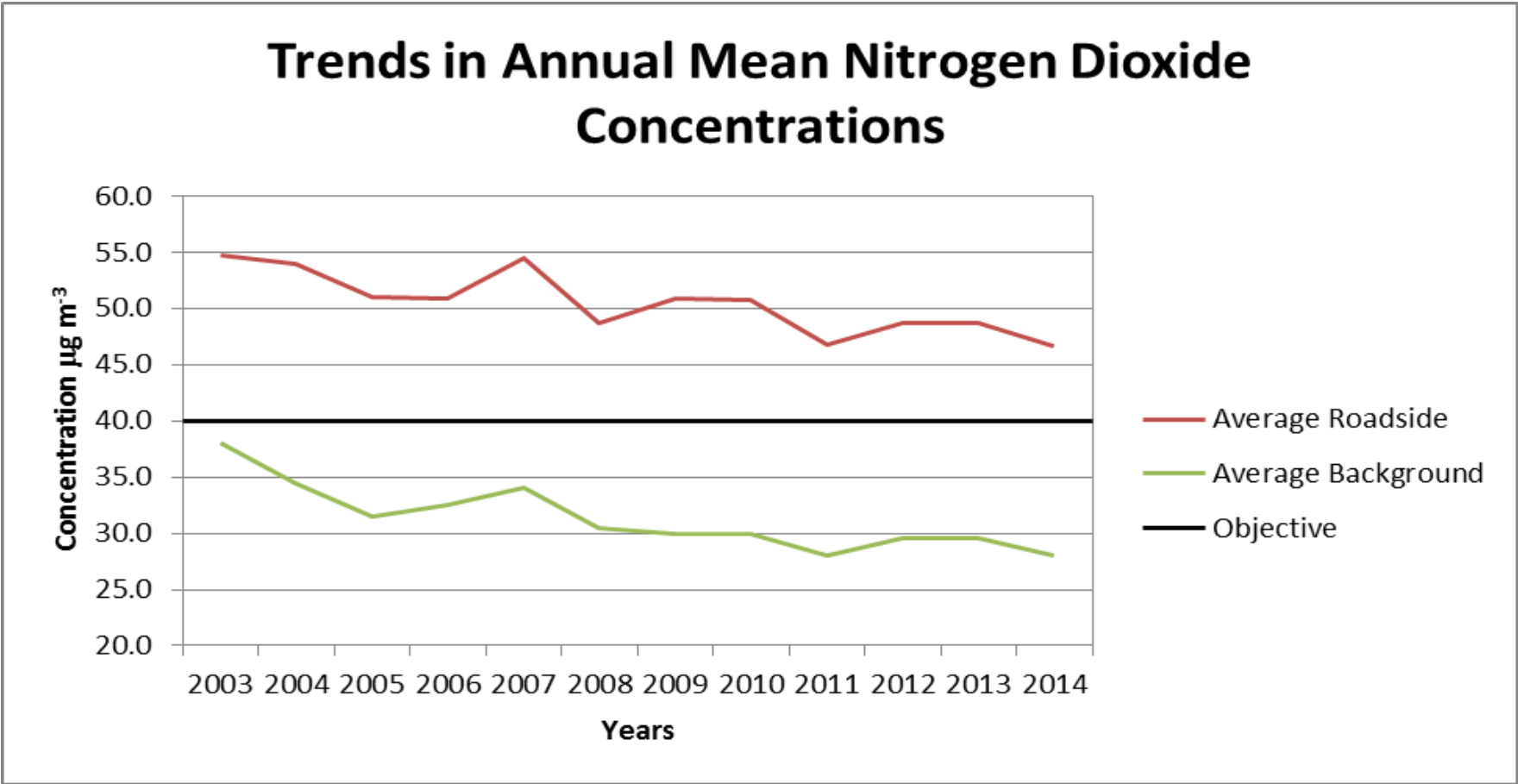


Table 2.4 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective

Site ID	Site Type	Within AQM A?	Valid Data Capture for period of monitoring %	Valid Data Capture 2014 % ^a	Number of Exceedences of Hourly Mean (200 µg m ⁻³)				
					2010	2011	2012	2013	2014 ^b
GR4 Eltham	Suburban	Y	N/a	65	4	0	0	0	0 (86.1)
GR5 Trafalgar Rd	Roadside	Y	N/a	98	0	0	0	0	5
GR7 Blackheath Hill	Roadside	Y	N/a	97	0	1	0	1	0
GR8 Woolwich Flyover	Roadside	Y	N/a	98	38	6	27	8	26
GR9 Westthorne Av	Roadside	Y	N/a	96	0	0	0	4	1
GN0 Burrage Grove	Roadside	Y	N/a	99	1	1	1	0	0
GN2 Millennium Village	Background	Y	N/a	80	0	0	2	2	0 (151.5)
GN3 Plumstead High St	Roadside	Y	N/a	89	1	0	0	0	0 (120.7)
GB6 Falconwood	Roadside	Y	N/a	92	5	7	21	11	10
GN4 Fiveways	Roadside	Y	N/a	97	-	0	1	7	2

^a Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

^b Where period of valid data is less than 90%, the 99.8th percentile of hourly means is included in brackets.

Diffusion Tube Monitoring Data

The monitoring results given in Table 2.5 are the bias adjusted results. The annual mean concentrations that exceeded the $40 \mu\text{g m}^{-3}$ annual mean NO_2 objective are highlighted in bold. Those results that exceeded $60 \mu\text{g m}^{-3}$ are underlined; these sites indicate that the hourly objective was potentially exceeded. Annual adjustments have been made to those sites with less than 9 months data capture (i.e. GW25 and GW37).

The results are derived from the 2014 LWEP report. Overall data capture rates for all of the diffusion tube monitoring sites during 2014 was very good (96%). Only three sites had 75% or less data capture (GW25, GW30 and GW37) and these were annualised using factors derived from background sites in nearby Bexley and Barking and Dagenham. The factors were 0.996, 1.1266 and 0.9933 respectively.

Three sites were located at suburban background locations (GW37, GW39 and GW40), and the results for all of these easily met the objective, with concentrations less than $27 \mu\text{g m}^{-3}$.

Seven roadside sites, plus two background sites also measured concentrations that met the objective, although five of these were borderline, i.e. greater than $36 \mu\text{g m}^{-3}$.

The majority of roadside sites however exceeded the objective. Of the thirty sites that exceeded, seventeen roadside sites exceeded $50 \mu\text{g m}^{-3}$, with five of these between 60 and $70 \mu\text{g m}^{-3}$ and two others that exceeded $70 \mu\text{g m}^{-3}$. Based on the Defra LAQM guidance all of these sites (GW29, GW33, GW35, GW36, GW50, GW101 and GW102) potentially may exceed the hourly objective. The sites exceeding $70 \mu\text{g m}^{-3}$ were the co-located site at the Woolwich Flyover (GW50) and the site on Plumstead Road (GW101).

The mean concentration for all the sites that exceeded the objective was $53.1 \mu\text{g m}^{-3}$. All of these roadside sites either represent or are very close to locations with relevant exposure for the annual mean objective.

The results for the period 2010 to 2014 inclusive are shown in Table 2.6. In previous years the number of sites exceeding the objective was 30 in 2013, 33 in 2012, 26 in 2011, 29 in 2010 and 28 in 2009 (excluding co-located sites). The mean concentrations for these years were: $54 \mu\text{g m}^{-3}$ (in 2009); $56 \mu\text{g m}^{-3}$ (in 2010); $54 \mu\text{g m}^{-3}$ (in 2011), $55 \mu\text{g m}^{-3}$ (in 2012) and 53.9 (in 2013). The results for 2014: 30 sites exceeding, with a mean of 53.1 are little changed from previous years.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.95)
								2014 ($\mu\text{g m}^{-3}$)
GW23	Siebert Rd	Roadside	Y	-	11	N/a	N	42.7
GW24	Plumstead Common Rd	Roadside	Y	-	12	N/a	N	54.8
GW25	Eltham Rd	Roadside	Y	-	8	Y	N	45.1*
GW26	Foots Cray Rd	Roadside	Y	-	12	N/a	N	31.2
GW27	Charlton Village	Roadside	Y	-	12	N/a	N	43.7
GW28	Dunblane Rd	Roadside	Y	-	12	N/a	N	36.9
GW29	Woolwich Rd Charlton	Roadside	Y	-	12	N/a	N	61.8
GW30	Indus Rd	Roadside	Y	-	9	N/a	N	38.0*
GW31	Deansfield School	Roadside	Y	-	12	N/a	N	37.5
GW32	Banchory Rd	Roadside	Y	-	12	N/a	N	51.9
GW33	Blackheath Hill	Roadside	Y	-	12	N/a	N	63.4
GW34	Bannockburn School	Roadside	Y	-	11	N/a	N	44.0
GW35	Woolwich Rd Greenwich	Roadside	Y	-	11	N/a	N	69.4
GW36	Boord St	Roadside	Y	-	12	N/a	N	60.1
GW37	De Lucy School	Background	Y	-	8	Y	N	26.6*
GW38	Westhorne Av	Background	Y	-	12	N/a	N	35.9

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.95)
								2014 ($\mu\text{g m}^{-3}$)
GW39	Bexley Rd ECC	Background	Y	Triplicate/ Co-located	12	N/a	N	20.0
GW40	Shrewsbury House	Background	Y	-	12	N/a	N	19.4
GW41	Sidcup Rd	Roadside	Y	-	12	N/a	Y	44.7
GW42	Greenwich Church St	Roadside	Y	-	12	N/a	N	52.8
GW43	Creek Rd	Roadside	Y	-	12	N/a	N	57.0
GW44	Eltham High St	Roadside	Y	-	12	N/a	N	50.7
GW48	Greenwich South St	Roadside	Y	-	11	N/a	Y	42.0
GW49	Woolwich High St	Roadside	Y	-	12	N/a	Y	44.6
GW50	Woolwich Flyover	Roadside	Y	Triplicate/ Co-located	12	N/a	N	73.9
GW51	Bugsbys Way	Roadside	Y	-	12	N/a	N	46.9
GW52	Woolwich High St	Roadside	Y	-	12	N/a	N	43.9
GW53	Shooters Hill Rd	Roadside	Y	-	12	N/a	N	37.0
GW54	Westhorne Av	Roadside	Y	-	12	N/a	N	56.4
GW55	Crowns Wood Way	Roadside	Y	Triplicate	12	N/a	N	57.6
GW56	Sidcup Rd	Roadside	Y	-	10	N/a	N	56.7

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2014 (Number of Months or %)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.95)
								2014 ($\mu\text{g m}^{-3}$)
GW57	Trafalgar Rd	Roadside	Y	Triplicate/ Co-located	12	N/a	N	36.4
GW58	Blackheath Hill	Roadside	Y	Triplicate/ Co-located	12	N/a	N	48.5
GW59	Westthorne Av	Roadside	Y	Triplicate/ Co-located	12	N/a	N	44.7
GW60	Burrage Grove	Roadside	Y	Triplicate/ Co-located	12	N/a	N	32.7
GW61	Millennium Village	Background	Y	Triplicate/ Co-located	12	N/a	N	35.2
GW101	Plumstead Rd	Roadside	Y	-	12	N/a	N	81.8
GW102	Plumstead Rd	Roadside	Y	-	12	N/a	N	67.1
GW103	Wricklemarsh Rd	Roadside	Y	-	12	N/a	N	47.3
GW104	Sun Lane	Roadside	Y	-	12	N/a	N	52.0
GW105	Cliftons Roundabout	Roadside	Y	-	12	N/a	N	55.7
GW106	Ground Depot Rd	Roadside	Y	-	10	N/a	N	45.4

* Adjusted annual mean (see Box 3.2 of TG(09))

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g m}^{-3}$				
			2010 (Bias Adjustment Factor = 1.06)	2011 (Bias Adjustment Factor = 1.02)	2012 (Bias Adjustment Factor = 1.04)	2013 (Bias Adjustment factor = 0.96)	2014 (Bias Adjustment Factor = 0.95)
GW23	Roadside	Y	48.6	39.4	42.2	46.0	42.7
GW24	Roadside	Y	58.3	53.1	54.9	58.3	54.8
GW25	Roadside	Y	55.5	48.0	47.1	48.9	45.2
GW26	Roadside	Y	37.5	32.5	31.6	32.2	31.2
GW27	Roadside	Y	53.8	46.1	51.1	49.8	43.7
GW28	Roadside	Y	40.8	37.8	39.7	36.4	36.9
GW29	Roadside	Y	70.7	65.0	66.6	65.2	61.8
GW30	Roadside	Y	41.7	37.9	52.0	39.3	38.3
GW31	Roadside	Y	35.1	34.5	37.9	37.9	37.5
GW32	Roadside	Y	50.9	47.8	50.1	48.5	51.9
GW33	Roadside	Y	67.1	59.2	64.1	62.7	63.4
GW34	Roadside	Y	52.1	48.2	48.3	45.1	44.0
GW35	Roadside	Y	73.8	71.5	73.2	72.3	69.4
GW36	Roadside	Y	46.0	52.6	54.5	55.2	60.1
GW37	Background	Y	26.5	28.9	24.6	22.7	23.6
GW38	Background	Y	38.6	36.2	37.6	37.0	35.9
GW39	Background	Y	25.4	23.1	23.8	22.0	20.0
GW40	Background	Y	25.4	22.6	25.4	21.3	19.4
GW41	Roadside	Y	47.2	48.5	47.8	43.3	44.7
GW42	Roadside	Y	59.8	56.0	52.5	53.1	52.8
GW43	Roadside	Y	61.6	62.3	66.8	60.4	57.0
GW44	Roadside	Y	70.5	48.4	50.4	55.6	50.7
GW48	Roadside	Y	49.2	47.4	47.6	45.6	42.0
GW49	Roadside	Y	46.3	43.7	48.5	43.4	44.6

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) $\mu\text{g m}^{-3}$				
			2010 (Bias Adjustment Factor = 1.06)	2011 (Bias Adjustment Factor = 1.02)	2012 (Bias Adjustment Factor = 1.04)	2013 (Bias Adjustment factor = 0.96)	2014 (Bias Adjustment Factor = 0.95)
GW50	Roadside	Y	72.6	75.5	75.9	67.5	73.9
GW51	Roadside	Y	47.1	41.9	49.3	43.3	46.9
GW52	Roadside	Y	54.4	48.5	45.7	44.9	43.9
GW53	Roadside	Y	44.9	43.3	41.8	34.2	37.0
GW54	Roadside	Y	61.2	60.8	63.6	57.5	56.4
GW55	Roadside	Y	58.8	53.2	58.1	60.8	57.6
GW56	Roadside	Y	64.2	53.5	56.2	56.1	56.7
GW57	Roadside	Y	46.7	43.1	41.9	39.7	36.4
GW58	Roadside	Y	52.3	50.7	48.5	49.4	48.5
GW59	Roadside	Y	54.8	44.3	44.6	43.9	44.7
GW60	Roadside	Y	46.4	41.3	39.0	38.0	32.7
GW61	Background	Y	41.0	40.7	40.0	39.1	35.2
GW101	Roadside	Y	79.8	85.3	78.8	79.5	81.8
GW102	Roadside	Y	68.5	65.3	70.2	66.2	67.1
GW103	Roadside	Y	45.8	47.7	52.8	46.3	47.3
GW104	Roadside	Y	50.4	55.2	58.5	50.5	52.0
GW105	Roadside	Y	72.4	51.0	55.7	53.9	55.7
GW106	Roadside	Y	45.0	43.8	41.9	47.5	45.4

2.2.2 PM_{10}

The TG09 guidance highlights that any PM_{10} monitoring undertaken must conform to criteria relating to the gravimetric European reference method or its approved equivalent. The Council uses gravimetric techniques, plus FDMS analysers, which were found to be equivalent.

TEOM instruments, which use a VCM (Volatile Correction Model) correction to meet the equivalence criteria, are also permitted. The VCM method is based on the assumption that the volatile component of PM_{10} lost during the heated sampling of PM with the standard TEOM is consistent across a defined geographical area. The model uses the FDMS purge measurement as an indicator of this volatile component. As FDMS instruments have met the equivalence criteria, the VCM correction is also considered equivalent to the European reference method.

The results for the Greenwich sites are reported below as **reference equivalent**, these represent either gravimetric or FDMS measurements (where no correction has been made) or TEOM measurements that were corrected using the VCM. The data are all fully ratified other than for 2014.

All of the Greenwich monitoring sites met the annual mean objective for the 2010 to 2014 period (as shown in Table 2.7). The highest annual mean concentrations monitored for 2014 were at the two roadside sites at the Woolwich Flyover (GR8) and Fiveways (GN4) where the results were both $29 \mu\text{g m}^{-3}$. All other sites recorded annual mean concentrations between 18 and $27 \mu\text{g m}^{-3}$.

The daily mean objective, which has been exceeded more widely across the UK than the annual mean objective, is reported in Table 2.8. The monitoring results for all roadside sites show that the daily mean objective of not more than 35 days with a mean 24-hour concentration greater than $50 \mu\text{g m}^{-3}$ was not exceeded in 2014.

The objective has been exceeded in earlier years at sites, including the Woolwich Flyover site (GR8), and Blackheath Hill sites (GR7). For 2013 these sites recorded 20 days or more that exceeded, as did the Millennium Village (GN2) site. The Westbourne Avenue site (GR9) site recorded slightly less than 20 days.

The other Greenwich sites also all had some periods when the daily standard of $50 \mu\text{g m}^{-3}$ was exceeded, although this was mostly 10 days or less.

For 2011 the sites had an increased number of days that exceeded compared to previous years. This was mainly as a result of the episodes that arose in the early part of the year and also during November. These peaks in PM_{10} concentrations occur during periods of stable conditions, specifically during winter when London sources can dominate concentrations, at other times high pressure systems can lead to imported transboundary PM_{10} from elsewhere in the UK and Europe.

The concentrations measured in Greenwich are considered typical of those measured elsewhere across London (KCL, 2012).

Table 2.7 Results of Automatic Monitoring of PM₁₀: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2014 % ^a	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration µg m ⁻³				
						2010	2011	2012	2013 ^b	2014 ^b
Eltham (GR4)	Suburban	Y	N/a	80	Y	23	23	20	20	18
Trafalgar Road (GR5)	Roadside	Y	N/a	97	Y	22	23	23	23	20
Blackheath Hill (GR7)	Roadside	Y	N/a	94	Y	28	32	28	30	27
Woolwich Flyover (GR8)	Roadside	Y	N/a	81	Y	33	35	33	32	29
Westthorne Avenue (GR9)	Roadside	Y	N/a	93	Y	22	23	20	24	25
Burrage Grove	Roadside	Y	N/a	70	Y	28	28	27	28 (30)	23 (23.1)

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2014 % ^a	Confirm Gravimetric Equivalent (Y or NA)	Annual Mean Concentration $\mu\text{g m}^{-3}$				
						2010	2011	2012	2013 ^b	2014 ^b
(GN0)										
Millennium Village (GN2)	Industrial background	Y	N/a	69	Y	22	25	23	26	26 (25.5)
Plumstead High St (GN3)	Roadside	Y	N/a	77	Y	20	22	21	20 (18)	23
Falconwood (GB0)	Roadside	Y	N/a	51	Y	27	27	26	30 (28)	25 (22.7)
Fiveways Sidcup Road (GN4)	Roadside	Y	N/a	95	Y	-	30	30	31 (33)	29

^a Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

^b Means “annualised” as in Box 3.2 of TG(09), if monitoring was not carried out for the full year.

Table 2.8 Results of Automatic Monitoring for PM₁₀: Comparison with 24-hour mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2014 % ^a	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 µg m ⁻³)				
						2010	2011	2012	2013 ^b	2014 ^b
Eltham (GR4)	Suburban	Y	N/a	80	Y	4	22	9	5	7 (28.12)
Trafalgar Road (GR5)	Roadside	Y	N/a	97		2	18	16	8	5
Blackheath Hill (GR7)	Roadside	Y	N/a	94		20	41	26	29	18
Woolwich Flyover (GR8)	Roadside	Y	N/a	81		33	42	33	26	17 (45.8)
Westhorne Avenue (GR9)	Roadside	Y	N/a	93		9	25	16	17	19
Burrage Grove	Roadside	Y	N/a	70		18	32	28	18 (50)	15 (37.3)

Site ID	Site Type	Within AQMA?	Valid Data Capture for monitoring Period %	Valid Data Capture 2014 % ^a	Confirm Gravimetric Equivalent	Number of Exceedences of 24-Hour Mean (50 µg m ⁻³)				
						2010	2011	2012	2013 ^b	2014 ^b
(GN0)										
Millennium Village (GN2)	Urban background	Y	N/a	69		9	25	20	20 (46)	16 (48.36)
Plumstead High St (GN3)	Roadside	Y	N/a	77		7	16	8	3 (34)	14 (38.24)
Falconwood (GB0)	Roadside	Y	N/a	51		16	25 (47)	27	28 (52)	13 (43.92)
Fiveways Sidcup Road (GN4)	Roadside	Y	N/a	95		-	26 (49)	24 (54)	31 (53)	25

^a Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

^c Where capture is less than 90%, include the 90th percentile of 24-hour means is in brackets

2.2.3 Sulphur Dioxide

Automatic monitoring of SO₂ is undertaken at the representative suburban background GR4 site in Eltham. The results for 2014 include some provisional data and are given in Table 2.9 below. The results show that there were 2 periods that exceeded the 15 minute standard, with no periods that exceeded the hourly or 24 hourly standards in the UK AQS objectives. The results for previous years (to 2007) (see earlier Greenwich reports) indicate no periods when these standards were exceeded. As a result the AQS objectives were not exceeded at this site.

Table 2.9 Results of Automatic Monitoring of SO₂: Comparison with Annual Mean Objectives

Site ID	Site Type	Within AQMA?	Valid Data Capture 2014 % ^a	Number of Exceedences (percentile in bracket µg m ⁻³)		
				15-minute Objective (266 µg m ⁻³)	1-hour Objective (350 µg m ⁻³)	24-hour Objective (125 µg m ⁻³)
GR4	Suburban	N	96	2	0	0

^a Data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%).

2.2.4 Other pollutants monitored

2.2.4.1 Ozone

The Council undertook the continuous measurement of ozone at its background site in Eltham (GR4), plus four roadside sites at Falconwood (GB6), Woolwich Flyover (GR8), Westhorpe Avenue (GR9) and Plumstead High Street (GN3). The results for the period 2010 – 2014 are given in Table 2.10. The data capture for all years exceeded 90%. The Government's air quality objective, not to exceed 10 periods where the daily maxima exceeds 100 µg m⁻³ in a calendar year, was only exceeded at the suburban background site in Eltham during the period reported; this was for two years, 2011 and 2012.

The LAQN index for ozone is based on an annual mean (which is derived from an average of selected sites dependant on type and availability of data). This has shown, since 1996 through

to the end of 2007, a 37% increase in levels (ERG, 2009). Thus this indicates that concentrations of ozone have increased across London.

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 led to an increase in ozone concentrations. This can be partially seen by the number of periods shown at the roadside sites since 2011 e.g. at the roadside site at Falconwood (GB6). With diminishing NO_x concentrations, it is likely that future ozone concentrations in London will more closely resemble those in surrounding rural areas. 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 continue to provide an understanding of oxidation close to polluted areas and also future changes over time.

Table 2.10 Number of daily maxima of ozone exceeding 100 µg m⁻³ based on 8-hour running mean (2010-2014)

Objective	2010	2011	2012	2013	2014
GR4	7	15	10	6	4
GB6	0	6	6	3	0
GR8	0	1	4	0	0
GR9	0	3	5	2	1
GN3	0	1	1	0	0

(Note - bold exceeds the objective)

2.2.4.2 PM 2.5

The Council undertook the continuous measurement of PM_{2.5} at seven of its sites in 2014 using FDMS instruments. Measurements were also undertaken at the BX3 suburban site in Thamesmead. This site however used a TEOM instrument.

The unadjusted annual mean results for the monitoring sites are given in Table 2.11.

Data capture was good for most sites in 2014 except for the GR4 (68%), GN0 (71%), GB0 (71%). The unadjusted annual mean results for the monitoring sites are given in Table 2.11.

Table 2.11 PM_{2.5} annual mean results ($\mu\text{g m}^{-3}$) (2010 - 2014)

Objective	2010	2011	2012	2013	2014
GR4	16.6	16.1	13.3	15.2	<i>11.5</i>
GR8	16.4	17.2	15.4	14.9	14.6
GR9	17.1	17	15.8	17.2	15.8
GN0	19.7	24.5	18.1	17.5	<i>17.1</i>
GN2	16.4	19.1	15.2	15.4	<i>15.5</i>
GN3	15.1	18.7	19.1	15.3	16.3
GB0	18.2	17.8	18.6	16.4	<i>14.4</i>
BX3	9.4	9.8	9	9.5	N/a

(Note - italics indicates < 90% data capture)

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 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 FDMS and TEOM instruments. The results for the FDMS instruments meet the equivalence criteria (as for PM_{10}). However the $\text{PM}_{2.5}$ data for the TEOM instrument is reported without adjustment to a gravimetric equivalent. The measurement results for all years and sites indicated that the backstop objective was not exceeded, although it was approached in 2011 at the GN0 site.

2.2.5 Summary of Compliance with AQS Objectives

The Royal Borough of Greenwich has examined the results from monitoring and recent modelled predictions across the Borough. Concentrations are currently above the objectives for annual mean nitrogen dioxide, and in recent years for daily mean PM_{10} within the designated Borough wide AQMA. As a result of these findings there is no need to proceed to a Detailed Assessment based on monitoring.

Concentrations of the other LAQM pollutant monitored i.e. sulphur dioxide are all below the relevant objectives; therefore there is no need to proceed to a Detailed Assessment for these pollutants.

$\text{PM}_{2.5}$ and ozone are not LAQM pollutants and are reported for information purposes.

3 Road Traffic Sources

The focus of attention for road traffic sources is on those relevant locations close to busy roads, especially in congested areas and near to junctions, where traffic emissions are higher, and in built up areas where the road is canyon like and buildings restrict the dispersion and dilution of pollutants. Only those locations, which have not been assessed during the earlier rounds or where there has been a change or new development, are assessed.

The 2010 London Atmospheric Emissions Inventory (LAEI) has been used to identify changed flows and as reported earlier the Council previously designated the whole of the Borough as an AQMA.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Concentrations are often higher where traffic is slow moving, with stop/start driving, and where buildings on either side reduce dispersion. Screening models so far have not proved helpful at identifying potential exceedences, which have only been identified by monitoring. This assessment is for NO₂ only.

Previous Review and Assessments undertaken by the Council investigated the presence of narrow roads with residential properties close to the kerb. The TG09 guidance requires the identification of residential properties within 2m of the kerb. The roads previously identified are all within the Council's AQMA and this situation has not changed.

The Royal Borough of Greenwich confirms that there are no new/newly identified congested streets with a flow above 5,000 vehicles per day and residential properties close to the kerb, that have not been adequately considered in previous rounds of Review and Assessment.

3.2 Busy Streets Where People May Spend 1-hour or More Close to Traffic

These include some street locations where individuals may regularly spend 1-hour or more, for example, streets with many shops and streets with outdoor cafes and bars, close to road traffic where there may be high concentrations of NO₂. (Note - those people that are occupationally exposed are not included, as they are not covered by the regulations). The assessment is for NO₂ only.

Busy streets where people may spend an hour or more close to traffic were examined in previous assessments. There has been no change to the previous findings since then and no new roads have been constructed with traffic flows greater than 10,000 vehicles per day in the Council's area.

The Royal Borough of Greenwich confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

3.3 Roads with a High Flow of Buses and/or HGVs.

These include street locations in the Borough where traffic flows are not necessarily high (i.e. fewer than 20,000 vehicles per day) but where there are an unusually high proportion of buses and/or HGVs. The assessment is for both NO₂ and PM₁₀ and is dependent on the proximity of relevant exposure within 10 m of the kerbside. The Council in earlier Review and Assessments identified those roads within the Borough with high flows of heavy-duty vehicles. No new roads relevant to this section have been identified in the Borough.

The Royal Borough of Greenwich confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

Air pollutant concentrations are usually higher close to junctions, due to the combined impact of traffic emissions on roads forming the junction, and to the higher emissions due to stop start driving. The assessment is for both NO₂ and PM₁₀ and is dependent on the proximity of relevant exposure within 10 m of the kerbside.

There is no change to the previously reported situation concerning junctions and no new or newly identified junctions with relevant exposure within 10 m.

The Royal Borough of Greenwich confirms that there are no new/newly identified busy junctions/busy roads.

3.5 New Roads Constructed or Proposed Since the Last Round of Review and Assessment

The approach to considering new roads depends on whether or not an assessment was carried out in advance of building the new road. The assessment is for both NO₂ and PM₁₀ and is dependent on the proximity of relevant exposure within 10 m of the kerbside.

There have been no new or proposed roads in the Borough where an air quality assessment was required.

The Royal Borough of Greenwich confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

Only roads with significantly changed traffic flows that have not already been considered above were investigated. The assessment is for both NO₂ and PM₁₀.

A comparison of traffic flows from the latest version of the London Atmospheric Emissions Inventory confirms that there are no new roads with significantly changed traffic flows.

The Royal Borough of Greenwich confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

This section only applies to bus stations or sections of bus stations that are not enclosed, and where there is relevant exposure, including at nearby residential properties. The assessment is for both the annual mean and the 1-hour NO₂ objectives. (Note - the term “bus” in this instance is used to signify both buses and coaches).

Bus stations in Greenwich were examined in previous USAs and found not to require further investigation. Based on the TG09 guidance if such sources were previously considered and are within an existing AQMA there is no need to proceed further.

The Royal Borough of Greenwich confirms that there are no relevant bus stations in its area.

4 Other Transport Sources

4.1 Airports

Aircraft are potentially significant sources of nitrogen oxides (NO_x) emissions, especially during takeoff. The TG09 guidance used new information, which has resulted in the criteria to trigger a Detailed Assessment being relaxed, while the requirement to assess PM₁₀ has been removed. Thus this section only applies to NO₂. (Note – any road traffic using airports was considered in the previous section.)

The nearest airport, London City Airport, is outside the Borough, on the north side of the Thames from Greenwich in Newham. It is thus sufficiently distant not to be relevant. Furthermore passenger numbers of around 3.7 million passengers in 2014 (Source: <http://www.londoncityairport.com/aboutandcorporate/page/passengerstatistics>) are below the threshold of 10 million passengers per annum as given in the TG09 guidance.

The Royal Borough of Greenwich confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

Stationary locomotives, both diesel and coal fired, can give rise to high levels of sulphur dioxide (SO₂) close to the point of emission. Recent evidence also suggests that moving diesel locomotives, in sufficient numbers, can also give rise to high NO₂ concentrations close to the track where, along busy lines, emissions can be equivalent to those from a busy road.

4.2.1 Stationary Trains

Previous rounds of Review and Assessment also found that there are no areas within the Borough where diesel or steam locomotives are stationary for periods of 15 minutes or

more and within 15 m of locations where regular outdoor exposure arises. This situation has not changed.

The Royal Borough of Greenwich confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

4.2.2 Moving Trains

Diesel locomotives use rail lines that run through Greenwich, however these are not included within the list of lines (from Table 5.1 of TG09), which identify those with a “high” usage of diesel locomotives.

The Royal Borough of Greenwich confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

4.3 Ports (Shipping)

The assessment for shipping needs to consider SO₂ only. The northern Borough boundary aligns the river Thames and although there are some ship movements in this area they are not sufficient to require further investigation based on the TG09 guidance.

The Royal Borough of Greenwich confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

The Council and the Environment Agency (EA) control industrial sources within the Borough under the Environmental Permitting Regulations (England and Wales) 2010, as amended. The Council also has control over some smaller industrial and commercial sources, largely through the Clean Air Act, with its associated control of the stack heights. As a result of these controls, there are relatively few sources that may be relevant under the Local Air Quality Management (LAQM) regime. Many of these sources were also addressed during previous rounds of Review and Assessment. The focus is thus on new installations and those with significantly changed emissions.

Industrial sources are considered unlikely to make a significant local contribution to annual mean concentrations, but could be significant in terms of the short-term objectives in the Borough. Sources in neighbouring authorities and the combined impact of several sources are considered. The approach used is based on use of the planning and permitting processes. The assessment considers all the LAQM pollutants, including those most at risk of requiring further work (SO₂, NO₂, PM₁₀ and benzene).

5.1.1 New or Proposed Installations for which an Air Quality Assessment has been Carried Out

A new combustion plant on the west side of the Greenwich Peninsula. It will use waste material to produce a clean combustible gas of similar composition to natural gas. The plant meets the 'end of waste' criteria set by the Environment Agency (EA) and is housed in an existing building, no planning consent was necessary for the construction of the plant. Following comments by the Council a report was submitted to the EA and Council; these showed that the impact of the plant will be negligible in air quality terms. The plant is due to start operating in summer 2015

The Royal Borough of Greenwich has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

5.1.2 Existing Installations where Emissions have Increased Substantially or New Relevant Exposure has been introduced

The lists of existing Part A and B processes that are regulated under the Environmental Permitting regime are provided in the Appendices. These are all processes with low emissions of LAQM pollutants. None of these have increased emissions by greater than 30% and no new relevant exposure has been introduced nearby.

The Royal Borough of Greenwich confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

5.1.3 New or Significantly Changed Installations with No Previous Air Quality Assessment

A new combustion plant on the west side of the Greenwich Peninsula. It will use waste material to produce a clean combustible gas of similar composition to natural gas. The plant meets the 'end of waste' criteria set by the Environment Agency (EA) and is housed in an existing building, no planning consent was necessary for the construction of the plant. Following comments by the Council a report was submitted to the EA and Council; these showed that the impact of the plant will be negligible in air quality terms. The plant is due to start operating in summer 2015.

No other applications have been received for new or proposed sources where it has been determined that the installation is likely to give rise significant pollutant emissions.

The Royal Borough of Greenwich confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

There is some evidence that major petrol fuel depots could emit sufficient benzene to put the 2010 objective at risk of being exceeded, especially if combined with higher levels from nearby busy roads.

There are no major fuel (petrol) storage depots within the Royal Borough of Greenwich area.

5.3 Petrol Stations

There is some evidence that petrol stations could emit sufficient benzene to put the 2010 objective at risk of being exceeded, especially if combined with higher levels from nearby busy roads. Some sites in the Borough have however already incorporated petrol vapour recovery (PVR) systems, furthermore those service stations with petrol sales above 3.5 million litres per annum were required to install Stage 2 PVR systems before the 1st January 2010 deadline to comply with UK legislation to reduce petrol vapour (and benzene) from vehicles.

The previous round of Review and Assessment assessed all petrol stations for a throughput of more than 2000 m³ of petrol, and a busy road nearby. Of these none were found to have relevant exposure within 10m of the pumps and therefore it was not necessary to go to a Detailed Assessment. There has been no change in this situation for this round.

The Royal Borough of Greenwich confirms that there are no petrol stations meeting the specified criteria.

5.4 Poultry Farms

Some local authorities in England have identified potential exceedances of the PM_{10} objectives associated with emissions from poultry farms (defined as chickens (laying hens and broilers), turkeys, ducks and guinea fowl). These relate to large farms (> 100,000 birds) that are regulated by the EA. None however exist within the Council's area.

The Royal Borough of Greenwich confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

Biomass burning can lead to an increase in PM₁₀ emissions, from the combustion process itself and also by aerosol formation from the volatile materials distilled from the wood. Compared to conventional gas burning, biomass burning can also result in an increase in NO_x emissions due to the fuel-derived portion that is not present in gas combustion.

The whole Borough however is a Smoke Control Area, meaning that the emission of smoke from chimneys of domestic premises and other buildings is not permitted. Furthermore furnaces, chimneys and industrial processes are monitored carefully and only authorised appliances (as listed under the Smoke Control Area Orders) can be used to burn solid fuels such as coal, coke and wood.

6.1 Biomass Combustion – Individual Installations

The use of biomass to generate energy has potentially significant benefits for the reduction of greenhouse gas emissions. However there are concerns that an increase in biomass combustion in urbanised areas could be detrimental to air quality, particularly with respect to PM₁₀ and NO₂. The TG09 guidance includes a procedure to determine the impact of biomass combustion plant to see if there is the potential for the air quality objectives to be exceeded.

Following this the Council has assessed for individual combustion plant burning biomass ranging from 20 MW down to 50 kW units and no new plant have been identified that have not previously been considered.

The Royal Borough of Greenwich confirms that there is no new biomass combustion plant in its area.

6.2 Biomass Combustion – Combined Impacts

As already outlined the Council is a Smoke Control Area and therefore any biomass burning using non-authorised appliances is considered minimal. There is however the potential that many small biomass combustion installations (including domestic solid-fuel burning), whilst individually acceptable, could in combination lead to unacceptably high PM₁₀ concentrations, particularly in areas where PM₁₀ concentrations are close to or above the objectives. The impact of domestic biomass combustion in most areas is thought to be small at the time of writing, but could become more important in future. The potential for combined impacts, other than that discussed above, will be assessed should future plant be proposed. Currently there is minimal domestic solid fuel burning as discussed in the next section.

The Royal Borough of Greenwich confirms that there is no new biomass combustion plant in its area.

6.3 Domestic Solid-Fuel Burning

The previous rounds of Review and Assessment identified areas where domestic solid fuel burning gives rise to exceedences of the objective for SO₂. PM₁₀ from domestic solid fuel burning was also covered above.

The whole of the Borough is designated a Smoke Control Area and there are no areas of significant domestic solid fuel use in the Borough. This position has not changed from the previous USA, which confirmed that no areas of significant domestic solid fuel burning were identified. Gas is widely available in the Borough and it remains the predominant fuel used for domestic water and space heating.

The Royal Borough of Greenwich confirms that there are no areas of significant domestic fuel use in its area.

7 Fugitive or Uncontrolled Sources

Dust emissions from uncontrolled and fugitive sources can give rise to elevated PM_{10} concentrations. These sources can include, but are not limited to the following sites: quarrying and mineral extraction sites, landfill sites, coal and material stockyards, or materials handling, major construction works and waste management sites. Dust can arise from the passage of vehicles over unpaved ground and along public roads that have been affected by dust and dirt tracked out from dusty sites. Other sources of dust are from the handling of dusty materials, the cutting of concrete, etc. and wind-blown dust from stockpiles and dusty surfaces.

There are numerous waste transfer stations and other waste facilities within the Royal Borough of Greenwich (see Appendices). These are permitted by the Environment Agency. Many of these are located close to the river Thames away from locations with relevant exposure. Based on recent air quality assessments, local professional knowledge and recent complaints to the Council no fugitive and uncontrolled particulate matter emissions that might result in relevant exposure have been identified.

The Royal Borough of Greenwich confirms that there are no additional potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

The 2014 monitoring results within the Borough confirmed that the annual mean nitrogen dioxide objective continues to be exceeded at roadside and nearby locations. The sites monitored are considered to represent relevant exposure. The results further indicate that the hourly objective is potentially exceeded however at some sites, although there is not considered to be relevant exposure at these sites for this objective. The daily mean PM10 objective has also been exceeded in recent years.

Based on these findings, the Council does not need to undertake a Detailed Assessment, as no new potential or actual exceedances at relevant locations were established. The Council previously designated the whole Borough as an Air Quality Management Area for NO₂ and PM₁₀.

8.2 Conclusions from Assessment of Sources

The Council has assessed local developments of road transport, other transport, industrial processes, commercial/domestic, fugitive emissions, plus residential and commercial sources. The findings for these have indicated that there are no new changes that require the Council to undertake a Detailed Assessment.

8.3 Proposed Actions

This report follows the technical guidance (TG09) and fulfils this part of the continuing LAQM process.

The findings from following this methodology are that the Council has not identified a need to amend air quality boundaries and thus need not proceed to a Detailed Assessment. The findings also indicate that the AQMA should be maintained.

The Council will therefore undertake the following actions:

1. Undertake consultation on the findings arising from this report with the statutory and other consultees as required.
2. Maintain the existing monitoring programme so far as reasonably practicable.
3. Continue with its Air Quality Action Plan in pursuit of the AQS objectives.
4. Prepare for the submission of its next Air Quality report.

9 References

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Royal Borough of Greenwich, 2014. 2014 Air Quality Progress Report for the Royal Borough of Greenwich.

Appendices

Appendix A: Results of non-automatic NO₂ monitoring (µg m⁻³)

Site	Class	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
GW23	R	44.79	31.68	48.22	48.83	34.8	48.56	52.86	31.35	59.53		56.74	36.95
GW24	R	48.65	37.81	66.06	64.44	52.5	71.6	71.39	51.57	75.65	44.79	58.29	50.23
GW25	R	48.36	43.44	53.81	51.63	43.73			42.14	52.99	44.94		
GW26	R	37.91	27.84	37.66	30.83	25.53	26.57	32.11	26.07	34.69	32.56	44.29	37.61
GW27	R	51.84	43.72	53.33	49.98	36.92	46.13	45.6	39.67	50.35	42.1	49.31	43.14
GW28	R	47.78	37.41	41.29	35.25	33.41	38.07	34.93	28.68	41.64	36.35	51.36	39.21
GW29	R	79.73	82.67	75.15	76.9	53.63	64.46	65.32	55.7	77.11	57.1	29.03	63.26
GW30	R			43.62	39.04	35.59	36.92	37	34.04	42.15	40.4	53.53	
GW31	R	39.24	33.75	44.75	41.19	35.78	36.7	36.59	31.18	49.02	36.69	49.67	39.2
GW32	R	64.68	50.34	59.35	55.15	42.91	47.54	52.72	46.7	52.14	54.18	70.22	59.08
GW33	R	61.95	53.91	74.69	71.05	61.99	78.9	74.34	57.04	81.18	60.98	71.38	52.43
GW34	R	55.44	40.17	48.89	52.75	38.47	44.92	42.22	41.32	50.01		52.9	43.63
GW35	R	81.55	74.12	72	82.35	61.25	78.83	72.72	63.76	81	65.98	69.76	
GW36	R	81.4	60.32	68.18	59.86	56.72	54.64	59.64	63.83	56.97	68.02	65.94	63.6
GW37	B	28.85	21.37	30.42	22.08	20.17	21.14			26.12			27.99
GW38	B	47.49	34.49	47.04	41.9	33.72	42.56	36.78	28.94	46.66	36.38	45.84	12.05
GW39	B	25.69	17.46	28.06	20.36	17.46	18.1	16.95	16.19	23.22	19.46	26.28	22.84
GW40	B	22.7	16.55	25.19	20.59	15.16	17.52	16.52	16.2	21.95	18.09	28.08	26.68
GW41	R	55.96	47	48.34	44.62	40.83	37.28	44.38	45.64	47.37	52.32	56.29	43.61
GW42	R	56.88	51.47	55.21	60.17	47.16	61.12	64.18	44.9	70.01	50.15	64.91	40.91

GW43	R	73.16	58.84	64.13	67.57	55.12	59.06	41.07	50.97	65.99	59.43	67.21	57.91
GW44	R	50.85	42.77	56.44	60.75	42.63	60.37	60.69	47.74	64.04	43.82	59	52.17
GW48	R	51.12	42.61	47.15	43.75	37.96	21.1	45.93		45.48	49.74	50.96	50.27
GW49	R	56.13	46.55	50.78	46.2	42.83	48.14	43.33	39.03	48.88	44.01	52.81	43.88
GW50	R	91.2	92.4	79.69	72.42	75.28	64.17	74.64	80.07	64.52	90.14	72.48	76.73
GW51	R	59.32	49.06	55.1	46.62	43.76	43.01	44.95	42.14	50.94	49.79	56.03	52.17
GW52	R	42.39	31.22	57.93	53.11	35.08	56.02	48.55	37.4	62.66	35.57	52.78	41.58
GW53	R	45.67	34.01	41.77	42.22	32.7	33.11	33.7	33.89	41.54	41.39	44.77	42.57
GW54	R	63.25	51.07	64.84	67.33	49.71	61.98	59.3	45.23	75.81	57.69	65.42	51.01
GW55	R	54.45	36.51	83.29	63.77	49.9	62.35	73.31	43.21	88.3	48.81	78.37	45.32
GW56	R	56.79	48.04			47.68	58.05	68.2	65.62	67.01	62.58	60.24	62.7
GW57	R	39.44	34.54	43.74	37.84	29.38	40.39	39.3	31.08	46.33	36.09	41.61	40.12
GW58	R	57.21	44.23	56.1	53.6	44.6	53.37	55.01	42.66	58.51	47.63	52.04	46.81
GW59	R	48.05	37.58	54.06	53.04	41.2	53.44	46.23	36.81	57.7	46.13	55.74	33.96
GW60	R	34.93	24.22	40.94	34.58	32.7	36.6	36.64	28.52	42.95	29.28	37.6	33.96
GW61	R	44.87	48.1	47.66	35.79	35.01	32.25	29.49	25.69	34.76	31.62	42.1	37.92
GW101	R	111.68	91.11	89.62	95.2	79.59	84.41	85.56	76.68	87.03	85.29	81.48	65.85
GW102	R	73.59	63.86	84.34	75.23	62.68	69.54	72.47	62.38	79.54	72.55	67.88	63.38
GW103	R	50.11	52.11	43.21	45.45	39.35	47.33	49.74	43.88	60.62	49.12	57.49	49.8
GW104	R	54.96	55.89	52.51	52.79	49.32	45.05	48.75	48.15	66.52	55.15	62.93	54.7
GW105	R	54.05	61.47	56.42	52.68	59.84	68.4	58.26	64.67	57.96	56.28	55.31	58.6
GW106	R			54.15	50.54	40.81	50.19	49.44	40.32	52.86	42.41	51.82	45.3

Appendix B: Permitted installations

Part A installations in Royal Greenwich

Ref	Reg. Category	Name	Address	Postcode
YP3830LF	Combustion Processes	EDF Powerlink Ltd	Greenwich Generating Station, Old Woolwich Road,	SE10 9NY
WP3930UD	The disposal of waste oils (other than by incineration or landfill) in a facility with a capacity of more than 10 tonnes per day	Associated Reclaimed Oils Limited	165 Tunnel Avenue	SE10 0PW
EP-LT2170 / EAWML 83241	Waste transfer from Public Market	Royal Borough of Greenwich	Market Compound, Beresford Street	SE18
EP-LT2635 / EAWML 83240	Metal and Waste Recycling	Metal and Waste Recycling Ltd	North Site, 3 Copperas Street, Deptford	SE8 3DA
EAEPFRFP38 90EEV005 (EAWML 83317)	Mobile plant for the treatment of soils and the treatment of contaminated material, substances and products, for the purpose of remedial action.	O'Keefe Soil Remediation Limited	Mobile plant	SE10 0PU
EA/EPR/MP3 890EJ/S001 (EAWML 83239)	Metal and Waste Recycling	Concorde Metals Recycling Ltd	Unit 3/4 Building 6, Ashleigh Commercial Estate, Westmoor Street	SE7 8NQ
EP3135PE	The disposal of hazardous waste in a landfill, including biological treatment of leachate and waste discharge of site drainage to controlled waters.	Tilfen Land Limited	Licensed Facility 3, Tripcock Point	SE28 0AB
EAEPGRGP31 90LTA001 (EAWML 101457)	Inert and excavation Waste Transfer Station with treatment	S Walsh & Son Ltd	Bay Wharf, Victoria Deep Water Terminal, 231 Tunnel Avenue, Greenwich	SE10 0QE
EPR/SP3499 VG	Standard Rules SR2008No20_75kte - vehicle storage, depollution & dismantling (authorised treatment) Facility	Mr Henry Obovu	Creekside Auto Repair Centre, Unit 7, Brookmarch Trading Estate, 70 Norman Road, Greenwich	SE10 9QE
EPR/FP3693	Storage and treatment	UK Power Networks	Eltham Grid Sub Station,	SE9 2RN

MB	of hazardous oil waste (mineral-based non-chlorinated insulating and heat transmission oils)	Holdings Limited	Rochester Way Relief Road	
EA/EPR/BP3 I3IHD/A001	Storage and treatment of hazardous, non-hazardous and inert material. Suitable treated material will be used for the manufacture of construction materials.	Soil Xchange Ltd	Charlton Waste Treatment Facility, Building 3 and Yard, Ashleigh Commercial Estate, Westmoor Street, London	SE7 8NQ
EPR/UP3990 EK/V002	Storage and treatment of waste, including hazardous waste. No asbestos waste.	Toulouse Plant Hire Ltd	55-71 Norman Road, Greenwich, London	SE10 9QF
EPR/WP373 ICP/A001	Production of Biodiesel	Gray's Waste Services Ltd	Nathan Way, Thamesmead West, London	SE28 0AU
EPR/KB3837 RZ/A001	Plastic film reprocessing	Plasrecycle Ltd	Former Hunter Plastics Site, Nathan Way, London	SE28 0AB

Part B installations in Royal Greenwich

Table of permitted installations in the Council's area

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	SE10 0RT	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	SE10 0QE	Permitted
147	Fixed Concrete Crusher	Murphy's (Waste) Ltd	Transfer Station, Horn Lane, Greenwich	SE10 0RT	Permitted
148	Concrete Batching	CEMEX	Angerstein Wharf, Horn Link Way, Greenwich	SE10 0RT	Permitted
150	Concrete Batching	Euromix Concrete Ltd	Brewery Wharf, Norman Road, Greenwich	SE10 9QZ	Permitted
152	Vehicle Respraying	Southside Accident Repair centre	123/125 Nathan Way, Thamesmead	SE28 0AB	Permitted
153	Mobile Concrete Crusher	O'Keefe Construction (Greenwich) Ltd	St. Andrew's House, 1 Dreadnought Street, Greenwich	SE10 0PU	Permitted
155	Mobile Concrete Crusher No.2	O'Keefe Construction (Greenwich) Ltd	St. Andrew's House, 1 Dreadnought Street, Greenwich	SE10 0PU	Permitted
156	Bulk storage of cement	Day Aggregates	Murphy's Wharf, Lombard Wall, Charlton	SE7 7SH	Permitted

Table of permitted petrol stations in the Council's area

Ref	Name	Address	Postcode	Status
201	Asda Petrol Station	Bugsby Way, Charlton	SE7 7ST	Permitted
202	Total Fina	176 Footscray Road, New Eltham	SE9	Permitted
203	Morrison Petrol Station	Thamesmere Drive, Thamesmead	SE288RE	Permitted
204	J Sainsbury plc	Messeter Place, Eltham	SE9	Permitted
205	Star Lee S/stn	1 Sidcup Road, Lee	SE128BL	Permitted
206	Snax 24 Ltd PFS	79 Kidbrooke Park Road, Blackheath	SE3	Permitted
208	JET Service Station	177-189 Creek Road, Deptford	SE8 3OU	Permitted
210	Trafalgar Filling Station	43-45 Trafalgar Road, Greenwich	SE109TT	Permitted
211	Hexagon S/stn	340 Woolwich Road, Charlton	SE7	Permitted
213	Thamesmead S/stn	1-3 Bostall Hill, Abbey Wood	SE2 0RB	Permitted
215	Eltham Service Station	39-41 Eltham High Street, Eltham	SE9 1DH	Permitted
216	Shell Service Station	160-168 Plumstead Common Road, Plumstead	SE18 2UL	Permitted
217	Lakedale S/stn	190-214 Plumstead High Street, Plumstead	SE18 1JH	Permitted
218	Blackheath S/stn	37A Shooters Hill Road, Blackheath	SE3 7HS	Permitted
219	Shell Service Station	165 Shooters Hill Road, Blackheath	SE3	Permitted
220	Shell Service Station	Next to 551 Sidcup Road, Eltham	SE9 3AF	Permitted
221	Shell Service Station	728 Sidcup Road, Eltham SE9	SE9	Permitted
223	Shell Service Station	7-9 Tudor Parade, Well Hall Road, Eltham	SE9 5SX	Permitted
224	Tesco P.F.S	59 Sidcup Road, Lee	SE12 8BL	Permitted
230	WJ King (Garages) Ltd	40 Artillery Place, Woolwich	SE184AE	Permitted
231	J Sainsbury plc	Bugsby Way, Charlton	SE10	Permitted
232	Crown Woods S/stn	Bexley Road	SE9 2NL	Permitted

Table of permitted dry cleaners in the Council's area

Ref	Name	Address	Postcode	Status
301	The Village Dry Cleaners	135 Lee Road	SE3 9DS	Permitted
302	Panache Dry Cleaners	192 Court Road, Eltham	SE9 4EW	Permitted
303	Westmount Dry Cleaners	146 Westmount Road, Eltham	SE9 1XA	Permitted
304	Greenwich Dry Cleaners	25 Woolwich Road, Greenwich	SE10 0RA	Permitted
305	Taylor's Cleaners	68 Herbert Road, Plumstead	SE18 3SH	Permitted
306	Westcombe Dry Cleaners	74 Westcombe Hill	SE3 7DY	Permitted
307	Morrisons Supermarket	2 Twin Tumps Way	SE28 8RD	Permitted
308	Cleantech Dry Cleaners	213 Eltham High Street	SE9 ITX	Permitted
309	Elegance Dry Cleaners	172 Westcombe Hill	SE3 7DH	Permitted
310	Collins Cleaners	3 Stratheden Parade	SE3 7SX	Permitted
311	Well Hall Express	18 Well Hall Parade, Eltham	SE9 6SP	Permitted
312	Woolwich Express	59 Woolwich New Road	SE18 6ED	Permitted
313	Cleaners of Eltham	10 Well hall Road, Eltham	SE9 6SF	Permitted
314	Tailored Press	130 Plumstead Common Road	SE182UL	Permitted
315	Soma Dry Cleaners	237 Greenwich High Road	SE108NB	Permitted
316	Collins Dry Cleaners	168 Trafalgar Road, Greenwich	SE10 9TZ	Permitted
318	Spotless Dry Cleaners	168 Shooters Hill Road	SE3 8RP	Permitted
319	Early Bird Dry Cleaners	139 Plumstead High Street	SE18 SE	Permitted
321	Rosam Dry Cleaners	173 Trafalgar Road	SE109TX	Permitted
322	Unique Dry Cleaners	6 Frances Street, Woolwich	SE185EF	Permitted
324	Top Class Dry Cleaners	196 Bexley Road	SE9 2PH	Permitted
325	Asik Dry Cleaners	88 Plumstead High Street	SE18 1SL	Permitted
326	Attrill's	413, Footscray Road	SE9 3UL	Permitted
327	Village Dry Cleaners	1 The Village, Charlton	SE7 8UG	Permitted
328	Royal Dry Cleaners	27 Lewisham Road	SE137QS	Permitted
330	New Eltham DC	397 Footscray Road	SE9 2DR	Permitted
331	T & T Launderette and Dry Cleaners	9 Anglesea Road	SE18 6EG	Permitted
332	Comet 2 Dry Cleaners	55 Well Hall Road	SE9 6SZ	Permitted
333	Vina Dry Cleaners	92 Royal Hill	SE10 8RT	Permitted