

2014 Air Quality Progress Report for *Royal Borough Of Greenwich*

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

December 2014



CLEANERAIR
FOR LONDON

Local Authority Officer	Chris Banks
Department	Environmental Health
Address	Royal Borough of Greenwich
Telephone	020 8854 8888
e-mail	Chris.banks@greenwich.gov.uk
Report Reference number	Greenwich_Progress_2014_final
Date	December 2014

Executive Summary

The Royal Borough of Greenwich 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 2014 Air Quality Progress report fulfils one aspect of this on-going commitment.

The Council's Air Quality Progress report updates recent air quality monitoring in the Royal Borough and considers other local developments that might affect local air quality. If major changes are noted the Council is required to undertake a Detailed Assessment. This is in accordance with Defra LAQM guidance.

This report details the monitoring results for the most recent calendar year, i.e. 2013. The report also considers the actions that the Council and others are undertaking in pursuit of the objectives under Part IV of the Environment Act 1995.

The report identifies that:

From the monitoring and local developments there is no need to undertake a Detailed Assessment.

For nitrogen dioxide and particles (specifically PM₁₀) the Council has previously designated an Air Quality Management Area (AQMA) across the Borough. The emission sources for these pollutants are dominated by road transport in the Borough. The findings from this report indicate that the AQMA should be maintained.

In view of the findings 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. Continue with its Air Quality Action Plan in pursuit of the AQS objectives.
4. Prepare for the submission of its next Air Quality report.

Table of Contents

1	Introduction	6
1.1	Description of Local Authority Area	6
1.2	Purpose of Progress Report	6
1.3	Air Quality Objectives	7
1.4	Summary of Previous Review and Assessments	10
2	New Monitoring Data	11
2.1	Summary of Monitoring Undertaken	11
2.2	Comparison of Monitoring Results with Air Quality Objectives	23
3	New Local Developments	48
4	Planning Applications	53
5	Air Quality Planning Policies	55
6	Local Transport Plans and Strategies	59
7	Energy, Climate Change and Sustainability	62
8	Implementation of Action Plans	64
9	Conclusions and Proposed Actions	75
9.1	From New Monitoring and Modelling Data	75
9.2	Relating to New Local Developments	75
9.3	Other Conclusions	75
9.4	Proposed Actions	76
10	References	77
11	Appendices	78

List of Tables

- Table 1.1 Air Quality Objectives included in Regulations for the purpose of LAQM in England
- Table 1.2 Air Quality Objectives not included in Regulations for the purpose of LAQM
- Table 2.1 Details of Automatic Monitoring Sites
- Table 2.2 Details of Non- Automatic Monitoring Sites
- Table 2.3 Results of Automatic Monitoring for NO₂: Comparison with Annual Mean Objective
- Table 2.4 Results of Automatic Monitoring for NO₂: Comparison with 1-hour Mean Objective
- Table 2.5 Table 2.6 Results of NO₂ Diffusion Tubes 2013
- Table 2.6 Results of NO₂ Diffusion Tubes (2009 to 2013)
- Table 2.7 Averaged annual mean concentrations for Greenwich diffusion tube sites (2008 to 2013)
- Table 2.8 Results of Automatic Monitoring for PM₁₀: Comparison with Annual Mean Objective
- Table 2.9 Results of Automatic Monitoring for PM₁₀: Comparison with 24-hour Mean Objective
- Table 2.10 Results of Monitoring of SO₂: Comparison with AQS Objectives
- Table 2.11 Number of daily maxima exceeding 100 µg m⁻³ based on 8-hour running mean
- Table 2.12 PM_{2.5} annual mean results (µg m⁻³) (2009 - 2013)
- Table 9.1 Action Plan Progress

List of Figures

- Figure 2.1 2013 map of Non-Automatic Monitoring Sites in R.B of Greenwich
- Figure 2.2 Averaged annual mean concentrations for Greenwich diffusion tube sites (2008 to 2013)

Appendices

- Appendix 1: Part A installations in Greenwich
- Appendix 2: Part B installations in Greenwich

1 Introduction

1.1 Description of Local Authority Area

The Royal Borough of Greenwich is situated to the south east of the centre of London and is part of 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 population for 2013 was 268,500 (GLA, SHLAA data, 2013).

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.

1.2 Purpose of Progress 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.

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 (LA) should undertake a Detailed Assessment immediately, and not wait until the next round of Review and Assessment.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in **England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of 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 1.2 details other air quality objectives in England that are in addition to those set for the purpose of LAQM.

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu\text{g m}^{-3}$	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	10 mg m^{-3}	Running 8-hour mean	31.12.2003
Lead	0.50 $\mu\text{g m}^{-3}$	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
Particulate Matter (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

Table 1.2 Air Quality Objectives not included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
PM_{2.5} (Not Scotland)	25 µg m ⁻³	Annual mean	2020
	Target of 15% reduction in concentrations at urban background locations	3-year mean	Between 2010 and 2020
Ozone	100 µg m ⁻³ not to be exceeded more than 10 times a year	8 hour mean	31.12.2005

1.4 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 published its Air Quality Action Plan in 2002. The plan is currently being revised and updated and a new version will be published in 2015

The Council's subsequent Updating and Screening Assessments and Progress reports were also completed and the findings were in accordance with those of the earlier Detailed Assessment.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Automatic monitoring in the Borough is undertaken at the following 11 fixed long-term sites. The automatic sites in operation at the time of writing are:

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=0.055573699999968085&laEdge=Y&details=\)](http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GR9&Mapttype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.055573699999968085&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=0.055573699999968085&laEdge=Y&details=\)](http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GN0&Mapttype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.055573699999968085&laEdge=Y&details=))

Millennium Village (GN2) – a background site (that is 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=\)](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=0.055573699999968085&laEdge=Y&details=general\)](http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GN3&Mapttype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.055573699999968085&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=0.14238299999999526&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&Mapttype=Google&mapview=All&la_id=11&zoom=11&lat=51.4744&lon=0.055573699999968085&laEdge=Y&details=general\)](http://www.londonair.org.uk/london/asp/publicdetails.asp?site=GN4&Mapttype=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=\)](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 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.

Table 2.1 Details of Automatic Monitoring Sites

Site Name (ID)	Site Type	Easting	Northing	Inlet Height (m)	Pollutants Monitored	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Eltham (GR4)	Suburban	543978	174655	5	NO ₂ PM ₁₀ PM _{2.5} SO ₂ (and O ₃)	FDMS	Y (0)	N/A	N
Trafalgar Road (GR5)	Roadside	538960	177954	3	NO ₂ PM ₁₀	TEOM	Y (0)	5	Y
Blackheath Hill (GR7)	Roadside	538141	176710	3	NO ₂ PM ₁₀	FDMS	Y (0)	20	N
Woolwich Flyover (GR8)	Roadside	540200	178367	3	NO ₂ PM ₁₀ PM _{2.5} (and O ₃)	TEOM	Y (0)	3	Y
Westhorne Avenue (GR9)	Roadside	541879	175016	3	NO ₂ PM ₁₀ PM _{2.5} (and O ₃)	FDMS	Y (0)	12	N
Burrage Grove (GN0) note - previously GR10	Roadside	544084	178881	3	NO ₂ PM ₁₀ PM _{2.5}	FDMS	Y (1)	3	Y

Site Name (ID)	Site Type	Easting	Northing	Inlet Height (m)	Pollutants Monitored	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
Millennium Village (GN2) note - previously GR12	Background	540169	178999	3	NO ₂ PM ₁₀ PM _{2.5}	FDMS	Y (0)	N/A	Y
Plumstead High St (GN3) note - previously GR13	Roadside	545560	178526	3	NO ₂ PM ₁₀ PM _{2.5} (and O ₃)	FDMS	Y (0)	5	Y
Falconwood GB6	Roadside	544997	175098	3	NO ₂ PM ₁₀ PM _{2.5} O ₃	TEOM	Y (5)	12	Y
Fiveways Sidcup Rd (GN4)	Roadside	543582	172653	2	NO ₂ PM ₁₀	FDMS	Y (5)	2	Y
Thamesmead BX3	Suburban	547323	181231	2.5	PM _{2.5}	TEOM	Y (0)	N/A	N

Notes:

- 1) GB0 is a FDMS analyser located at the Falconwood GB6 site.
- 2) All PM_{2.5} monitoring uses FDMS instruments, other than BX3 which uses a TEOM.

2.1.2 Non-Automatic Monitoring Sites

The Royal Borough of Greenwich undertakes an extensive 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 2013, 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 2013 are illustrated in Figure 2.1. The details of the areas are given in the table 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 Health and Safety Laboratory's (HSL) Workplace Analysis Scheme for Proficiency (WASP) programme for diffusion tubes, which provides a Quality Assurance / Quality Control (QA/QC). It achieved a 100% "Satisfactory" in the laboratory performance testing rounds 116 – 123 between January 2012 and December 2013.

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 LWEP factor) was derived to apply bias correction to the raw diffusion tube results. Triplicate tubes were co-located alongside five continuous NO₂ monitoring sites, plus other sites in the LWEP in 2013. 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 undertaken using the most recent default factor spreadsheet from Defra’s helpdesk (version 09/14) for comparison purposes. The 2013tube precision was good for 19 of the studies. These default factors were based on statistical analyses of reported data provided by other local authorities.

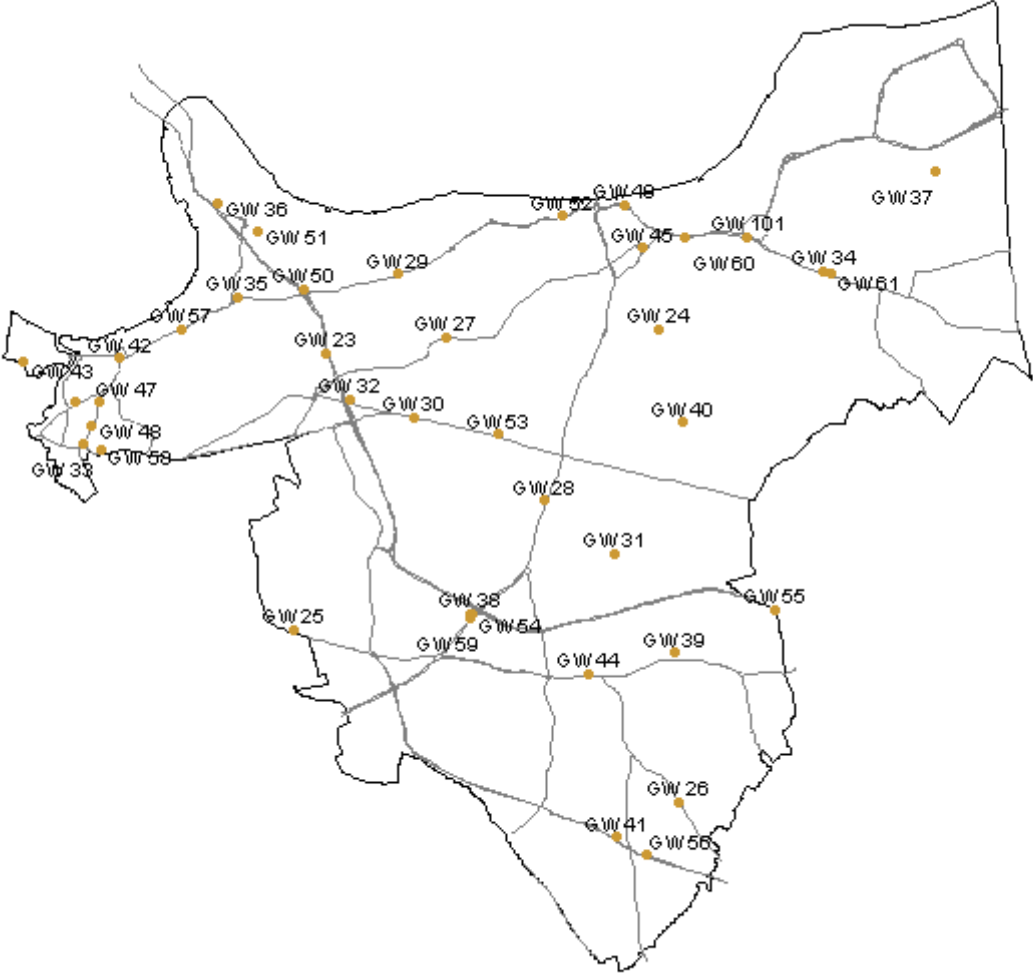
Year	Bias Default factor	LWEP Bias factor
2009	0.97 (16 studies)	0.97
2010	1.03 (16 studies)	1.06
2011	0.95 (25 studies)	1.02
2012	1.02 (21 studies)	1.04
2013	1.01 (20 studies)	0.96

There was reasonable agreement between the sets of factors, albeit with some variation between years. Since 2009 the LWEP factors have been slightly larger than the default factors. There are many potential reasons for this discrepancy. 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 2013 indicates that the diffusion tube results slightly overestimate continuously monitored concentrations.

Figure 2.1 2013 map of Non-Automatic Monitoring Sites in R.B of Greenwich



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	Westthorne 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 (2013)

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)	Westthorne 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)	Westthorne Av	541915	175039	Roadside	Y	2.5	Y
GW55(32,33,34)	Crown Woods Way (Triplicate co-located 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)	Westthorne 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 2013 continuous results along with recent years' monitoring from 2009. 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 London Air Quality Network website (See <http://www.londonair.org.uk/london/asp/lahome.asp>).

2.2.1 Nitrogen Dioxide (NO₂)

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 µg m⁻³, which is used to represent an indicative value for the hourly mean objective. This is in line with TG09 guidance.

Automatic Monitoring Data

The nitrogen dioxide monitoring results for the Council's automatic sites are compared directly to the annual mean and hourly mean objectives. The following tables (Tables 2.3 and 2.4) provide results for the period from 2009 to 2013 inclusive. The data are fully ratified for all years. 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 2013 at the sites was good (representing around 90% or more of the year) at all sites other than the background site at the Millennium Village, although even here the data capture was 75%. For previous years the data capture at all sites was also mostly good, as reported previously (see earlier Council reports).

The background site located in parkland in suburban Eltham (GR4) met the AQS annual mean objective of 40 µg m⁻³ for 2013, with concentrations around 21 µg m⁻³;

this 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 that were mostly borderline with the objective at $38 \mu\text{g m}^{-3}$ in 2013. This site is located close to industry.

The GN3 roadside site in Plumstead High Street also met the objective and was borderline with the objective for 2013. The site has exceeded the objective during the previous years reported.

All of the other sites exceeded the annual mean objective in 2013. This included the roadside site at Trafalgar Road (GR5), where the annual mean concentration was slightly more than the $40 \mu\text{g m}^{-3}$ in 2013. Prior to this concentrations at the site had always exceeded the objective by a larger amount.

There was also a fall in concentrations at the GR8 site by the Woolwich Flyover; however this site has consistently monitored concentrations that easily exceed the objective. The annual mean for 2013 was $64 \mu\text{g m}^{-3}$. The nearest residential façade to the monitoring location is 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.

The sites at Blackheath Hill (GR7), Westthorne Avenue (GR9), Burrage Grove (GN0), Falconwood (GB6) and Fiveways (GN4) also easily exceeded the objective for all years reported, monitoring annual mean concentrations in 2013 that ranged between 45 and $58 \mu\text{g m}^{-3}$. Concentrations at all of these sites were mostly slightly higher (or the same) in 2013 as previous years. The facades of the nearest receptors to the GR7, GR9 and GN0 sites are close to the monitoring sites and thus the measured concentrations represent the level of exposure.

The GB6 and GN4 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 46.8 and $50.1 \mu\text{g m}^{-3}$ 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 2013 results show that none of the sites exceeded the hourly mean objective. The GB6 site at Falconwood however exceeded this objective in 2012 and it also recorded the highest number of periods exceeded at the Royal Greenwich sites in 2013, with 11 hours recorded.

The GR8 site at the Woolwich flyover has also exceeded the objective in previous years (2012 being the most recent year). The annual mean concentration at the site in 2013 exceeded the indicative annual mean of $60 \mu\text{g m}^{-3}$, albeit only 8 hours were recorded as exceeding the hourly mean standard of $200 \mu\text{g m}^{-3}$.

The sites at GR7 Blackheath Hill, GR9 Westhorne Avenue and GN4 Fiveways all recorded periods that exceeded the hourly standard on at least one occasion during 2013.

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 have confirmed that NO_x and NO_2 concentrations were not responding as expected to the projected decreases in vehicle emissions (KCL, 2012).

Table 2.3 Results of Automatic Monitoring for NO₂: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013% ^b	Annual Mean Concentration (µg m ⁻³)				
					2009	2010	2011	2012	2013
GR4	Suburban	Y	-	97	24	24	23	22	21
GR5	Roadside	Y	-	99	48	47	42	44	41
GR7	Roadside	Y	-	86	43	43	48	48	48
GR8	Roadside	Y	-	100	82	73	67	71	64
GR9	Roadside	Y	-	100	45	46	43	44	46
GN0	Roadside	Y	-	100	49	53	43	45	45
GN2	Background	Y	-	75	36	36	33	37	38
GN3	Roadside	Y	-	98	44	42	42	39	37

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013% ^b	Annual Mean Concentration ($\mu\text{g m}^{-3}$)				
					2009	2010	2011	2012	2013
GB6	Roadside	Y	-	94	45	51	42	47	51
GN4	Roadside	Y	-	95	-	-	<i>47</i>	52	58

In bold, exceedence of the NO₂ annual mean AQS objective of 40 $\mu\text{g m}^{-3}$; italics indicates less than 75% data capture.

^a Data capture for the monitoring period, where monitoring was only carried out for part of the year

^b Data capture for the full calendar year

Table 2.4 Results of Automatic Monitoring for NO₂: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Number of Hourly Means > 200µg m ⁻³				
					2009	2010	2011	2012 ^c	2013
GR4	Suburban	Y	-	97	0	4	0	0	0
GR5	Roadside	Y	-	99	2	0	0	0	0
GR7	Roadside	Y	-	86	0	0	1	0	1
GR8	Roadside	Y	-	100	53	38	6	27	8
GR9	Roadside	Y	-	100	0	0	0	0	4
GN0	Roadside	Y	-	100	3	1	1	1	0
GN2	Background	Y	-	75	0	0	0	2	2
GN3	Roadside	Y	-	98	0	1	0	0	0

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Number of Hourly Means > 200µg m ⁻³				
					2009	2010	2011	2012 ^c	2013
GB6	Roadside	Y	-	94	6	5	7	21	11
GN4	Roadside	Y	-	95	-	-	0	1	7

In bold, exceedence of the NO₂ hourly mean AQS objective (200µg m⁻³ – not to be exceeded more than 18 times per year)

^a Data capture for the monitoring period, where monitoring was only carried out for part of the year

^b Data capture for the full calendar year

Diffusion Tube Monitoring Data

The monitoring results given in Table 2.5 are the annualised and bias adjusted and where appropriate distance corrected, values for the diffusion tubes exposed in 2013 (as detailed earlier in Table 2.2). 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.

The 2013 results are derived from the 2013 LWEP report. The overall data capture rates for all of the diffusion tube monitoring sites during 2013 was high (at 96%). Only two sites had less than 75% data capture (GW103 and GW106). The annualising factors used reflected that the measured values were slight underestimates (the factors used were between 1.01 and 1.07).

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 around $22 \mu\text{g m}^{-3}$.

Seven roadside sites, plus two intermediate sites also measured concentrations that met the objective, although three of these were borderline (i.e. exceeding $38 \mu\text{g m}^{-3}$).

The majority of roadside sites however exceeded the objective. Of the thirty sites that exceeded, sixteen roadside sites exceeded $50 \mu\text{g m}^{-3}$, with six 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, GW43, GW50, GW55, GW101 and GW102) potentially may exceed the hourly objective. The sites exceeding $70 \mu\text{g m}^{-3}$ were on Woolwich Road (GW35) and on Plumstead Road (GW101).

The mean concentration for all the sites that exceeded the objective was $53.9 \mu\text{g m}^{-3}$. All of these roadside sites either represent or are very close to locations with relevant exposure for the annual mean objective.

In previous years the number of sites exceeding the objective was 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) and 55 $\mu\text{g m}^{-3}$ (in 2012).

The results for the period 2008 to 2013 inclusive are shown in Table 2.6 and these are summarised into background and roadside sites in Table 2.7 and Figure 2.3. (Note -the 2008 data were taken from previous reports).

This highlights for the background sites that the annual mean concentration reduced from 24.2 $\mu\text{g m}^{-3}$ in 2008, to 22 $\mu\text{g m}^{-3}$ in 2013. Measurements for the same years at roadside sites also showed a slight downward trend in annual mean NO_2 concentration across the network, with the network annual mean NO_2 concentration decreasing from 50.0 $\mu\text{g m}^{-3}$ in 2008 to 48 $\mu\text{g m}^{-3}$ in 2013. Overall however concentrations are little changed for the period shown.

Table 2.5 Results of NO₂ Diffusion Tubes 2013

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	2013 Data Capture (Number of Months) ^a	2013 Bias adjusted annual mean ($\mu\text{g m}^{-3}$) ^b (Bias Adjustment factor used = 0.96)
GW23	Siebert Rd	Roadside	Y		11	46.0
GW24	Plumstead Common Rd	Roadside	Y		12	58.3
GW25	Eltham Rd	Roadside	Y		11	48.9
GW26	Foots Cray Rd	Roadside	Y		12	32.2
GW27	Charlton Village	Roadside	Y		12	49.8
GW28	Dunblane Rd	Roadside	Y		12	36.4
GW29	Woolwich Rd Charlton	Roadside	Y		12	<u>65.2</u>
GW30	Indus Rd	Roadside	Y		9	39.3
GW31	Deansfield School	Roadside	Y		12	37.9
GW32	Banchory Rd	Roadside	Y		12	48.5
GW33	Blackheath Hill	Roadside	Y		12	<u>62.7</u>
GW34	Bannockburn School	Roadside	Y		12	45.1
GW35	Woolwich Rd Greenwich	Roadside	Y		10	<u>72.3</u>
GW36	Boord St	Roadside	Y		12	55.2
GW37	De Lucy School	Background	Y		11	22.7
GW38	Westhorne Av	Intermediate	Y		12	37.0
GW39	Bexley Rd ECC	Intermediate	Y	Triplicate/ Co-located	12	22.0
GW40	Shrewsbury House	Background	Y		12	21.3

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	2013 Data Capture (Number of Months) ^a	2013 Bias adjusted annual mean ($\mu\text{g m}^{-3}$) ^b (Bias Adjustment factor used = 0.96)
GW41	Sidcup Rd	Roadside	Y		11	43.3
GW42	Greenwich Church St	Roadside	Y		12	53.1
GW43	Creek Rd	Roadside	Y		12	60.4
GW44	Eltham High St	Roadside	Y		12	55.6
GW48	Greenwich South St	Roadside	Y		12	45.6
GW49	Woolwich High St	Roadside	Y		12	43.4
GW50	Woolwich Flyover	Roadside	Y	Triplicate/ Co-located	12	67.5
GW51	Bugsbys Way	Roadside	Y		12	43.3
GW52	Woolwich High St	Roadside	Y		11	44.9
GW53	Shooters Hill Rd	Roadside	Y		12	34.2
GW54	Westhorne Av	Roadside	Y		12	57.5
GW55	Crowns Wood Way	Roadside	Y	Triplicate	12	60.8
GW56	Sidcup Rd	Roadside	Y		12	56.1
GW57	Trafalgar Rd	Roadside	Y	Triplicate/ Co-located	12	39.7
GW58	Blackheath Hill	Roadside	Y	Triplicate/ Co-located	12	49.4
GW59	Westhorne Av	Roadside	Y	Triplicate/ Co-located	12	43.9
GW60	Burrage Grove	Roadside	Y	Triplicate/ Co-located	12	38.0

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	2013 Data Capture (Number of Months) ^a	2013 Bias adjusted annual mean ($\mu\text{g m}^{-3}$) ^b (Bias Adjustment factor used = 0.96)
GW61	Millennium Village	Intermediate	Y	Triplicate/ Co-located	12	39.1
GW101	Plumstead Rd	Roadside	Y		11	79.5
GW102	Plumstead Rd	Roadside	Y		12	66.2
GW103	Wricklemarsh Rd	Roadside	Y		8	46.3
GW104	Sun Lane	Roadside	Y		12	50.5
GW105	Cliftons Roundabout	Roadside	Y		12	53.9
GW106	Ground Depot Rd	Roadside	Y		8	47.5

In bold, exceedence of the NO₂ annual mean AQS objective of 40 $\mu\text{g m}^{-3}$

Underlined, annual mean > 60 $\mu\text{g m}^{-3}$, indicating a potential exceedence of the NO₂ hourly mean AQS objective

^a Means “annualised” as in Box 3.2 of TG(09)(<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38>). Those results in italics indicate less than 90% data capture recorded.

Table 2.6 Results of NO₂ Diffusion Tubes (2009 to 2013)

Site ID	Site Type	Within AQMA?	Bias adjusted Annual Mean Concentration ($\mu\text{g m}^{-3}$)				
			2009 (Bias Adjustment Factor = 0.95)	2010 (Bias Adjustment Factor = 1.06)	2011 (Bias Adjustment Factor = 1.02)	2012 (Bias Adjustment Factor = 1.04)	2013 (Bias Adjustment factor = 0.96)
GW23	Roadside	Y	42.8	48.6	39.4	42.2	46.0
GW24	Roadside	Y	51.1	58.3	53.1	54.9	58.3
GW25	Roadside	Y	53.6	55.5	48.0	47.1	48.9
GW26	Roadside	Y	42.8	37.5	32.5	31.6	32.2
GW27	Roadside	Y	51.6	53.8	46.1	51.1	49.8
GW28	Roadside	Y	38.8	40.8	37.8	39.7	36.4
GW29	Roadside	Y	<u>70.7</u>	<u>70.7</u>	<u>65.0</u>	<u>66.6</u>	<u>65.2</u>
GW30	Roadside	Y	38.1	41.7	37.9	52.0	39.3
GW31	Roadside	Y	32	35.1	34.5	37.9	37.9
GW32	Roadside	Y	48.3	50.9	47.8	50.1	48.5
GW33	Roadside	Y	59.8	<u>67.1</u>	59.2	<u>64.1</u>	<u>62.7</u>
GW34	Roadside	Y	51.3	52.1	48.2	48.3	45.1
GW35	Roadside	Y	<u>74.4</u>	<u>73.8</u>	<u>71.5</u>	<u>73.2</u>	<u>72.3</u>
GW36	Roadside	Y	54.2	46.0	52.6	54.5	55.2
GW37	Background	Y	28	26.5	28.9	24.6	22.7
GW38	Intermediate	Y	36.9	38.6	36.2	37.6	37.0
GW39	Intermediate	Y	25.1	25.4	23.1	23.8	22.0
GW40	Background	Y	22.5	25.4	22.6	25.4	21.3
GW41	Roadside	Y	45	47.2	48.5	47.8	43.3
GW42	Roadside	Y	58.1	59.8	56.0	52.5	53.1
GW43	Roadside	Y	59.1	<u>61.6</u>	<u>62.3</u>	<u>66.8</u>	<u>60.4</u>
GW44	Roadside	Y	<u>61.1</u>	<u>70.5</u>	48.4	50.4	55.6
GW48	Roadside	Y	47.1	49.2	47.4	47.6	45.6
GW49	Roadside	Y	50.3	46.3	43.7	48.5	43.4

Site ID	Site Type	Within AQMA?	Bias adjusted Annual Mean Concentration ($\mu\text{g m}^{-3}$)				
			2009 (Bias Adjustment Factor = 0.95)	2010 (Bias Adjustment Factor = 1.06)	2011 (Bias Adjustment Factor = 1.02)	2012 (Bias Adjustment Factor = 1.04)	2013 (Bias Adjustment factor = 0.96)
GW50	Roadside	Y	<u>75.3</u>	<u>72.6</u>	<u>75.5</u>	<u>75.9</u>	<u>67.5</u>
GW51	Roadside	Y	50.5	47.1	41.9	49.3	43.3
GW52	Roadside	Y	44.8	54.4	48.5	45.7	44.9
GW53	Roadside	Y	46.3	44.9	43.3	41.8	34.2
GW54	Roadside	Y	<u>60.6</u>	<u>61.2</u>	<u>60.8</u>	<u>63.6</u>	57.5
GW55	Roadside	Y	51	58.8	53.2	58.1	<u>60.8</u>
GW56	Roadside	Y	56.1	64.2	53.5	56.2	56.1
GW57	Roadside	Y	43.6	46.7	43.1	41.9	39.7
GW58	Roadside	Y	47	52.3	50.7	48.5	49.4
GW59	Roadside	Y	44.6	54.8	44.3	44.6	43.9
GW60	Roadside	Y	41.6	46.4	41.3	39.0	38.0
GW61	Intermediate	Y	42.2	41.0	40.7	40.0	39.1
GW101	Roadside	Y	<u>78.7</u>	<u>79.8</u>	<u>85.3</u>	<u>78.8</u>	<u>79.5</u>
GW102	Roadside	Y	<u>67.6</u>	<u>68.5</u>	<u>65.3</u>	<u>70.2</u>	<u>66.2</u>
GW103	Roadside	Y	44.7	45.8	47.7	52.8	46.3
GW104	Roadside	Y	50.3	50.4	55.2	58.5	50.5
GW105	Roadside	Y	54.9	<u>72.4</u>	51.0	55.7	53.9
GW106	Roadside	Y	43.5	45.0	43.8	41.9	47.5

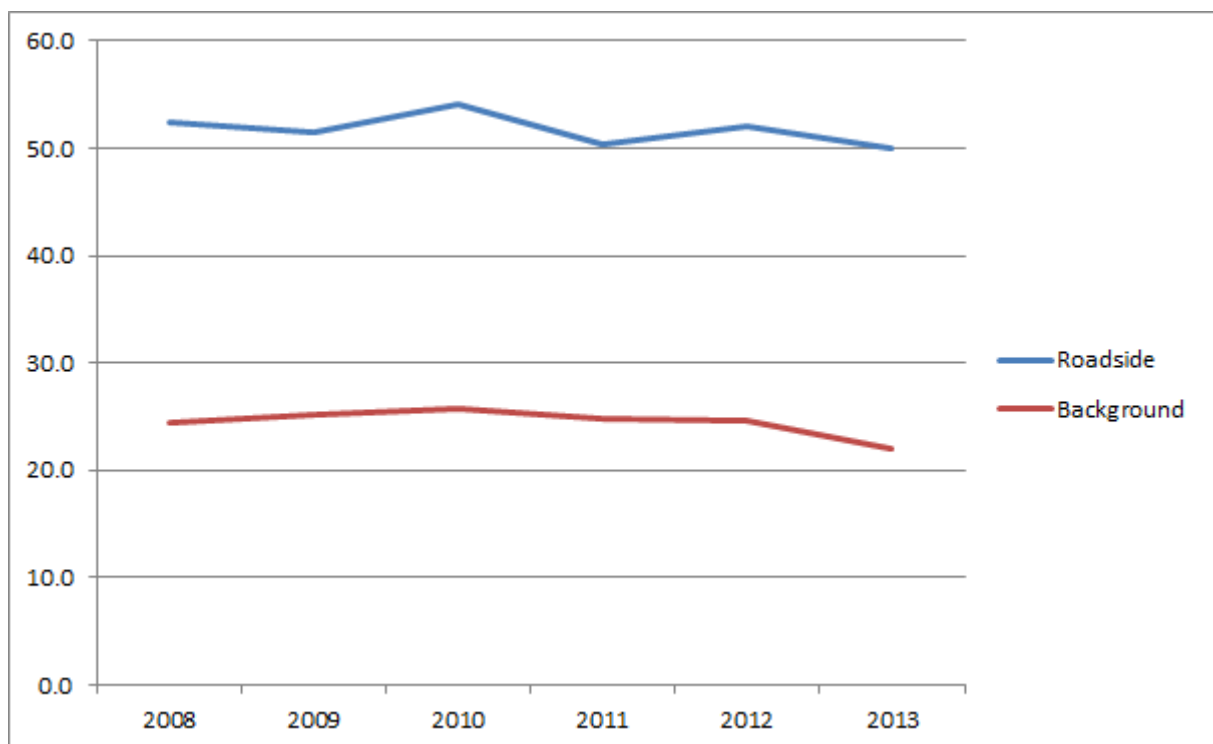
In bold, exceedence of the NO₂ annual mean AQS objective of 40 $\mu\text{g m}^{-3}$

Underlined, annual mean > 60 $\mu\text{g m}^{-3}$, indicating a potential exceedence of the NO₂ hourly mean AQS objective

Table 2.7 Averaged annual mean concentrations for Royal Greenwich diffusion tube sites (2008 to 2013)

Site type	2008	2009	2010	2011	2012	2013
Roadside	52.4	51.5	54.1	50.3	52.0	50.0
Background	24.5	25.2	25.8	24.9	24.6	22.0

Figure 2.2 Averaged annual mean concentrations for Royal Greenwich diffusion tube sites (2008 to 2013)



2.2.2 Particulate Matter (PM₁₀)

The TG09 guidance highlights that any PM₁₀ 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 PM₁₀ 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 Royal 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 2013.

All of the monitoring sites met the annual mean objective for the 2009 to 2013 period (as shown in Table 2.8). The highest annual mean concentrations monitored for 2013 were at the two roadside sites at the Woolwich Flyover (GR8) and Fiveways (GN4) where the results were both slightly over 30 µg m⁻³.

The other sites that recorded annual mean concentrations of around 30 µg m⁻³ were the roadside site at Blackheath Hill (GR7), Falconwood (GB0) and Burrage Road (GN0).

All other sites recorded annual mean concentrations around 20 µg m⁻³, apart from the urban background site at the Millennium Village, which recorded 26 µg m⁻³. The lowest concentration was monitored on Plumstead High Street.

The daily mean objective, which has been exceeded more widely across the UK than the annual mean objective, is reported in Table 2.9. The monitoring results for the roadside sites at Falconwood (GN0), Burrage Grove (GN0) and Fiveways (GN4) 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 exceeded in 2013, based on the 90.4th percentile of daily means.

Other sites including the Woolwich Flyover site (GR8), and Blackheath Hill sites (GR7) have previously exceeded the objective in earlier years reported. 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 had some periods when the daily standard of $50 \mu\text{g m}^{-3}$ was exceeded. 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 Royal Greenwich are considered typical of those measured elsewhere across London (KCL, 2012).

Table 2.8 Results of Automatic Monitoring for PM₁₀: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg m ⁻³)				
						2009	2010	2011	2012	2013 ^c
Eltham (GR4)	Suburban	Y	N/a	90	Y	26	23	23	20	20
Trafalgar Road (GR5)	Roadside	Y	N/a	100	Y	21	22	23	23	23
Blackheath Hill (GR7)	Roadside	Y	N/a	95	Y	24	28	32	28	30
Woolwich Flyover (GR8)	Roadside	Y	N/a	99	Y	37	33	35	33	32
Westhorne Avenue (GR9)	Roadside	Y	N/a	90	Y	23	22	23	20	24
Burrage Grove (GN0)	Roadside	Y	N/a	65	Y	25	28	28	27	28 (30)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration ($\mu\text{g m}^{-3}$)				
						2009	2010	2011	2012	2013 ^c
Millennium Village (GN2)	Industrial background	Y	N/a	77	Y	20	22	25	23	26
Plumstead High St (GN3)	Roadside	Y	N/a	56	Y	20	20	22	21	20 (18)
Falconwood (GB0)	Roadside	Y	N/a	72	Y	23	27	27	26	30 (28)
Fiveways Sidcup Road (GN4)	Roadside	Y	N/a	68	Y	-	-	30	30	31 (33)

^a Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

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

^c Mean "annualised" as in Box 3.2 of TG(09) (<http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38>), as valid data capture was less than 75%

Table 2.9 Results of Automatic Monitoring for PM₁₀: Comparison with 24-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg m ⁻³				
						2009	2010	2011	2012	2013 ^c
Eltham (GR4)	Suburban	Y	N/a	90	Y	11	4	22	9	5
Trafalgar Road (GR5)	Roadside	Y	N/a	100	Y	4	2	18	16	8
Blackheath Hill (GR7)	Roadside	Y	N/a	95	Y	12	20	41	26	29
Woolwich Flyover (GR8)	Roadside	Y	N/a	99	Y	44	33	42	33	26
Westhorne Avenue (GR9)	Roadside	Y	N/a	90	Y	13	9	25	16	17
Burrage Grove (GN0)	Roadside	Y	N/a	65	Y	0	18	32	28	18 (50)
Millennium Village (GN2)	Urban background	Y	N/a	77	Y	12	9	25	20	20 (46)

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % ^a	Valid Data Capture 2013 % ^b	Confirm Gravimetric Equivalent (Y or N/A)	Number of Daily Means > 50µg m ⁻³				
						2009	2010	2011	2012	2013 ^c
Plumstead High St (GN3)	Roadside	Y	N/a	56	Y	6	7	16	8	3 (34)
Falconwood (GB0)	Roadside	Y	N/a	72	Y	9	16	25 (47)	27	28 (52)
Fiveways Sidcup Road (GN4)	Roadside	Y	N/a	68	Y	-	-	26 (49)	24 (54)	31 (53)

In bold, exceedence of the PM₁₀ daily mean AQS objective (50µg m⁻³ – not to be exceeded more than 35 times per year)

^a Data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

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

^c Data capture for full calendar year was less than 90%, the 90.4th percentile of 24-hour means in brackets

2.2.3 Sulphur Dioxide (SO₂)

Automatic monitoring of SO₂ is undertaken at the representative suburban background GR4 site in Eltham. The results for 2013 are given in Table 2.10 below. These show that there were no periods that exceeded the 15 minute, hourly or 24 hourly standards in the UK AQS objectives. The results for previous years (to 2007) (see earlier reports) also recorded no periods when these standards were exceeded. As a consequence the AQS objectives were not exceeded at this site.

Table 2.10 Results of Monitoring of SO₂: Comparison with AQS Objectives

Site ID	Site Type	Within AQMA?	2013 Valid Data Capture %	Number of Exceedences		
				15-minute Objective (266 µg m ⁻³)	1-hour Objective (350 µg m ⁻³)	24-hour Objective (125 µg m ⁻³)
GR4	Suburban	Y	92	0	0	0

2.2.4 Ozone monitoring

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), Westhorne Avenue (GR9) and Plumstead High Street (GN3). The results for the period 2009 – 2013 are given in Table 2.11. The data capture for all years exceeded 90%; except GR9 site in 2009.

The Government's air quality objective, not to exceed 10 periods 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 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.

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 2.11 Number of daily maxima exceeding 100 µg m⁻³ based on 8-hour running mean (2009-2013)

Objective	2009	2010	2011	2012	2013
GR4	8	7	15	10	6
GB6	0	0	6	6	3
GR8	0	0	1	4	0
GR9	<i>0</i>	<i>0</i>	3	5	2
GN3	0	0	1	1	0

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

2.2.5 PM_{2.5} monitoring

The Council undertook the continuous measurement of PM_{2.5} at eight of its sites, including the BX3 suburban site in Thamesmead. The sites all used FDMS instruments, apart from the BX3 site, which used a TEOM instrument.

The unadjusted annual mean results for the monitoring sites are given in Table 2.12.

Data capture was good for most sites in 2013 and was around 90%; other than the GR4 site, which had instrument problems and lower data capture, plus the GN0 site; both had data capture around 70%.

The unadjusted annual mean results for the monitoring sites are given in Table 2.12.

Table 2.12 PM_{2.5} annual mean results (µg m⁻³) (2009 - 2013)

Objective	2009	2010	2011	2012	2013
GR4	17.6	16.6	16.1	13.3	15.2
GR8	18.6	16.4	17.2	15.4	14.9
GR9	15.5	17.1	17	15.8	17.2
GN0	19.8	19.7	24.5	18.1	17.5
GN2	15.4	16.4	19.1	15.2	15.4
GN3	14.2	15.1	18.7	19.1	15.3
GB0	16.8	18.2	17.8	18.6	16.4
BX3	9.7	9.4	9.8	9	9.5

(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 Royal Borough of 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 instruments are 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 only at the GN0 site.

2.3 Summary of Compliance with AQS Objectives

The Royal Borough of Greenwich monitors nitrogen dioxide, particulate matter measured as PM_{10} , sulphur dioxide, ozone and particulate matter measured as $\text{PM}_{2.5}$. Of these pollutants, only Nitrogen Dioxide and PM_{10} exceed the air quality standard objectives at sites close to roads. Levels of nitrogen dioxide and PM_{10} have remained fairly constant since 2008. Any changes are within the variability which would be expected due to weather conditions. No clear trends are evident

The Royal Borough of Greenwich has examined the results from monitoring and recent modelled predictions across the Borough. Concentrations are above the objectives for annual mean nitrogen dioxide, plus 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

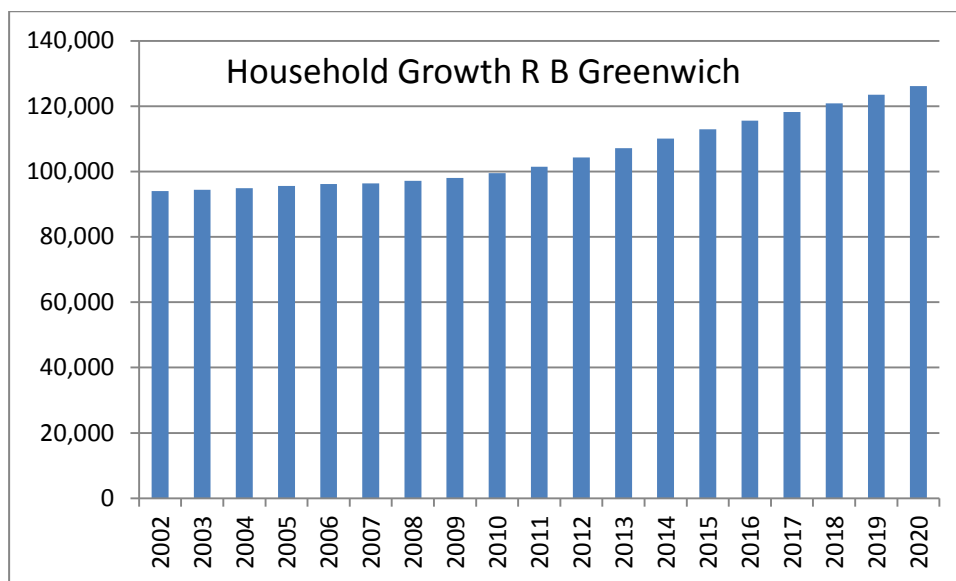
below the relevant objectives; therefore there is no need to proceed to a Detailed Assessment for these pollutants.

PM_{2.5} and ozone are not LAQM pollutants and are reported for information purposes.

3 New Local Developments

This section deals with any changes in the Royal Borough that may affect air quality. It has only been necessary to consider locations which have not been assessed during the earlier rounds, or where there has been a change or new development.

Whilst this section deals with specified large development projects which may have an impact on air quality, it should be noted that the borough is undergoing a high level of population growth. The population of the Royal Borough has increased from 221,000 to 264,000 between 2002 & 2013 and the number of households is projected to increase from 94,000 in 2002 to 126,000 in 2020.



Whilst it is anticipated that new residents will be using private motor vehicles less than the national average, even a small increase in the number of vehicles is likely to have a disproportionate effect on congestion on the roads and therefore a potentially significant increase in emissions. There will also be a significant additional demand placed on public transport.

The population increase will increase emissions in other ways. Whilst new homes will be more energy efficient than old housing, there will still be a requirement for space heating leading to an increase in diffuse emissions.

The following developments have the potential to affect air quality in the Borough since the last report.

1. Silvertown Tunnel

This is a proposed development that aims to ease regular congestion at the Blackwall Tunnel, plan for London's increased population and ease future congestion on roads. The Silvertown Tunnel will be a new twin-bore tunnel providing a road link beneath the Thames from the Blackwall Tunnel Southern Approach on the Greenwich Peninsula to the Tidal Basin roundabout in the Royal Docks area. Construction could start in late 2017 and the earliest that the tunnel could be open is 2021/2022.

The tunnels will be accessible to all motorised vehicles. There will be two traffic lanes in each direction. To further improve the movements of buses and goods vehicles, one lane in each direction could be reserved for buses and HGVs.

Consultation has recently started and is ongoing. Further assessments will be undertaken. Preliminary investigations confirm that poor air quality is already an important problem in this area, partly as a result of the very high level of demand for the Blackwall Tunnel and the congestion on the approaches to the tunnel.

Initial forecasts estimate that by the early 2020s without the Silvertown Tunnel, traffic queuing to pass through the Blackwall Tunnel will worsen. The opening of the new tunnel will lead to changes in the distribution of traffic crossing the river. Some roads will see a decrease in traffic and others will see an increase. A particular effect of the Silvertown tunnel will be a reduction in the congestion on the approaches to the Blackwall Tunnel.

Overall, with the changes in traffic flows that are forecast and the reduction in congestion, the levels of emissions are expected across the area in 2021 with Silvertown to be lower than the level of emissions expected in 2021 without Silvertown. However, the change in traffic flows will mean that some roads experience an increase in emissions whilst others experience a reduction.

Air quality modelling to determine the change in emissions and how it will influence concentrations of NO₂ and PM₁₀ and how they affect receptors (e.g. homes and schools) is intended. This will be reported by TfL in the consultation planned for mid-2015. This air quality assessment will be reported in subsequent air quality reports.

2. Enderby Wharf

The Enderby Wharf development is high quality with mixed use comprising a 251 room hotel, 770 new homes, and leisure and office accommodation together with the refurbishment of a listed building known as Enderby House, skills and training academy plus an international cruise terminal with a 160 metre frontage onto the river Thames. Enderby Wharf has been designed to accommodate the largest cruise ships up to 240 metres long, which can sail through the Thames Barrier. The onshore terminal has been designed to accommodate 3,000 passengers embarking or disembarking at any one time with their accompanying luggage. It is anticipated that nearly 100 cruise ships per annum will moor at Enderby Wharf when the terminal is fully operational.

An Environmental Impact Assessment was undertaken and this noted for air quality that the whole of the Borough has been declared an Air Quality Management Area, and that existing air quality is already generally poor. The assessment of sensitive receptors in a baseline (existing) scenario indicates that the annual mean objective for NO₂ is expected to be exceeded (irrespective of the proposed development).

The change in traffic volumes arising from the development is not expected to lead to a marked increase in annual mean NO₂ concentrations. The results indicated that the development will lead to a slight adverse or negligible impact for the receptors. In addition, the results indicate that the development will result in, at worst, a slight adverse impact in relation to particulate matter at one of the receptors, whilst all other receptors would experience a negligible change.

The development was granted planning permission with conditions attached. Construction works are currently underway and the first cruise ship is expected in 2016.

3. Morden Wharf Pyrolysis Plant

This is a new combustion plant on the west side of the Greenwich Peninsula. It takes waste material using it 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). As the new plant is housed in an existing building, no planning consent was necessary for the construction of the plant. However the plant will require an Environmental permit issued by the E A. Documents presented to the EA & the Council show that the impact of the plant will be negligible in air quality terms. The plant is due to start operating in summer 2015.

4. Greenwich Peninsula revised masterplan

On 2002, outline planning consent was granted for the construction of 10,010 new homes on the Greenwich Peninsula. Since that date, whilst some of the consented sites have been built on, the developers have decided to amend the scheme to increase the number of homes to 15,700. The developers have been in discussion with the council about the new scheme and a new outline application accompanied by an Environmental Statement is expected in 2015.

5. Charlton Riverside

Early proposals have been made for the construction of 3,500 new homes in this predominantly industrial area. The development is likely to be progress by way of a supplementary planning document. The Environmental Health Department has raised concerns about the introduction of a residential land use in an area significantly impacted by air pollution. These concerns will continue to be pursued as the development process continues.

6. Reopening Greenwich Power Station

There are early proposals being made to re-open Greenwich Power Station. The station was originally used to provide electricity for London Underground and is still available as a back-up source of power. The station will be powered by a natural gas powered combined heat and power plant with waste heat supplying

local buildings. The station will require an Environmental permit in order to operate. A review of the proposals will be made when more details become available.

7. East London River Crossing

During 2014, TfL consulted on a new river crossing in East London. Location of the new crossing included three which would have direct impacts on the Royal Greenwich:

- Improved Woolwich Ferry
- New ferry at Thamesmead
- New bridge at Thamesmead

None of the proposed crossings will be built before the early 2020's. An Environmental Statement will be required which will assess impacts on air quality.

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

The Royal Borough of Greenwich confirms that all the following have been considered:

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

4 Planning Applications

The Local Development Framework or LDF is the name given to the planning documents which collectively deliver the spatial planning strategy and policies for the local area by building upon existing local and regional strategies.

The Royal Borough of Greenwich's Local Development Framework is made up of the following documents:

- Local Plan Core Strategy with Detailed Policies - This document sets out the strategic objectives for Royal Greenwich as well as the more detailed development management policies and the implementation framework required to deliver the strategy.
- Site Specific Allocations – This document will support the Core Strategy by identifying specific sites that are important to delivering the vision set out in the Core Strategy. This will include large sites that will deliver a significant amount of development, such as for housing or employment space.

The Royal Borough of Greenwich's existing and emerging development plans are complemented by Supplementary Planning Documents (SPDs) and other guidance. These documents are not part of the statutory development plan but are a material consideration in planning applications. The following SPDs have been produced to date.

- Thamesmead and Abbey Wood SPD
Prepared jointly with Bexley Council and formally adopted on 31 December 2009.
- Kidbrooke Area SPD
Prepared to help guide the development of Kidbrooke Village, a large area of growth and regeneration in the Borough on the site of the former Ferrier Estate.
- Planning Obligations SPD

Provides detailed guidance on the type and scale of planning obligations for development proposals within Royal Greenwich.

- Woolwich Town Centre Masterplan SPD
Prepared to help guide development in Woolwich Town Centre. Adopted on 12 April 2012.
- Eltham Town Centre Masterplan SPD
Prepared to help guide development in Eltham Town Centre. Adopted on 12 April 2012.
- Charlton Riverside Masterplan SPD
Prepared to help guide development at Charlton Riverside. Adopted on 12 April 2012.
- Greenwich Peninsula West SPD
Prepared to help guide development at Greenwich Peninsula West. Adopted on 12 April 2012.
- Greener Greenwich SPD
Prepared to give guidance to developers and communities on sustainable design and construction. An air Quality section is included.

5 Air Quality Planning Policies

The Royal Borough of Greenwich is a leading member of the Low Emission Strategies Partnership, which evolved from those local authorities awarded Air Quality Beacon Councils status. The Low Emission Strategies Partnership was first established in 2008, as an informal group working together to reduce road transport emissions. Since then, the Partnership have secured over £1 million in grant funding for local and national projects and played an important role in establishing low emission tools and approaches.

The Royal Borough of Greenwich acts as the body that is accountable for the Partnership, holding the financial assets and awarding contracts. Governance and scrutiny is provided by the Partnership Board, which currently includes individuals representing seven local authorities.

The Low Emission Partnership is a group of local authorities working together to protect public health, and tackle climate change, by reducing emissions from road transport. The Partnership promotes ambitious joined up action to reduce both emissions of toxic air pollutants and greenhouse gases, delivered by cost effective and practical interventions supported by robust impact assessment.

It specialises in two broad areas:

1. Accelerating the adoption of low emission transport fuels and technology and
2. Use of emission based assessment to support policy and action. It also works more widely to enable integration of its approach with complementary drivers, interventions and methods.

The overall aim is to achieve and evidence significant emission reductions from local transport. To do this the Partnership's current work programme is focussed on working with and supporting local authorities to develop and implement local air quality action plans and low emission measures. This includes:

- Cost effective scoping of options for integrated air quality action – enabling consideration of a broad range of options, meaningful early stage engagement with stake holders, setting of high level objectives and identification of integrated packages of action capable of achieving them.
- Planning agreements that support low emission development by reducing transport emissions.
- Fleet management plans, licensing controls and procurement criteria, which accelerate fleet uptake of low emission technologies and increase low emission fleet management and driver training practices.
- Giving access to and supporting use of practical methods and tools for quantifying impacts, justifying individual measures and supporting negotiation of agreements, alongside progress on establishing assurance and certification mechanisms for low emission developments.

For more information see:

<http://www.lowemissionstrategies.org/about.html#sthash.XEoo7WLL.dpuf>

The Royal Borough of Greenwich's Core Strategy includes a policy on air pollution which takes account of Low Emission Strategies:

Policy E(c) Air Pollution

Development proposals with the potential to result in any significant impact on air quality will be resisted unless measures to minimise the impact of air pollutants are included. Such planning applications should be accompanied by an assessment of the likely impact of the development on air quality.

All new developments with a floor space greater than 500sqm or residential developments of 10 or more units are required to reduce carbon dioxide (CO₂), particulate matter (PM₁₀) and nitrogen dioxide (NO₂) emissions from transport through the use of measures such as those set out in DEFRA guidance 'Low

Emissions Strategies: using the planning system to reduce transport emissions Good Practice Guidance -January 2010'.

Residential development proposals within areas that are currently exposed to air quality concentrations above the National Air Quality Strategy (NAQS) Objectives for particulate matter (PM10) and nitrogen dioxide (NO2) should take into account the need to reduce exposure by the following design mitigation hierarchy:

- i. Separation by distance;
- ii. External layout;
- iii. Internal layout; and
- iv. Suitable ventilation.

The Greater London Authority (GLA) also published its Sustainable Design and Construction Supplementary Planning guidance (SPG) in April 2014. This SPG provides guidance on the implementation of London Plan and includes detailed guidance on the implementation of the “air quality neutral” provisions of the London Plan and minimum emission standards for combined heat and power (CHP) and biomass plant.

Supplementary planning guidance (SPG) on The Control of Dust and Emissions during Construction and Demolition was also produced in July 2014. This SPG provides guidance on the implementation of London Plan policy 7.14 - Improving Air Quality, as well as a range of policies that deal with environmental sustainability, health and quality of life.

To support the policies in the London Plan this SPG includes guidance on:

- The preparation of an Air Quality Statement for construction and demolition activities, including air quality (dust) risk assessments;
- The stages of development the Air Quality Statement is to cover, that is for demolition, earthwork, construction stages and trackout (vehicles leaving the site) stages of the works;

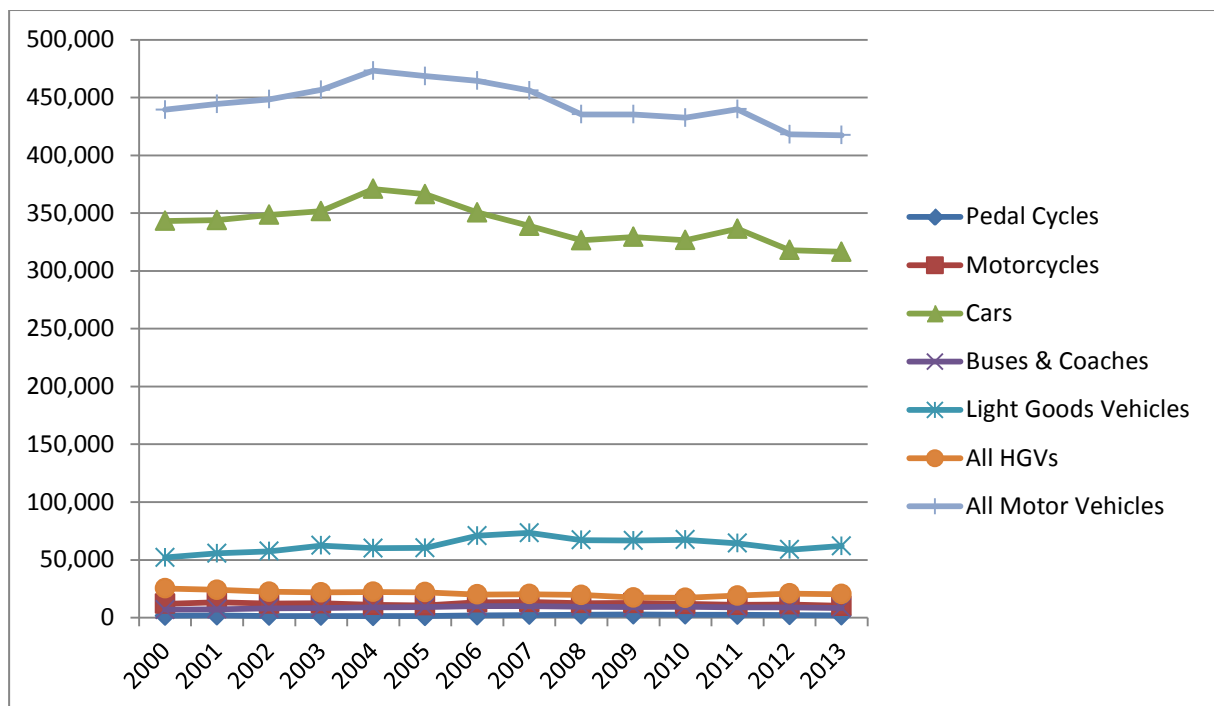
- The identification of the potential scale (large, medium, small) of dust emissions for each stage of work;
- The identification of the level of risk due to the scale of dust emissions on health, soiling (dirt) and the natural environment, depending on activities, their intensity and the sensitivity of receptors
- Best practice methods for controlling dust on-site and to prevent trackout
- Recommendations for monitoring
- Early notification of new 2015 and 2020 standards for non-road mobile machinery

The Council will use this guidance with relevant development proposals in the Borough.

6 Local Transport Plans and Strategies

Traffic has been identified as the principal source of air pollution in excess of the levels set out in the Air Quality Standards Regulations. The highest vehicle flows are found on the major road network which is the responsibility of Transport for London. Traffic counts on the major road network indicate that there has been a small decline in the number of motor vehicles on this network. The decline does not seem to have been of significant magnitude to make an impact on levels of the principal pollutant of concern NO₂

Traffic flows Major Roads in Greenwich



The Royal Borough of Greenwich has an ambitious local transport plan, backed up by supporting documents including a Cycling Strategy, aimed at reducing congestion, increasing sustainable travel, and in doing so contributing to improved local air quality.

The Borough's Local Implementation Plan (LIP) for transport was produced in 2011 and a three year delivery plan update provided for 2014-2017. The annual programme of investment focuses on the delivery of a package of measures that will

reduce single occupancy car use, and increase walking, cycling and public transport.

These measures include:

- The roll-out (Borough-wide) of 20mph zones in all residential areas
- Development of a high quality network of cycling and walking routes across Royal Greenwich
- A supportive package of measures to improve priority for buses and access to bus stops
- A focus on reducing road casualties through local safety schemes and a supportive package of behaviour change initiatives
- Support to improve access to the Borough's public transport networks including rail, tube and DLR stations
- Funding for direct measures to improve air quality including electric vehicle charging points, and support for Car Clubs to reduce overall car ownership levels
- Investigating the potential for piloting the outcomes of the Roads Task Force, including Major Schemes programmes such as Eltham High Street which seek to redress the balance of streets in favour of pedestrians, cyclists and public transport users

In addition to the annual investment programme, the Borough supports the development of strategic public transport links to assist in mode shift away from car use. The Borough has championed the development of Crossrail in the Borough, including a package of complementary measures around our Crossrail stations at Woolwich and Abbey Wood. Royal Greenwich also supports and encourages the use of river services as an alternative to overcrowded public transport and road networks.

A key objective for the Borough is to improve north/south public transport links in Royal Greenwich, including the development of DLR extensions to Eltham and Kidbrooke and creation of better orbital bus routes. Royal Greenwich is also working closely with TfL on a package of high quality bus priority corridors in the Borough.

Royal Greenwich will continue to promote and support a package of Thames River Crossings (including the development of a fixed crossing at Gallions Reach) to ease congestion and facilitate improved access to key employment areas.

These annual investment programmes, and broader strategic objectives, are delivering demonstrable improvements in reducing single occupancy car trips and increasing sustainable transport. Between 2011 and 2014, cycle use in the Borough has more than doubled, whilst walking now accounts for nearly 30% of all trips made by residents. In the last two years (2012-2014) the percentage of all trips made by car has reduced by 2%. Non-car modes of transport make up 55% of all trips originating in Royal Greenwich.

In addition, at a London wide level, the Mayor for London continues to implement a package of London wide measures including LEZ standards, retiring the oldest, most polluting taxis and cleaning up the bus fleet. Together these have been reported to reduce PM₁₀ emissions by an estimated 15%, and NOx emissions by 20%.¹

In February 2013 the Mayor also announced his intention to establish a new Ultra Low Emissions Zone (ULEZ), in central London only, from 2020 to further improve air quality in and close to central London. In its response to the consultation, the Royal Borough supported the principle of the ULEZ but challenged the estimated effectiveness and called for the scheme to be extended to cover the whole of London.

¹ London Atmospheric Emissions Inventory

7 Energy, Climate Change and Sustainability

The Council's Greener Greenwich programme is concerned with tackling climate change in the borough and seeks to ensure that *“Greenwich will have a high quality local environment where resources are used efficiently and are from renewable sources wherever possible. Greenwich recognises its place in the world and seeks to improve the quality of life for everyone, including future generations”*

The Greener Greenwich programme is supported by the borough's Climate Change Strategy, which was published in 2011 and outlines the Council approach to the mitigation of and adaption to climate change and sets targets relating to reducing greenhouse gas emissions and how best to adapt to and minimise the impact of climate change.

In delivering the Greener Greenwich programme the Council:

- Ensures that all new development achieves a high standard of sustainable design and is adaptable to the future impacts of climate change. The Greener Greenwich Supplementary Planning Document (SPD) provides guidance on how new development in Greenwich should be designed and built so that it has a positive impact on the environment.
- Promotes the Mayor's 'Energy Hierarchy' for carbon reduction in building design and supports the development and implementation of decentralised energy and renewable energy proposals to help lower energy demand and increase efficiency
- Promotes behavioural change programmes and schemes to retrofit existing buildings with energy efficiency measures and renewable technologies in order to reduce energy requirements.

- Promotes and protects biodiversity in the borough, ensuring that development considers opportunities to incorporate green infrastructure such as living roofs and walls, which not only benefit biodiversity but also delivers air quality benefits by absorbing pollutants and help to make buildings more thermally efficient.
- Delivers measures and behavioural change programmes that increase active travel awareness and encourage a modal shift away from single car use towards more sustainable options.

8 Implementation of Action Plans

The Council was required to implement an Air Quality Action Plan following its original designation of the AQMA under Part IV of the Environment Act 1995. The Action Plan encompassed measures to be delivered by the Council and other organisations to improve air quality in the Borough; the Action Plan was set out in pursuit of the government's air quality objectives. The Council has thus met and continues to meet its obligations.

A tabular summary of the Council's original Action Plan is provided (see Table 9.1). This confirms that many of the original action plan measures are completed, whilst others have developed further. These however require revision and enhancement to reflect changes and to consider other measures that aim to address the changes and ongoing air quality problems that have prevented a sufficient reduction in concentration in major cities in the UK and also Europe.

In addition to the above, the Mayor for London and TfL are to undertake the following measures that seek to reduce air pollution across London:

- Additional public transport hybrid buses - with 600 new Bus for London vehicles, which alongside a new commitment to deliver another 600 conventional hybrid buses over the next three years would increase the number of hybrid buses to more than 1,600 by 2016
- New Euro Standard 6 buses - the £18m programme to retire the last 900 Euro 3 standard buses in London so that all of TfL's bus fleet will be of Euro 4 Standard or better for NOx emissions by the end of 2015
- Measures to clean up construction sites - these sites are responsible for around 12 per cent of London's NOx emissions and to tackle that the Mayor will introduce a new Low Emission Zone for construction machinery. The standards will be agreed with the construction industry and will be consulted on as part of new Supplementary Planning Guidance (referred to earlier).

The following table provides an update on the revised Royal Borough of Greenwich Air Quality Action Plan. It highlights that all original actions have been either fully completed or are part of the Council's ongoing commitments and duties.

Table 9.1 Action Plan Progress

No.	Action	Status	Follow – up Action	Key Indicators /Monitoring/ Quantification
1	The Royal Borough of Greenwich will continue to implement all measures required of London Boroughs in the Mayor’s Air Quality Strategy (MAQS) and Transport Emissions Roadmap	Ongoing	Latest MAQS released on 14/12/10. Low Emission Strategy Partnership featured. RBG referenced as a case study within the Report. Continue implementation of all measures in MAQS Transport Emissions Roadmap issued September 2014	Monitor measures being met as required by the MAQS & Transport Emissions Roadmap.
2	The Royal Borough of Greenwich fully supports the London Low Emission Zone (LEZ) & a London wide ‘Ultra Low Emission Zone’ (ULEZ)	Ongoing	GLA responsibility. LEZ was introduced in February 2008. Included phased implementation for different category vehicles. Mayor confirmed that the LEZ now affects larger vans, minibuses, motor caravan and other specialist vehicles from 3 rd January 2012. Publicise LEZ restrictions on the Royal Borough of Greenwich website. At the end of 2014, TfL and the GLA proposed the introduction of a ULEZ based on the boundaries of the current congestion charge zone. Royal Greenwich responded to the consultation demanding that the area should be extended to cover the whole of the current LEZ	Effectiveness of LEZ monitored by TfL (e.g. level of compliant vehicles). TfL use RBG air quality monitoring data to quantify emission changes associated to new phases of LEZ restrictions. LEZ restrictions publicised - http://www.royalgreenwich.gov.uk/info/413/pollution_control-air_quality/588/low_emission_zone Introduction of a London wide ULEZ
3	The Royal Borough of Greenwich will implement the Mayor’s Transport Strategy at a local level through the Local Implementation Plan.	On-going	LIP Delivery Plan for 2014-2017 has been through internal consultation process and approved by TfL and Mayor of London.	Each action/ measure in the Transport Strategy and LIP will be fully implemented. Car mode share decreased from 46% to 44% between 2012 and 2014 (3 year rolling averages)
4	The Royal Borough of Greenwich will work with Transport for London and Highways Agency in seeking significant reductions in vehicle emissions on the A102 and the	On-going	TfL have overall responsibility of TLRN. RBG working towards demand management/ pedestrianisation scheme in Greenwich Town Centre with TfL consultation. RBG will support road cleaning and dust suppression	Air quality monitoring alongside TLRN roads (e.g. Woolwich Flyover and Blackheath Hill) will indicate change/ effectiveness in pollutants emissions.

	Transport for London Road Network (TLRN)		techniques on TfL roads around specific identified areas such as Blackwall Tunnel.	
5	The Royal Borough of Greenwich will support and continue to work with Thames Gateway London Partnership (TGLP) to secure improvements in public transport so as to reduce car dependency and implement measures that will improve air quality in the Borough.	On-going	A public transport accessibility program is in progress that results in improved access to stations and bus stops using TfL funding. The Royal Borough of Greenwich is a member of TGLP. TfL and RBG have succeeded in projects such as Crossrail, DLR extensions, tube modernisation and other public transport modes as achievements. TGLP support cross-borough working to improve access to sustainable transport.	Monitor % change in traffic counts and vehicle modes through screen line data, including cycle use. Compare with previous years data. Cycle mode share has increased from 1% (2009) to 2.1% (2014). Walking mode share has increased from 26.7% to 28.5% in same period. Public transport accounts for over one fifth of all trips originating in the Borough, whilst car use has recently declined (see above). Extensive network of bus stop accessibility improvements delivered in 2013/14 and further programme in 2014/15.
6	The Royal Borough of Greenwich promotes walking as a healthy and viable alternative to car transport and will promote cycling as a viable alternative to the car, including the provision of appropriate routes and facilities and during term time through Sustainable School Travel Programs (STPs)	On-going	Walking actions implemented under LIP including improved crossings/ riverside footpaths/ signage. Implementation of Cycling Strategy Action Plan including new routes development, cycle parking and supporting behaviour change programmes (cycle training, school travel plans etc).. Commitment to maintaining and promoting the Green Chain Walk within the borough.	Annual cycling strategy reports contain detailed figures on new cycling networks installed and numbers of children/adults receiving cycle training. In 2013/14 over 200 adults and 1,000 children received training. Annual Sustainable Modes of Travel updates will quantify mode shift achieved through School Travel Plans
7	The Royal Borough of Greenwich 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	Home Zones installed in prior years. The Council has an ongoing programme of 20 mph zones to be rolled out to all residential areas.	20mph zones now cover approximately 40% of the Borough; roll out to be complete in line with funding through LIP programme over forthcoming years. In completed 20mph zones between 1999 and 2009, all severities of casualties have reduced by 57%, and KSIs (Killed and Seriously Injured) have reduced by 69% in those zones.
8	The Royal Borough of Greenwich will assess and help large employers in the Borough develop and implement Transport Plans.	On-going	All major planning applications have to incorporate sustainable modes of travel such as travel planning, car clubs and monitoring. These include service and delivery strategies. Secured through planning	Officers review Travel Plans for all sites and ensure best practice quality through use of ATTrBuTE tool, followed by ongoing review of actions and mode split surveys Development control transport planning

			conditions and obligations.	process has allowed extensive expansion of Car Club bays and members. There are now 45 Car Club bays across the Borough and over 3,000 members.
9	The Royal Borough of Greenwich will seek the further promotion of bus travel through bus service reliability targets set in LIP	On-going	The Council works closely with TfL on the provision of and improvement of bus services.	Excess wait time for buses is currently 1 (2013/14), which is in line with target,
10	The Royal Borough of Greenwich will continue to work with Network Rail and rail operators to secure continuing improvements of the rail service provided to the Borough	On-going	Crossrail secured for Abbey Wood and Woolwich Arsenal station. Lobbying will be made for any additional extensions or other plans of benefit to RBG.	Ongoing monitoring of improvements made to rail network/ service in RBG. TfL Passenger usage shows strong growth at many rail stations across the Borough For example between 2012/13 and 2013/14 the usage at Kidbrooke increased by 19%.
11	The Royal Borough of Greenwich believes that the river Thames is an under used sustainable transport resource and will continue to promote the transportation of people and goods by the river and also continue to protect wharves where viable for the shipment of freight.	On-going	The pier at Woolwich and the QE2 pier near the O2 arena. RBG encourage all major planning proposals close to river to utilise wharves wherever possible for delivery of good, material etc. Currently part of planning process included in the UDP (LDF)	Passenger numbers from piers across Royal Greenwich remain strong. Particular growth seen at Woolwich Arsenal pier towards the end of 2014. In 2014/15 year to date figures show a 16% increase in passenger figures compared to previous data.
12	The Royal Borough of Greenwich 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	The GWT scheme is no longer funded but the Council is working with TfL and a consultancy to evaluate and implement some of the benefits and maintain reserved land for possible future use for an alternative scheme	Current borough bus Excess Wait Time is in line with target performance at 1min delay.
13	The Royal Borough of Greenwich will seek to meet the requirements of the Road Traffic Reduction Act in the Borough through the variety of measures discussed in the Council's Local Implementation Plan.	On-going	The LIP ongoing to 2014, regular review of LIP carried out by internal departments.	The Royal Borough of Greenwich is currently seeing some of the best road casualty reduction figures across London. 2013 KSI figures are 86% less than baseline (2005-2009) in RBG compared to 36% reduction across the capital as a whole
14	The Royal Borough of Greenwich will	On-going	The Royal Borough of Greenwich Parking	There are now 45 Car Club bays across

	use its Parking Strategy to control parking on new developments whilst also discouraging commuter parking and other less essential trips.		Enforcement Plan (in LIP) sets policies to control commuter parking and limit onsite parking on new developments. RBG initiated a successful car club in west of the Royal Borough, clubs now also available in Royal Arsenal and secured for new Kidbrooke Development. Royal Greenwich LDF policy promotes car-free developments and states maximum 1 car space per unit for new residential developments.	the Borough and over 3,000 members, with average utilisation rates of vehicles (over 24hr periods) over 30%.
15	The Royal Borough of Greenwich will maintain the Romney Road 7.5 tonne Lorry Ban in order to protect Greenwich Town Centre from air pollution and vibration.	On-going	Successful Lorry Ban still in place.	Continuous AQ monitoring station installed since 1997 to monitor effect of measure.
16	The Royal Borough of Greenwich will continue to implement traffic restraint measures to help create optimum driving conditions for the prevention of air pollution and to direct heavy good vehicles away from residential areas.	On-going	RBG 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.	Road space re-allocation to cycle and bus lanes in particular have helped contribute to growth/maintenance of those modes and reduction of 2% in car mode share between 2011 to 2013, and 2012 to 2014. Associated benefits in terms of constraining emissions from private vehicles. Roll out of 20mph zones (now covering 40% of the Borough) to all residential zones, with associated traffic calming measures, helps limit HGVs in residential areas.
17	The Royal Borough of Greenwich will seek to develop Freight Quality Partnerships in line with guidance produced by the Mayor for London.	On-going	RBG supports the Mayor's Freight Plan and will also continue to work with Thames Gateway sub-regional group on the freight quality partnership. Freight consolidation centres to be investigated.	Monitor level/ number of freight improvement schemes
18	The Royal Borough of Greenwich will seek to work with TfL, London Councils and the London Boroughs in reviewing the London Night Time Lorry Ban	On-going	Still in force - the Council is participating in TfL reviews.	Monitor progress of review and work undertaken.
19	The Royal Borough of Greenwich will continue to monitor and consult on	On-going	The Council's Environmental Health Department is consulted on all major	Monitor and quantify traffic flow and associated air quality with varying

	significant transport schemes and measures, including those to significantly reduce traffic levels such as those in Greenwich Town Centre.		planning applications. Full time pedestrianisation of Greenwich Town Centre under discussion with TfL.	schemes.
20	The Royal Borough of Greenwich will consider the powers laid down in The Road Traffic (Vehicle Emissions)(Fixed Penalty)(England) Regulations 2002, in conjunction with the Vehicle Inspectorate, London Councils and the London Boroughs	On-going	Vehicle emissions testing can be conducted on public highway. This raises awareness of vehicle emissions to drivers. Monitoring is effective dependant on funding and resources.	Experience of vehicle testing in the Royal Borough of Greenwich and other London Boroughs has shown this to be of limited effectiveness, particularly with the introduction of computer controlled engine management systems.
21	The Royal Borough of Greenwich 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 manufacturers recommendations. The total no. of the RBG's fleet vehicles is 630. Vehicles within scope of LEZ regulations are 450, 75% of which are compliant.	Monitor fleet fuel consumption and % change in emissions from fleet vehicles/ annum.
22	The Royal Borough of Greenwich will encourage and pursue the uptake of low emission vehicles, fuels and technologies such as a bio methane refuelling station at Birchmere Depot and electric vehicle charging points located around the borough.	On-going EcoStars hired on a two year contract from January 2015	All Council vehicles currently operate on ULS diesel and are Euro IV compliant or better. RBG fleet uses Chemcoal fuel additive to increase performance and lower emissions. 12 publicly accessible electric vehicle charging points operational from January 2011. All new major developments are required to implement Low Emission Strategies through S106 agreements including installation of electric charging points. A further 4 rapid charging points are being installed in 2015 The Royal Borough of Greenwich has procured two electric vehicles for use within the Borough. The Royal Borough of Greenwich/Ecostars to contact local fleet operators to promote efficient vehicle fleets	Monitor use of electric charging points operated by BluePoint London, TfLs preferred supplier. The Royal Borough of Greenwich will work with BluePoint London To enhance the network of charging points in the Borough. The Royal Borough of Greenwich has procured two electric vehicles for use within the Royal Borough. Number of fleet operators signed up to EcoStars. Improvement on fleet performance.

23	The Royal Borough of Greenwich will continue to clean Borough roads which will help to remove dirt with the potential for re-suspension	On-going	Highway litter and detritus measured by Cleansweep department in line with Defra's National Indicator 195. Targets set to 2013 to increase cleaning effectiveness.	Cleansweep department quantify and report on NI195, including meeting targets being met for highway detritus and litter.
24	The Royal Borough of Greenwich 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	The Royal Borough of Greenwich achieved level of excellence and aims to increase the recycling rate to the following: 2011/12 38% 2012/13 39% 2013/14 40% 2014/15 41%	Monitor annual rates of recycling compared to set targets
25	The Royal Borough of Greenwich is supporting plans for an Anaerobic Digestion (AD) facility to be located within the borough		Royal Borough of Greenwich explored plans to establish an Anaerobic Digestion plant and entered into negotiations and a tendering exercise in this respect. Plans for the plant were abandoned in April 2014 as a result of falling organic waste tonnages, changes to the contract required by the remaining bidder, and developments in the wider market that meant that prices were reducing elsewhere. The proposal has been replaced by consideration of options for delivering a medium/long term arrangement for the treatment of organic waste.	The delivery of a procurement of capacity at an existing or planned facility.
26	The Royal Borough of Greenwich will continue to prevent air pollution and seek more sustainable forms of development through policies and measures contained in the LDF.	On-going	The Royal Borough of Greenwich Core Strategy contains policies relating to Air Quality and Greener Greenwich SPD provides detailed guidance on how developers can implement sustainable design and benefit air pollution through the use of sustainable materials, installation of energy efficiency and renewable energy, and the installation of green roofs and through landscaping which benefits air quality. The Core Strategy requires that new	Through the London Plan, new major developments of any tenure in The Royal Borough of Greenwich are subject to a range of standards around energy and carbon emissions. Since 1st April 2013 to date there has been 416 applications assessed for energy and carbon reduction. These standards help ensure a high level of energy efficiency in new homes, leading to lower energy bills and reduced fuel poverty. Through these applications there

			development connect to or install a district heating network where possible. The Core Strategy also requires that new major residential development achieves Code for Sustainable Home Level 4 and new major non-residential developments achieve BREEAM Excellent for. In addition the Strategy requires all new development greater than 500sqm or residential development of 10 units or more to reduce CO ₂ , PM ₁₀ and NO ₂ emissions from transport through measures set out in Defra Guidance - Low Emissions Strategies 2010.	has been: <ul style="list-style-type: none"> - The installation of 17909m² of solar photovoltaic panels - The connection of 7700 properties to a district heating network In addition, where feasible planning conditions include a requirement for all new developments to incorporate living roofs.
27	The Royal Borough of Greenwich will continue to require ameliorating measures such as Travel Plans, vehicle fleet improvements, low emission strategies and financial contributions to mitigate emissions via section 106 planning agreements.	On-going	Low Emission Transport Schemes implemented on all major developments. Air quality assessments required on all planning applications with increased transport movements and/or boiler emissions.	Monitor levels of agreed section 106 planning agreements which include measures such as car-free developments, installation of electric vehicle recharging points, new car club bays, car free developments, travel plans. Development control transport planning process has allowed extensive expansion of Car Club bays and members. There are now 45 Car Club bays across the Borough and over 3,000 members. 108 electric vehicle charging points secured in recent years through s106 agreements as part of developments.
28	The Royal Borough of Greenwich will seek to support residents in improving the energy efficiency of their homes both in the public and private sectors	On-going	Continue with the home improvement team and the handy person service. Utilise the Housing Capital Programme and ECO funding to ensure The Royal Borough of Greenwich properties are maintained to a high standard of energy efficiency. Promote access to the Green Deal and ECO to private households through the Council's	Monitor the uptake/installation of measures in RBG households. In 2014/15 significant energy efficiency improvements have commenced at the Barnfield Estate which comprises of 577 properties across 30 blocks and 100 Royal Borough of Greenwich street properties 35 home improvement grants and loans

			ECO delivery partners. Promote high energy efficiency standards and low carbon energy in new developments.	and 26 Royal Greenwich Landlord scheme grant applications have been approved to date in 2014/15.
29	The Royal Borough of Greenwich will implement its Climate Change Strategy	On-going	<p>Climate Strategy focuses on actions to reduce CO₂ but will also have a beneficial impact on NO_x and PM₁₀ reductions. Royal Greenwich has set a borough wide CO₂ reduction target of 80% by 2050 based on a 2005 baseline.</p> <p>The Royal Borough of Greenwich continues to implement the Climate Change Strategy 2011 actions by: ensuring that development in the boroughs meets a high standard of sustainable design and incorporates decentralised energy and renewable energy; promotes behavioural change programmes and retrofit schemes to reduce the energy requirements of existing buildings; and delivers programmes that increase active travel awareness and encourage a modal shift away towards more sustainable travel options.</p>	<p>Annual Greenhouse Gas Report (of RBG's operational emissions and proportion of green electricity) produced by The Royal Borough of Greenwich showing CO₂ reductions. In 2013/14 the Royal Borough's greenhouse gas emissions for were 17.8% lower than the base year 2009-2010 and a 11.3% reduction from the previous reporting year.</p> <p>Annual Borough-wide per capita CO₂ emissions reported by DECC. Per capita emissions in Royal Greenwich have decreased from 5.4 tonnes per capita in 2005 to 4.2 tonnes per capita in 2012. These figures remain relatively unchanged from 2010.</p>
30	The Royal Borough of Greenwich will continue in its regulatory position to enforce Clean Air Act legislation and Statutory Nuisance under the Environmental Protection Act 1990 (particularly for dust), will continue to support the EA with ensuring all Part 'A' Processes use Best Available Techniques (BAT) and will continue to ensure that all Part B Processes in the Borough utilise BAT.	On-going	Ensure that all Part B Installations in the Borough maintain the highest standards of air pollution emission control.	The Royal Borough of Greenwich will ensure all inspected processes comply with their permit. Inspections will meet the minimum Defra risk rating scheme. Permit reviews will take into account local air quality objectives.

31	The Royal Borough of Greenwich will control dust emissions from large scale development sites by ensuring that our Protocol on Dust is adhered to alongside GLA's 'control of dust and emissions from construction and demolition'	On-going	Now use GLA document. Attached as condition to all major planning developments	Measure number of agreed major developments containing conditions of GLA and Council Protocol on dust.
32	The Royal Borough of Greenwich will monitor nitrogen dioxide and PM ₁₀ levels throughout the Borough, supporting the London Air Quality Network and National Automatic Urban and Rural Network, and will continue to expand the automatic monitoring network where feasible.	On-going	NO ₂ diffusion tube survey ongoing with 50+ sites. Automatic PM ₁₀ and NO ₂ at 10 sites in 2010. Work in progress to install monitor close to Blackwall tunnel entrance	Monitor the number of air quality monitors being installed. No reduction in pollution associated to this measure.
33	The Royal Borough of Greenwich will publicise and raise awareness of air quality through a number of mediums.	On-going	AirTEXT posters sent to PCT's and other sources to improve education and awareness to minimise personal pollution exposure. Idling engines signs mounted on each primary school in Borough. Signs around ferry and other locations being investigated. Involvement in proactively disseminating air quality information and guidance/ advice to public to be completed at Council events.	Monitor and pursue greater uptake of subscriptions to airTEXT for increased awareness. Monitor level of events attended by Pollution Team to raise awareness.

9 Conclusions and Proposed Actions

9.1 From New Monitoring and Modelling Data

In line with all boroughs bordering central London the 2013 monitoring results within the Borough confirmed that the annual mean nitrogen dioxide objective continues to be exceeded at some roadside and nearby locations. The sites monitored are considered to represent relevant exposure. The modelled predictions for the Borough also confirmed that the annual mean nitrogen dioxide objective continues to be exceeded at roadside and background locations. 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.

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

9.2 Relating to New Local Developments

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.

9.3 Other Conclusions

The measures outlined in the Council's Action Plan are either completed or still continuing as ongoing commitments. The Council is now working with partners, including the Greater London Authority, Transport for London, Environment Agency

and neighbouring London Boroughs and District councils on air quality improvement projects. The Council is also continuing to seek funding to optimise and focus further air quality actions.

9.4 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.

10 References

Carslaw, D.C., Beevers, S.D. Westmoreland, E. Williams, M.L. Tate, J.E., Murrells, T. Stedman, J. Li, Y., Grice, S., Kent, A. and I. Tsagatakis (2011). Trends in NO_x and NO₂ emissions and ambient measurements in the UK. Version: July 2011.

Defra, 2007. Air Quality Strategy for England, Scotland, Wales and Northern Ireland (Volume 1). Defra, London. Cm 7169.

Defra, 2009a. Local Air Quality Management, Technical guidance LAQM.TG09. Defra, London.

KCL, 2012. Air Quality in London GLA Health and Environment briefing note. KCL July 2012.

KCL, 2014. Reference PM₁₀ measurements at Manor Road, Bexley. KCL July 2014

Royal Borough of Greenwich (2013). Local Air Quality Management – Updating and Screening Assessment 2012.

Transport for London (2013) Local Implementation Plan (LIP) 2014/15 to 2016/17 Guidance, TfL 2013

11 Appendices

Appendix 1: Part A installations in 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 MB	Storage and treatment of hazardous oil waste (mineral-based non-chlorinated insulating and heat transmission oils)	UK Power Networks Holdings Limited	Eltham Grid Sub Station, Rochester Way Relief Road	SE9 2RN
EA/EPR/BP3 131HD/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 1CP/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

Appendix 2: 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 1TX	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