2014 Air Quality Progress Report for The Royal Borough of Kensington and Chelsea

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

May 2014

THE ROYAL BOROUGH OF
KENSINGTON
AND CHELSEA

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Executive Summary

Under the government's Air Quality Strategy, all local authorities are required to assess air quality within their borough annually. Kensington and Chelsea Council has been doing this for two decades and continues to be seriously concerned about the impact of air pollution on health. During this time evidence for the health effects has grown.

In 2000, the whole borough was declared an Air Quality Management Area (AQMA) on the basis that certain government air quality objectives, for nitrogen dioxide and particulate matter, would not be met. In 2003, the Council published its first Air Quality Action Plan (AQAP), which set out the steps the Council would take to work towards meeting these objectives. In September 2009, the Council published its current Action Plan as this comes to the end we are in the process of developing a new plan and engaging with stakeholders.

This latest progress report reviews air quality data collected in 2013 for the strategy pollutants; nitrogen dioxide (NO_2), particulate matter (PM_{10}) carbon monoxide, sulphur dioxide and benzene, 1, 3- butadiene, lead, benzo(α)pyrene (which is used as a marker for a complex group of hydrocarbons - PAH). Information on $PM_{2.5}$, and ozone is also included as these pollutants are also regarded as significant threats to health.

The second part of this report provides a summary of the implementation of the actions contained in the Air Quality Action Plan 2009 -2014 (Section 9). This reports good progress with most plans. We have continued to reduce emissions from Council buildings and vehicles and have seen increased collaborative working with our Public Health Team on raising awareness of the health impacts of poor air quality. With financial support from Defra and the Mayor of London we have also completed projects working with businesses and several schools to raise awareness and consider measures they may be able to introduce to reduce emissions and personal exposure to these.

It is of some comfort to note that the review of the monitoring data shows that most pollutants (excluding NO_2, PM_{10} and ozone) remain well within their respective objective levels.

The situation for NO_2 remains a concern. Monitoring at the borough's five continuous monitoring sites shows that exceedences of the annual mean NO_2 objective level have occurred at all sites apart from the North Kensington background site. There was a decline at some sites however there was no consistent pattern. We still require large reductions in concentrations, in the order of approximately 60% of total emissions, at the worst affected road side locations. The number of exceedences of the hourly mean objective vary from site to site, from none at the North Kensington background site to 444 at the Knightsbridge roadside site (compared to the 18 exceedences permitted).

Monitoring of PM_{10} at our three sites shows that these have all met the annual mean objective since 2008. Two out of three sites met the daily mean objective, but the

Earls Court site has not achieved this since 2010. Therefore it is likely that other sites may be at continued risk of exceedences.

The lack of progress in reducing NO_2 levels and the continued exceedence of the daily mean PM_{10} objective level are seriously worrying, particularly given the substantial reduction needed to meet the objective levels for NO_2 and the EU time limit of 2015. The UK is the first of the EU's 28 Member States to receive enforcement action on NO_2. This is the beginning of the legal enforcement process, which is likely to lead to the imposition of fines that may be passed on to regional and local government.

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1 Introduction

1.1 Description of Local Authority area

The Royal Borough of Kensington and Chelsea is a densely populated urban environment located to the west of central London. The borough extends from Chelsea Embankment in the south, through Kensington, Notting Hill and Ladbroke Grove up to Kensal Green to the north. It is bounded by Bayswater, Kensington Gardens and Belgravia to the east and by the West London Railway Line to the west. Kensington and Chelsea has less open space compared to other boroughs, however it has 26 public parks and open spaces, eight of which are categorised as major parks due to a combination of size and range of facilities. It is home to several major museums and part of the Imperial College campus.

Although the borough is geographically one of the smallest in London, at just over 4.7 square miles, it is one of the most densely populated areas in Europe – the current population is estimated at 190,000 people and there is a high population turnover estimated at over 20 per cent per year. The borough is primarily residential in character. There is a varied mix of housing with an estimated 29,000 dwellings in the private rented sector; 34,613 owner occupied and approximately 1900 homes available for social renting.

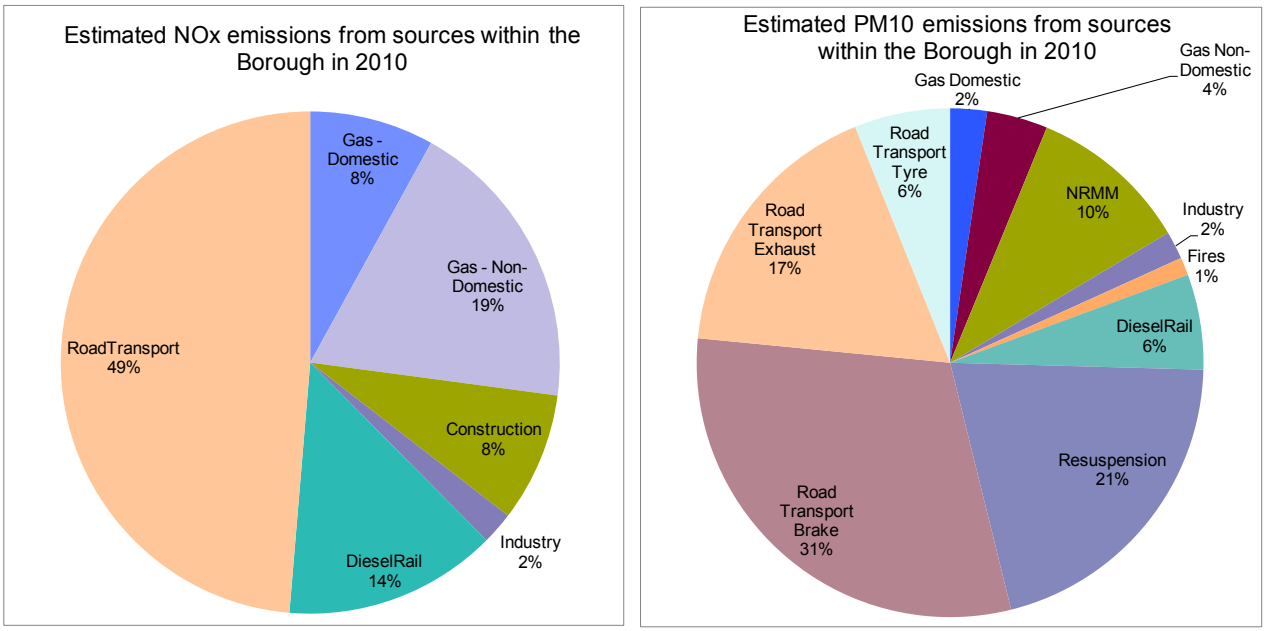
In addition to residential accommodation, the borough is also home to internationally recognised shopping centres, 12,000 businesses and over 120,000 jobs, three of the most visited museums in the UK and the second largest number of hotel beds in any London borough.

The borough has a large volume of commuter traffic; people both travelling across and into the area, and local residents travelling within and outside the borough. The area is relatively well served by the London Underground network with the Circle, District, Central, Piccadilly and Hammersmith and City Lines running through the borough. Although currently there is no over-ground rail service actually within the borough, the West London Line stations at Shepherds Bush, Kensington Olympia, West Brompton, and Imperial Wharf are easily accessible to residents and visitors in those localities. There is an extensive bus network.

There are 207 km (127 miles) of roads in the Borough. The Westway (A40), Cromwell Road (A4), the Earl‟s Court one-way system (A3220) and Chelsea Embankment (A3212) are all part of the Red Route network and Transport for London (TfL) is the Highway Authority for these routes they make up 12.5 km of the roads in the borough. The Council is the Highway Authority for all other adopted roads. The available north/south or east/west routes are constrained by bridges which mean that these are heavily trafficked. They are also often major retail areas with heavy pedestrian flows.

Emission sources

The emission sources of pollutants from within the borough are mainly from transport, residential and commercial activities. A large proportion of the pollution however arises from beyond the borough"s immediate area including neighbouring boroughs, the urban area as a whole and further afield from national and European sources. The contribution of NO_x and PM_{10} from the various sources within the borough in 2010 (based on the London Atmospheric Emissions Inventory (LAEI) released in 2013) is presented in the graphs below. Changes in the assumptions used for predicting emissions shows that emissions of NOx from transport are a bigger proportion than in previous inventories; this is likely to be due to a better understanding of how transport emissions reductions are not occurring as expected. For PM10 information is now also available for re-suspension, tyre and brake wear. Other sources which account for less than one percent are not shown (for NOx these include aviation, construction, oil, shipping etc).

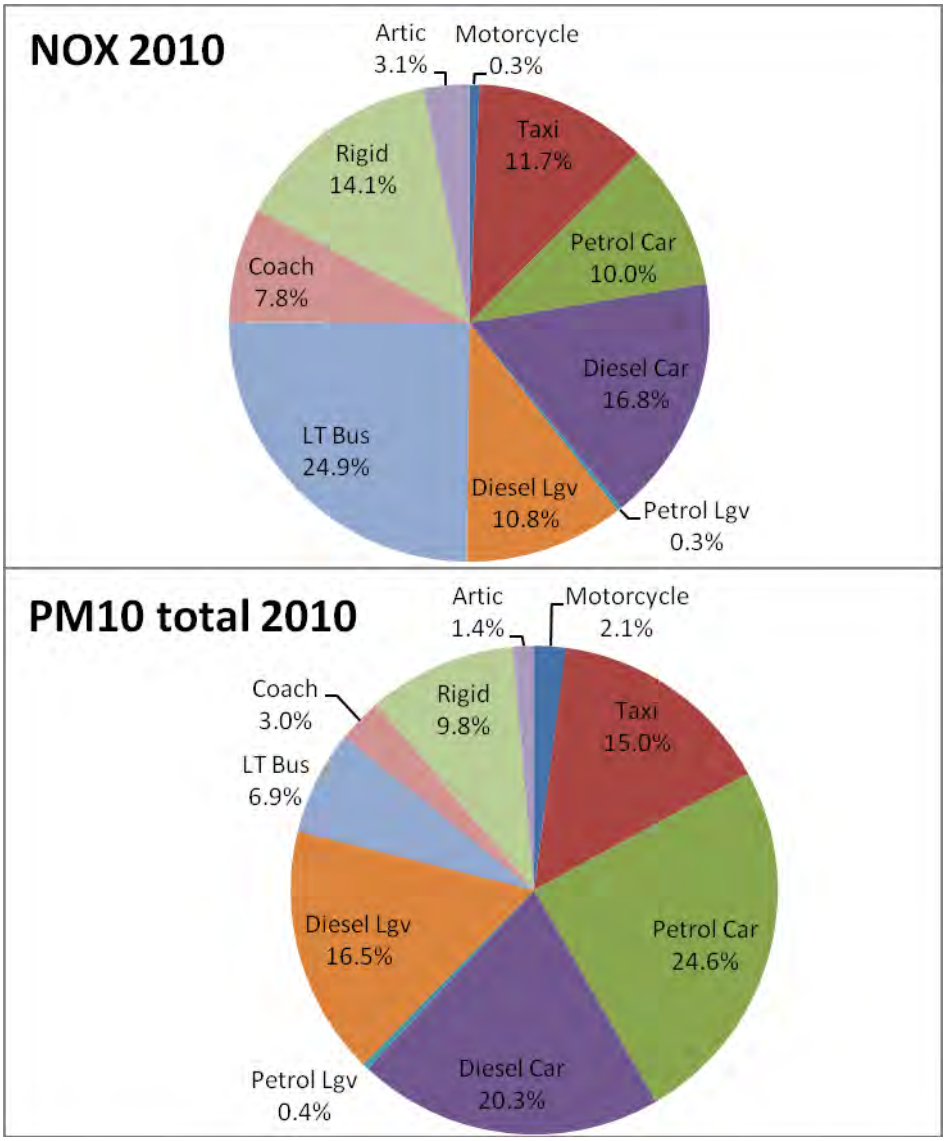


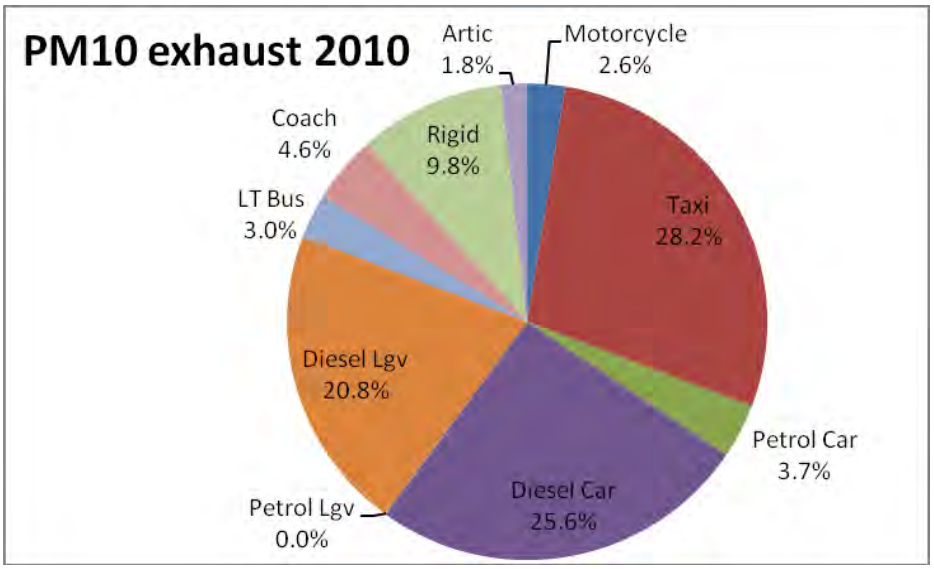
Data source LAEI 2010 (Published **2013**) showing modelled emissions for 2010.

The latest inventory shows the most significant source of NOx is road transport (49%) followed in descending order by gas emissions (28%), diesel rail (14%) and construction (8%). The most significant source of PM_{10} from within the borough is road transport (a combination of exhaust and road/tyre breakdown totalling 54%); however the next most important source is re-suspended materials (21%) and Non Road Mobile Machinery (10% - note this will be based on assumptions regarding the level of construction activity in the borough).

The charts overleaf focussing on transport emissions show the breakdown of emissions of NOx and PM10 from different vehicle and fuel types. These show that emissions from diesel vehicles accounts for 90% of transport emissions of NOx and 96% of tail pipe emissions of PM10. Additionally for PM10 the total emissions which include tyre and brake wear emissions are also estimated as these are now included in the latest inventory.

For NOx, cars (not including Taxis) are the main source at 26.8% of the total; however diesel fuelled cars contribute the larger fraction of this (16.8% of the total). Car sources are followed closely by buses(24.9%), then heavy duty vehicles (17.2% combining rigid and artic lories), taxis (11.7%), diesel LGV (10.8%) and coaches (7.8%) as the main sources. While taxis (28.2%), diesel cars (25.6%), diesel LGVs (20.8%)are the three main sources of exhaust emissions of PM_{10} .





1.2 Purpose of the report

This progress report fulfils the requirements of the Local Air Quality Management (LAQM) process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas and 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 and prepare an Air Quality Action Plan setting out the measures it intends to put in place in pursuit of the objectives.

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), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre (μg/m^3), except for carbon monoxide, where the units used are milligrammes per cubic metre (mg/m^3). Table 1.1 includes the number of permitted exceedences in any given year (where applicable).

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

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 μg/m^3	Running annual mean	31.12.2003

	5.00 µg/m^3	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of previous Review and Assessments

1.4.1 First round of Review and Assessment

Stages one to three

The Council completed the first round of Review and Assessment in 2000. It consisted of three stages which involved examining the sources of pollution, identifying the contribution of each source followed by a review of monitoring data, and finally a prediction of concentrations for the key deadlines using modelling. By the end of stage three, after a process of elimination, the following conclusions were reached.

Table 1.2 Summary of results of first round of Review and Assessment

Pollutant	Assessment
NO_2	High likelihood the borough would exceed the annual mean and hourly mean objective along many of the major roads in the borough.
PM_{10}	High likelihood that the borough would exceed the 24 hour mean

	objective at a few locations.
SO_2	Virtually no likelihood that the borough would exceed the objectives for sulphur dioxide.
CO	No likelihood that the borough would exceed the objectives for carbon monoxide.

Following a major public consultation in the summer of 2000 a decision was reached by the full Council to declare the whole of the borough an Air Quality Management Area (AQMA). The Order making the declaration came into force on the 6th December 2000 and was based on exceedences of nitrogen dioxide (NO_2) and particulate matter (PM_{10}).

Figure 1:1 Map of AQMA Boundary

Stage Four

Stage four was carried out to check the results of the previous reports in light of the latest air monitoring results at the time and further modelling work. This was completed in August 2003. It also took into account the revised information gathered on road traffic emissions, which essentially acknowledged that the exhaust emissions of newer vehicles were not as clean as previously claimed. There were some differences between the modelling undertaken previously, but exceedences were still being predicted for both NO_2 and PM_{10}. In addition the further work eliminated any concerns regarding carbon monoxide and sulphur dioxide. Alongside this, the Council‟s first Air Quality Management Plan was produced, setting out 25 actions that the Council should take to work towards improving air quality.

1.4.2 Second round of Review and Assessment

An Updating and Screening Assessment (USA) was conducted as part of the second round. This was published in December 2003. The purpose of a USA is to identify whether any changes have taken place with the seven pollutants, highlighted in Table 1.1, since the previous assessment. A Detailed Assessment (DA) must then be undertaken if this is the case. We concluded that a DA was unnecessary. The following year we submitted a combined Air Quality and Action Plan Progress report.

1.4.3 Third round of Review and Assessment

A further USA was undertaken as part of the third round of assessment in April 2006. Each pollutant was dealt with individually and considered against the updated guidance checklist at the time. Progress reports are undertaken in years when USAs are not required.

1.4.4 Fourth round of Review and Assessment

An Updating and Screening Assessment was completed in 2009. The latest monitoring data was reported for each pollutant and we re-examined all sources using the checklists provided in the Department of Environment, Food and Rural Affairs‟ (Defra) Local Air Quality Management Technical Guidance LAQM TG (09) to see if any significant changes had occurred. Following changes to guidance issued in 2009 we concluded that a further assessment was required in relation to emissions from the Paddington to Swansea railway line. In 2010 a joint review and assessment report and action plan update report was produced. In 2011, the final part (a progress report) of the fourth round was published.

1.4.5 Fifth round of Review and Assessment

An Updating and Screening Assessment was completed in 2012 followed by a Progress Report in 2013. This 2014 progress report forms the final part of the fifth round of review and assessment. All reports since 2003 are available for download from the Council‟s air quality WebPages:

http://www.rbkc.gov.uk/environmentandtransport/airquality/reportsanddocuments.aspx

2 New Monitoring Data

2.1 Summary of monitoring undertaken

2.1.1 Automatic monitoring sites

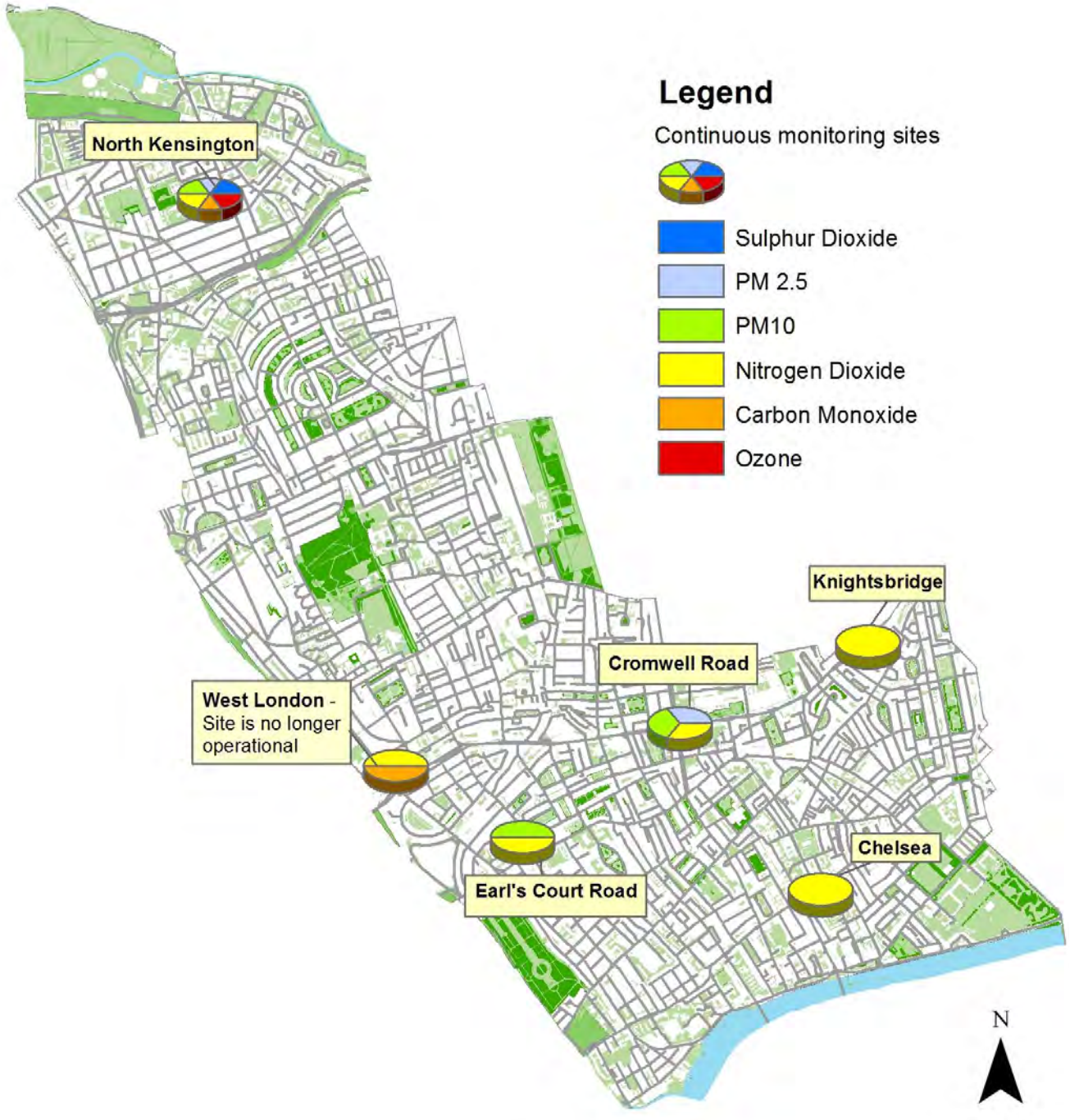
We have automated continuous monitoring at five sites in the borough. Figure 2.1 shows the locations of these sites in the borough and detailed information about each is contained in Table 2.1. In addition, information is included for the West London and Cromwell Road sites that were operated by Defra because data from these are included in the report. The Council also operates one gravimetric instrument, a partisol, located at the Earl‟s Court site. This type of instrument samples air continuously, but does not provide real time data (see glossary in Appendix C) as the filters must be weighed manually.

The Council took over the operation of the NOx analyser at Cromwell Road site due to the continued exceedence of the NO2 objective following Defra‟s decision to stop gaseous pollutant monitoring at the long running site at the end of September 2012. In addition Defra also ceased to monitor heavy metals (including lead) at the same site at the end of 2013. The West London site, though closed by Defra in 2007, is retained in the table as long term trends incorporate data from here.

Air quality data for 2013 has been included in the report where it is available but is largely provisional. The map overleaf shows continuous sites operating between 2006 and 2013.

Quality control and assurance
Calibrations of the monitoring instruments are carried out at fortnightly intervals by contractors. Automated data that we collect is subject to quality control and audit procedures by Kings Environmental Research Group (Kings ERG) and is disseminated via the London Air Quality Network (LAQN). In addition independent consultants carry out audits annually. An equipment servicing unit is also contracted to service equipment twice annually and to investigate and repair faults in order to maintain high quality data and good data capture. The North Kensington site is further scrutinised by Defra‟s contractors as it is affiliated to the Automatic Urban and Rural Network (AURN). Further information on data collection and quality control is included in Appendix A.

Figure 2:1 Map of automatic monitoring sites



Status: Final
Date: April 2014
Author:Environmental Quality

Table 2.1 Details of automatic monitoring sites

Site Code	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA ?	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?
KC1	North Kensington	Urban background LAQN & AURN affiliate	X 524045	Y 181752	Nitrogen oxides PM_{10} Carbon monoxide Sulphur dioxide Ozone Other Defra/ERG monitoring undertaken: PM_{10} & $PM_{2.5}$	Chemiluminescent FDMS and TEOM GFC Fluorescence UV Photometric FDMS , partisols	Y	Y	N/A	N
AURN to Sept 2012	Cromwell Rd/ Cromwell Rd 2	Roadside, AURN	X 26524	Y 178965	Nitrogen oxides Carbon monoxide Sulphur dioxide Other monitoring undertaken: Lead and heavy metals	Chemiluminescent GFC Fluorescence UV Partisol	Y	Y	3.5m from Cromwell Road	N
KC2	Cromwell Rd 2	Roadside, LAQN	X 26524	Y 178965	PM_{10} $PM_{2.5}$	FDMS FDMS	Y	Y	Approx within 8m of Cromwell Rd and 5m of Queens Gate.	N
AURN	West London Closed in 2007	Urban background AURN	X 25026	Y 178741	Nitrogen oxides Carbon monoxide	Chemiluminescent	Y	Y	50m from Warwick Rd	N
KC3	Knightsbridge	Kerbside, LAQN	X 27518	Y 179395	Nitrogen oxides	Chemiluminescent	Y	Y	Located on the kerb of Hans Road and 4m from Brompton Rd	Y
KC4	Kings Rd Chelsea	Roadside, LAQN	X 27268	Y 178089	Nitrogen oxides	Chemiluminescent	Y	Y	Approx 8m from Kings Rd	N
KC5	Earls Court	Kerbside, LAQN	X 25695	Y 178363	PM_{10} gravimetric Nitrogen oxides	Partisol plus Chemiluminescent	Y	Y	Sited on the kerb of Earls Court Rd	Y

2.1.2 Non-Automatic Monitoring

Monitoring data for benzene and nitrogen dioxide (NO_2) is collected using passive diffusion techniques (in addition to continuous monitoring). The borough participates in the London Wide Environmental Programme (LWEP) offered by Bureau Veritas for the provision and analysis of diffusion tubes. Further details on the laboratory, method, bias adjustment and quality control are in Appendix A.

Figure 2:2 Map of non-automatic nitrogen dioxide monitoring sites

Site code	Diffusion tube location
KC31	Ladbroke Grove/North Kensington Library
KC32	Holland Park
KC33	Cromwell Road/Earls Court Road
KC34	Dovehouse Street
KC35	Brompton Road/Cottage Place
KC38	Earls Court Station

Site code	Diffusion tube location
KC39	Lots Road/Upcerne Road
KC40	Brompton Road
KC41	Ladbroke Crescent
KC42	Pembridge Square
KC43	St Marks Grove
KC44	Donne Place
KC45	Chatsworth Court
KC46	Malborough Court -closed
KC47	Sion Manning School
KC48	Sloane Square
KC49	Harrods
KC50	Chelsea Physic Gardens 1
KC51	Chelsea Physic Gardens 2
KC52	Sloane Avenue School
KC53	Walmer House
KC54	Cromwell Road/Natural History Museum
KC55	Blantyre Street
KC56	Chelsea Old Town Hall
KC57	Pavillion St/Sloane Square
KC58	Kensington High Street/Campden Hill Rd
KC59	Kensington High Street/Argyll St
KC60	Old Brompton Rd
KC61	Fulham Rd/Limerston St
KC64	Warwick Road
KC65	Barlby Road
KC66	Acklam Road
KC67	Octavia House/Southern Row
KC68	Exhibition Road
KC69	Darfield Way

The diffusion tube site at Marlborough Court (KC46) shown above is no longer in use, but is still included in the map as historical data is available for the site.
The figure below shows all locations where benzene has been monitored, however only five sites are now in operation as the KC03 site was re-located in 2006 following the closure of the petrol station.

Figure 2:3 Map of non-automatic benzene monitoring sites

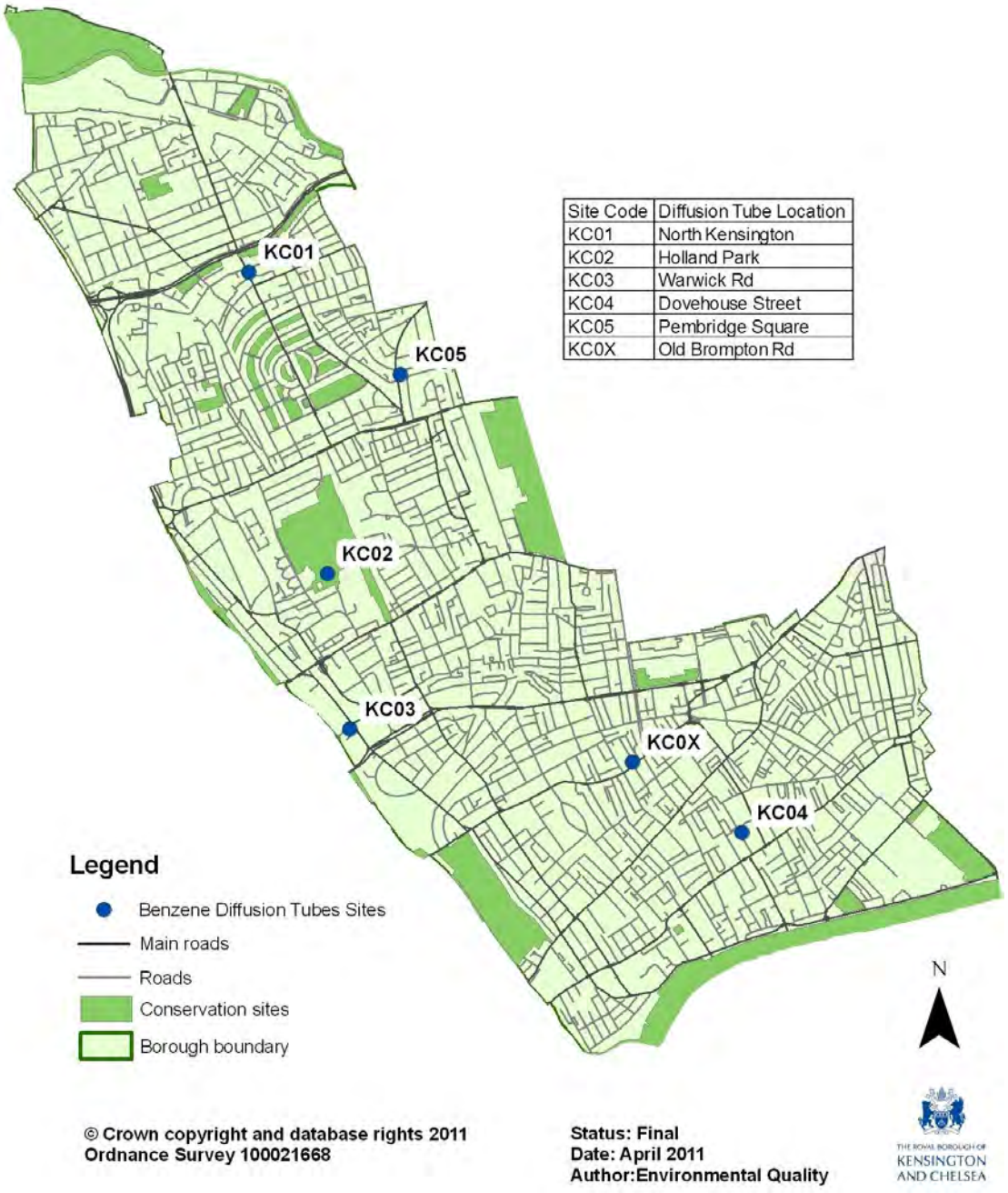


Table 2.2 overleaf provides further details of the 33 NO_2 and five benzene diffusion tube sites operating in the borough in 2011/12.

Table 2.2 Details of non- automatic monitoring sites

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A)*	Worst-case Location?
KC31	Ladbroke Grove/Nth Ken Library	Roadside	X 524342	Y 181271	NO_2	Y	Y	3.5m	No
KC32	Holland Park	Urban Background	X 524784	Y 179599	NO_2	Y	Y	380m	No
KC33	Cromwell Rd/ Earls Court Rd	Roadside	X 525355	Y 178841	NO_2	Y	Y	1.1m	Yes
KC34	Dovehouse Street	Urban Centre	X 527164	Y 178103	NO_2	Y	Y	26m	No
KC35	Brompton Road/ Cottage Place	Roadside	X 527192	Y 179185	NO_2	Y	Y	8m	No
KC38	Earls Court Station	Roadside	X 525548	Y 178556	NO_2	Y	Y	1.7m	Yes
KC39	Lots Road/ Upcerne Road	Roadside	X 526317	Y 177022	NO_2	Y	Y	8.1m	No
KC40	Brompton Road	Urban Centre	X 527214	Y 179153	NO_2	Y	Y	65m	No
KC41	Ladbroke Crescent	Urban Background	X 524294	Y 181200	NO_2	Y	Y	70m	No
KC42	Pembridge Square Library	Roadside	X 525191	Y 180705	NO_2	Y	Y	6m	No
KC43	St Marks Grove	Urban Background	X 525950	Y 177487	NO_2	Y	Y	38m	No
KC44	Donne Place	Urban Background	X 527335	Y 178810	NO_2	Y	Y	55m	No
KC45	Chatsworth Court	Roadside	X 525263	Y 178936	NO_2	Y	Y	13m	No
KC46	Marlborough Court- closed	Roadside	X 525157	Y 178892	NO_2	Y	Y	8m	No
KC47	Sion Manning School	Urban Background	X 524046	Y 181758	NO_2	Y	Y	8.5m	No
KC48	Sloane Square	Roadside	X 528011	Y 178675	NO_2	Y	Y	7m	No
KC49	Harrods	Urban Centre	X 527516	Y 179395	NO_2	Y	Y	4m	Yes
KC50	Chelsea Physic Garden (Gate)	Roadside	X 527726	Y 177727	NO_2	Y	Y	4m	No
KC51	Chelsea Physic Garden (Met Station)	Urban Background	X 527690	Y 177800	NO_2	Y	Y	92m	No
KC52	Sloane Avenue	Roadside	X 527411	Y 178659	NO_2	Y	Y	2.6m	No
KC53	Walmer House	Urban Background	X 523792	Y 181189	NO_2	Y	Y	12.5m	No

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location?
KC54	Cromwell Rd/ Natural History Museum	Roadside	X 526550	Y 178968	NO_2	Y	Y	3.1m	No
KC55	Blantyre St	Urban Background	X 526608	Y 177429	NO_2	Y	Y	100m	No
KC56	Chelsea Old Town Hall	Roadside	X 527268	Y 178089	NO_2	Y	Y	9m	No
KC57	Pavillion St/ Sloane Ave	Roadside	X 527889	Y 179145	NO_2	Y	Y	3m	No
KC58	Kensington H St/Kensington Church St	Roadside	X 525630	Y 179674	NO_2	Y	Y	13m	No
KC59	Kensington High St/Argyll St	Kerbside	X 525342	Y 179464	NO_2	Y	Y	0.7m	No
KC60	Old Brompton Rd/ Draycott Ave	Kerbside	X 526231	Y 178425	NO_2	Y	Y	0.7m	No
KC61	Fulham Rd/ Limerston St	Roadside	X 526377	Y 177867	NO_2	Y	Y	10m	No
KC64	Warwick Road	Roadside	X 524825	Y 178902	NO_2	Y	Y	3.5m	No
KC65	Barlby Road	Roadside	X 523899	Y 182113	NO_2	Y	Y	0.5m	No
KC66	Acklam Road	Railway	X 524541	Y 181893	NO_2	Y	Y	16m	No
KC67	Southern Row	Railway	X 524056	Y 182148	NO_2	Y	Y	38m	Yes
KC68	Exhibition Road	Kerbside	X 526863	Y 179060	NO_2	Y	Y	0.5m	Yes
KC69	Darfield Way	Background	X 523587	Y180893	NO2	Y	Y	11.7m	No
KC01	Ladbroke Grove/Nth Ken Library	Roadside	X 524342	Y 181271	Benzene	Y	Y	3.5m	No
KC02	Holland Park	Urban Background	X 524784	Y 179599	Benzene	Y	Y	380m	No
KC03	Warwick Rd - Petrol Station (forecourt) now closed	Petrol station	X 524911	Y 178736	Benzene	Y	Y	N/A	No
KC04	Dovehouse Street	Urban Background	X 527111	Y 178165	Benzene	Y	Y	45m	No
KC05	Pembridge Square Library	Roadside	X 525191	Y 180705	Benzene	Y	Y	6m	No
KC0X	Old Brompton Rd/ Clareville Grove Petrol St	Petrol station	X 526496	Y 178553	Benzene	Y	Y	N/A	No

2.2 Comparison of Monitoring Results with Air Quality Objectives

Nitrogen dioxide

There are two objectives for nitrogen dioxide (NO_2). A short term objective of 200µg/m^3 not to be exceeded more than 18 times per year as a one hour mean, and a longer term objective of 40µg/m^3 as an annual mean. The deadline for achieving these objectives was the end of 2005. The whole of the borough was declared an Air Quality Management Area in 2000 on the basis that NO_2 and PM_{10} (to a lesser extent) would not meet their objectives.

Monitoring data

Automatic chemiluminescent analysers and passive diffusion tubes are used to monitor NO_2 in the borough. The latter method provides more limited data but does allow levels to be compared to the annual mean objective at a greater number of locations than would be practicable by continuous methods alone.

Automatic monitoring data

Continuous monitoring is undertaken at five sites in the borough. Details of these sites are included in Table 2.3. The automatic monitoring results are shown in Tables 2.3 and 2.4. Another site in London, Marylebone Rd, has also been included for comparison purposes. The results have been assessed against the annual mean and the hourly mean objectives. All sites are located at distances which are representative of residential building facades with the exception of Earls Court which is relevant for short term exposure.

Table 2.3 Results of automatic monitoring for nitrogen dioxide: comparison with annual mean objective

Site ID	Location	Within AQMA?	% Data Capture calendar year 2013	Annual mean concentrations (µg/m^3)				
				2009	2010	2011	2012	2013
KC1	North Kensington	Y	99	33	37	36	37	37
KC5	Earls Court	Y	92	107	113	100	101	*94*
KC2	Cromwell Rd 2	Y	69	72	74	66	69	*60*
KC3	Knightsbridge	Y	99	89	91	81	92	*89*
KC4	Kings Road Chelsea	Y	94	93	91	91	92	*83*
AURN	Marylebone Rd	Y	93	107	98	97	94	85

*Data capture for Cromwell Rd site in 2013 is 69%. Means should normally be "annualised" if monitoring is less than 9 months however this has not been undertaken. Source: Londonair.org.uk. Data in *italics* is provisional and should be treated with caution. **Bold** indicates an exceedence of the annual objective (Table 1.1).

Preliminary results for 2013 are shown in Table 2.3 (data for 2012 has also been updated following that reported in the previous progress report with some concentrations being revised upward after final data ratification had been completed). All sites apart from the background site showed a drop in levels compared to the 2012 results however this should be treated with caution as data for 2013 is not fully

ratified and may be affected as indicated. However all sites other than the background site remain above the annual mean NO_2 objective level of 40 µg/m^3 by more than twice the concentration.

Figure 2.4 shows the longer term trend since 2000 in the borough (plus one other site in central London). Overall the concentrations have declined.

Figure 2:4 Trends in annual mean nitrogen dioxide concentration measured at automatic monitoring sites

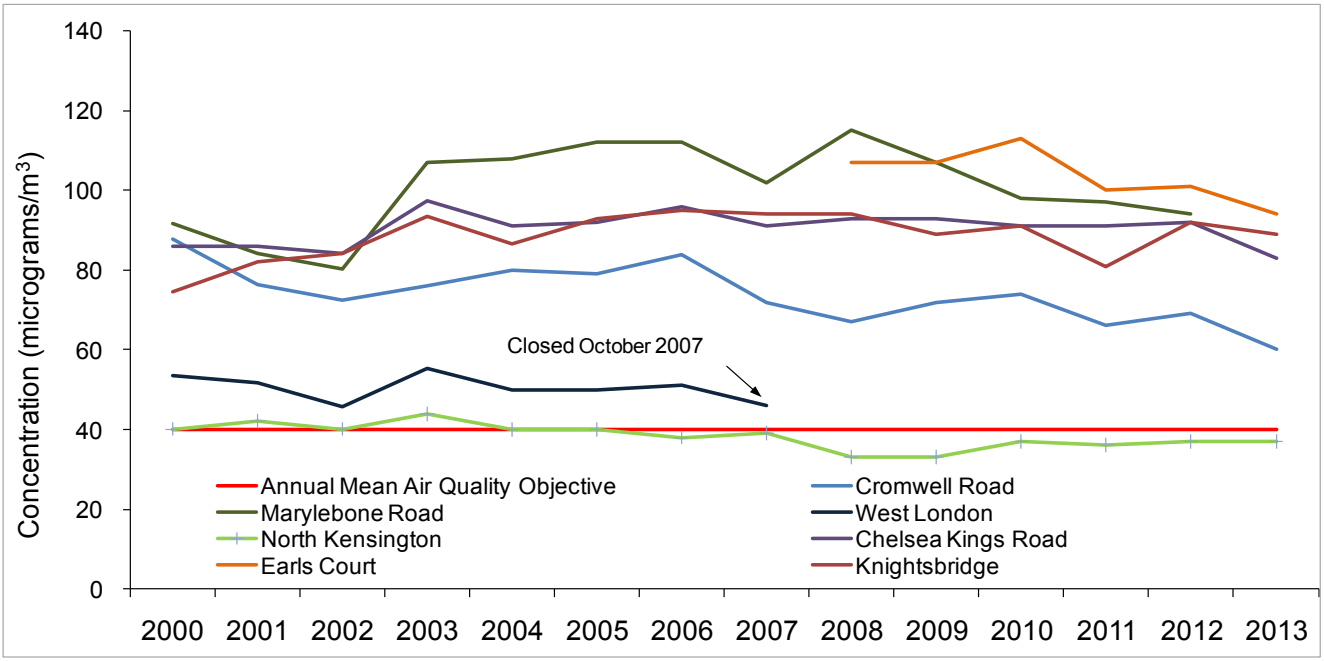


Table 2.4 Results of automatic monitoring for nitrogen dioxide: comparison with 1-hour mean objective

Site ID	Location	Within AQMA ?	% Data Capture calendar year 2013	Number of Exceedences of hourly mean (200 µg/m^3) Where valid data is less than 90% the 99.8th percentile of hourly means is shown in brackets				
				2009	2010	2011	2012	2013
KC1	North Kensington	Y	99	1	0	0	1	0
KC5	Earls Court*	Y	92	414	515	386	323	*131*
KC2	Cromwell Rd 2	Y	69	3	1	4	2	*12*
KC3	Knightsbridge	Y	99	358	307	181	500	*455*
KC4	Kings Road Chelsea	Y	94	72	63	76	74	*47*
AURN	Marylebone Rd	-	93	477	534	222	132	62

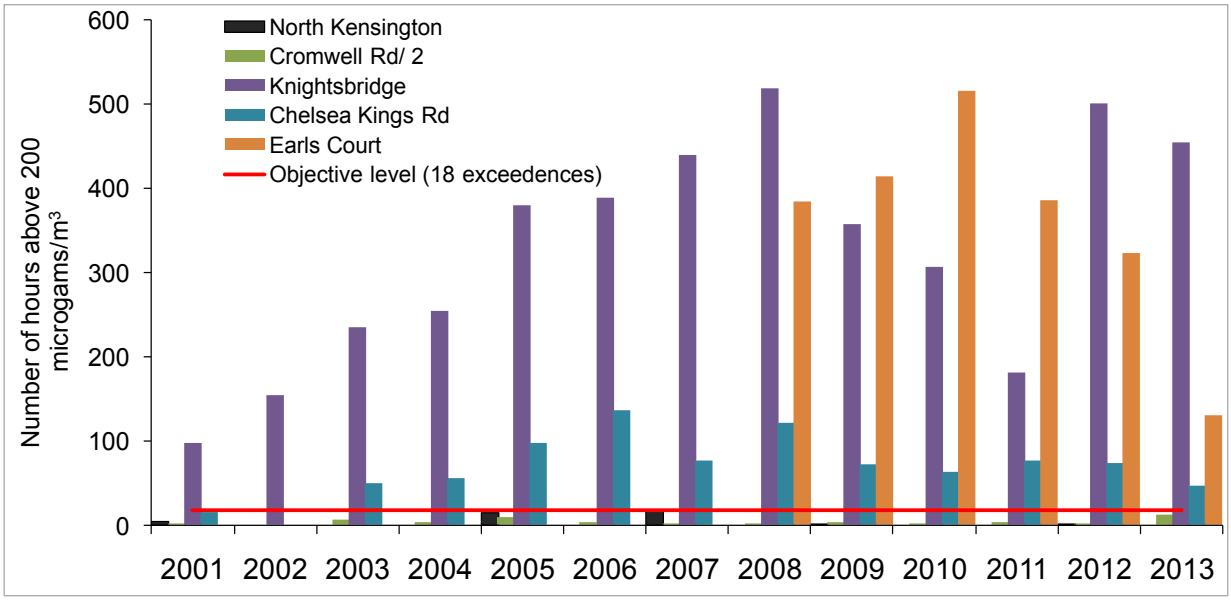
2013 data (in italics) is provisional and should be treated with caution. Source Londonair.org.uk.
Bold indicates an exceedence of the hourly mean objective (Table 1.1).
Ratified 2012 data increased number of hourly exceeds

Table 2.4 shows exceedences of the hourly mean (above 200µg/m^3) for NO_2. The preliminary data shows considerable variation from site to site, with no exceedences at the background site and between12 to 455 at the remaining sites (only 18 exceedences are permitted). Whilst levels appear to have dropped compared to 2012 it is important to note that the ratified data for 2012 resulted in the number of exceedences being revised upwards for Earls Court, Knightsbridge and Kings Road.

The significant differences in the number of exceedences illustrate that local site characteristics and vehicle fleet mix at each location play a very important part. Three of the five sites in the borough exceed the objective by a very wide margin.

The chart below shows the number of hourly exceedences measured at sites in the borough since 2001 (monitoring at Earls Court began in 2008). As mentioned, the hourly objective should not be exceeded more than 18 times in a year. The highest exceedences were measured in 2008 at the Knightsbridge site and at the Earls court site in 2010. Though there have been some reductions in the number of exceedences, they still remain significantly above the objective level.

Figure 2:5 Trends in the hourly mean nitrogen dioxide concentration measured at automatic monitoring sites



All the sites are representative of public exposure for either one or more of the objective values.

Diffusion tube monitoring data

Diffusion tube data for NO_2 was collected at 33 locations in 2013, one new site at Darfield Way was introduced however this data is not yet reported. The details of all the diffusion tube sites can be found in Table 2.2, in addition Appendix B shows a map of diffusion tubes and residential properties in the borough.

Table 2.5 presents the factored annual mean concentrations for 33 sites in 2013. The data is adjusted to take into account any potential difference between the continuous monitoring and the diffusion tube methods. The bias adjustment factor is calculated by Bureau Veritas using data collected at the boroughs AURN affiliated site. The bias adjustment factor for 2013 has been calculated as 1.14. Details of the analytical laboratory and bias adjustment methodology are described in Appendix A.

The results indicate that 29 sites were above the objective level. Of these, a further fourteen are at risk of exceeding the hourly mean objective (shaded cells), i.e. where the annual mean is above 60$\mu g/m^3$. This is consistent with the results from the continuous monitoring sites. The highest annual mean concentrations were recorded

outside Earls Court station and at the junction of Cromwell Road/Earls Court Road. Those not exceeding the objective were largely urban background sites such as Holland Park, Chelsea Physic Garden and Sion Manning School.

Table 2.5 Results of nitrogen dioxide diffusion tubes

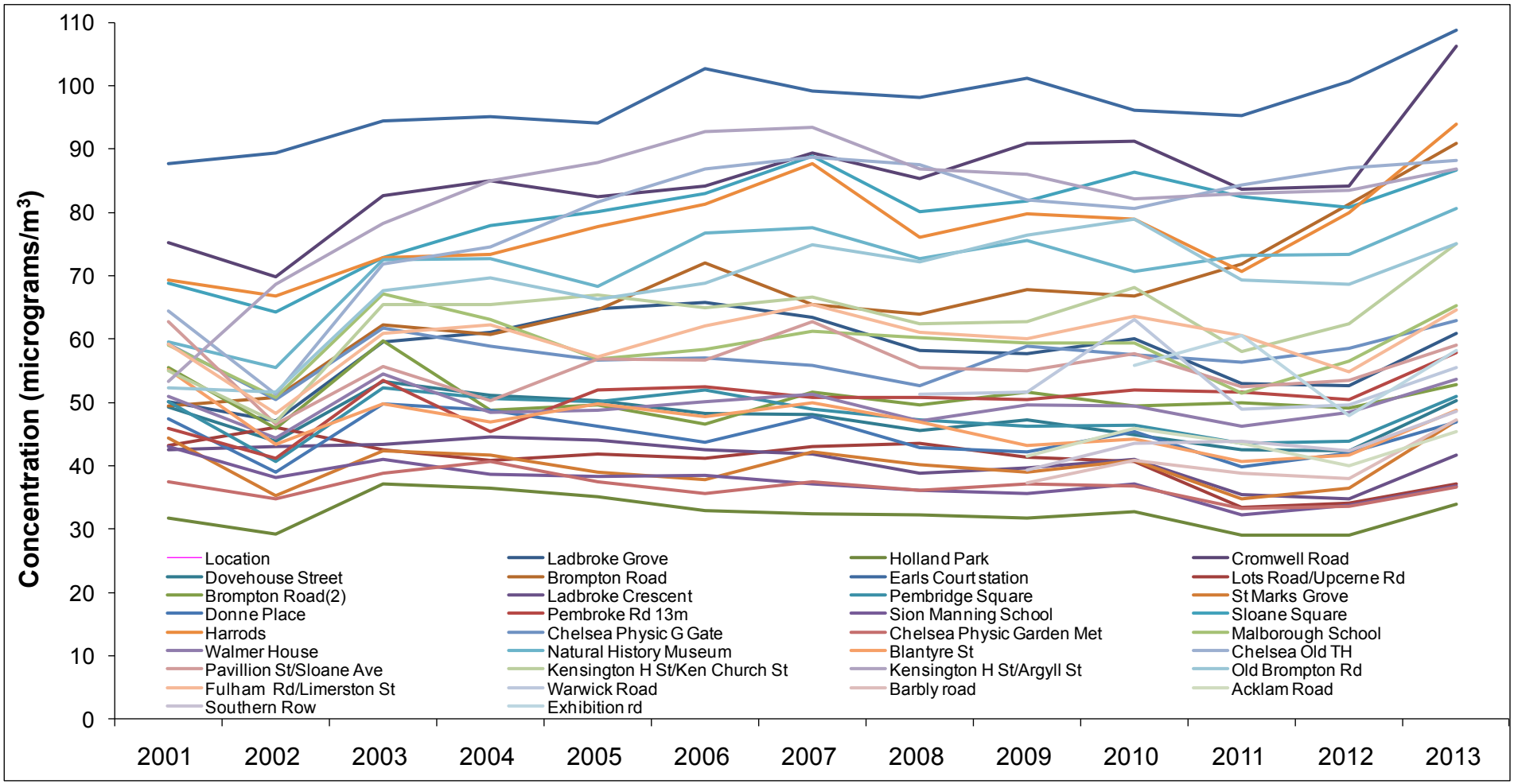
Site ID	Location	Within AQMA?	Data Capture % for full calendar year 2013	Annual mean concentrations (μg/m^3) Adjusted for bias (shown below)					Change between 2012 and 2013
				2009 1.00	2010 1.06	2011 1.02	2012 1.04	2013 1.14	
KC31	Ladbroke Grove/Nth Ken Library	Y	100	**57.7**	**60.0**	**52.9**	**52.6**	**60.9**	8.3
KC32	Holland Park	Y	92	31.7	32.8	29.0	29.1	34.0	4.9
KC33	Cromwell Road/Earls Court Rd	Y	92	**90.9**	**91.2**	**83.6**	**84.2**	**106.3**	22.1
KC34	Dovehouse Street	Y	100	**47.2**	**44.9**	**42.6**	**42.4**	**50.3**	7.9
KC35	Brompton Road/Cottage Place	Y	100	**67.9**	**66.8**	**71.8**	**81.3**	**90.9**	9.6
KC38	Earls Court Station	Y	100	**101.2**	**96.1**	**95.3**	**100.7**	**108.8**	8.1
KC39	Lots Road/Upcerne Road	Y	100	**41.4**	**40.7**	33.4	34.0	37.1	3.1
KC40	Brompton Road	Y	100	**51.6**	**49.5**	**49.9**	**49.1**	**52.9**	3.8
KC41	Ladbroke Crescent	Y	100	39.6	**40.9**	35.5	34.8	**41.7**	6.8
KC42	Pembridge Square Library	Y	100	**46.3**	**46.4**	**43.5**	**43.8**	**50.9**	7.1
KC43	St Marks Grove	Y	100	39.1	**40.8**	34.8	36.5	**47.1**	10.6
KC44	Donne Place	Y	100	**42.1**	**45.3**	**39.9**	**42.1**	**47.0**	4.9
KC45	Chatsworth Court	Y	100	**50.5**	**52.0**	**51.7**	**50.5**	**57.9**	7.4
KC47	Sion Manning School	Y	100	35.6	37.1	32.3	33.8	36.7	2.9
KC48	Sloane Square	Y	100	**81.8**	**86.3**	**82.4**	**80.8**	**86.6**	5.8
KC49	Harrods	Y	83	**79.8**	**79.0**	**70.6**	**80.0**	**94.0**	14
KC50	Chelsea Physic Garden (Gate)	Y	100	**58.9**	**57.5**	**56.4**	**58.5**	**62.9**	4.4
KC51	Chelsea Physic Garden (Met Station)	Y	100	37.1	36.8	33.2	33.5	36.6	3.1
KC52	Sloane Ave. nr Marlborough school	Y	92	**59.4**	**59.4**	**51.5**	**56.5**	**65.3**	8.8
KC53	Walmer House	Y	100	**49.6**	**49.4**	**46.3**	**48.5**	**53.6**	5.1
KC54	Cromwell Rd/Natural History Museum	Y	100	**75.6**	**70.7**	**73.2**	**73.4**	**80.6**	7.2
KC55	Blantyre St	Y	100	**43.2**	**44.3**	**40.6**	**41.7**	**48.8**	7.1
KC56	Chelsea Old Town Hall	Y	83	**81.9**	**80.6**	**84.3**	**87.1**	**88.2**	1.1
KC57	Pavillion St/Sloane Ave	Y	100	**55.0**	**57.7**	**52.5**	**53.5**	**59.0**	5.5
KC58	Kensington H St/Kensington Church St	Y	92	**62.8**	**68.2**	**58.1**	**62.4**	**75.0**	12.6
KC59	Kensington H St/Argyll St	Y	100	**86.1**	**82.2**	**83.0**	**83.4**	**86.9**	3.5
KC60	Old Brompton Rd/Draycott Ave	Y	100	**76.4**	**78. 9**	**69.3**	**68.6**	**75.1**	6.4
KC61	Fulham Rd/Limerston St	Y	92	**60.0**	**63.5**	**60.5**	**54.9**	**64.7**	9.8
KC64	Warwick Rd	Y	100	**51.7**	**63.0**	**49.0**	**49.6**	**55.5**	5.9
KC56	Barlby Road*	Y	92	**39.6**	**40.8**	38.8	38.0	**47.2**	9.2
KC66	Acklam Road*	Y	100	**43.4**	**45 9**	**43.5**	39.9	**45.4**	5.4
KC67	Southern Row*	Y	100	**41.6**	**43.6**	**43.8**	**42.3**	**48.7**	6.3
KC68	Exhibition Road	Y	100	**-**	**55.9**	**60.6**	**48.0**	**58.3**	10.3

Bias adjustment factor 2011=1.02, 2010= 1.06; 2009 = 1.00; 2008 = 0.98; (see Appendix A), KC47 and KC54 are the mean results of triplicate exposure. **Bold** indicates an exceedence of the annual mean objective of 40 μg/m^3 (Table 1.1). Underlined figures indicate a risk that the 1-hour objective may also be exceeded. * period mean reported in 2009 (May 2009- March 2010)

A comparison of annual mean levels showed that all sites measured higher concentrations in 2013 compared to 2012.

Figure 2.6 on the next page illustrates the trend since 2001. Overall, many sites (mainly roadside locations) have recorded increased levels; there are however some signs of improvement but no clear indication of a consistent downward trend other than at a small number of background locations.

Figure 2:6 Trends in annual mean nitrogen dioxide concentration measured at diffusion tube monitoring sites (factored)



Overall nitrogen dioxide conclusions

Despite some improvements in nitrogen dioxide levels at some sites, the borough continues to exceed the annual mean objective by an appreciable margin. The annual mean is exceeded at four out of five of the boroughs continuous sites and twenty-nine of the diffusion tube sites. Reductions of almost 60$\mu g/m^3$ are required at the worst road side positions; up to 40$\mu g/m^3$ are required at building facade locations on busy and congested roads, e.g. at distances of 8m as typified by the Kings Road/Knightsbridge sites. Roads which are less trafficked or where better dispersal characteristics exist, reductions of a few micrograms to 20$\mu g/m^3$ are needed. Background locations such as parks and school grounds or roads which have „access only traffic" are currently meeting the objective level.

The hourly mean is exceeded at three out of four of the continuous roadside monitoring sites and is likely to be exceeded at approximately over a third of diffusion tube monitoring locations. These are predominately the busier roadside locations such as High Streets. Hourly exceedences would have to be reduced by well over 400 hours to meet the objective level (of no more than 18 exceedences of 200$\mu g/m^3$) at the worst affected location.

The extent of these exceedences continues to have serious health implications. At some individual sites, levels are more than twice the annual objective level. We continue to fail the government objectives and time is running out for this borough and other parts of inner London to meet the EU objectives by 2015.

Particulate Matter (PM_{10})

There are two objectives for particulate matter (PM_{10}), to be achieved by 2004, which are incorporated in the Air Quality Regulations; 40µg/m^3 as an annual mean and 50µg/m^3 as a daily mean, not to be exceeded more than 35 times a year (see Table 1.1). The whole of the borough was declared an AQMA in 2000 partially based on exceedences of the 2004 PM_{10} objectives at certain locations.

Monitoring data

Monitoring of PM_{10} is challenging because of its complex and varied composition. In addition there are a wide range of instruments and methods that are available and these in turn produce variations in the way that particulate matter is sampled, resulting in differences in the measured concentrations. In recent years there has been much work on identifying methods „equivalent" to the EU reference. These issues have meant that a consistent long term dataset has been harder to achieve as exists with other pollutants.

Automatic monitoring of PM_{10} (using TEOM instruments) first began in 1995 in North Kensington (urban background site) and later from 1998 at the Cromwell Road site (roadside). These TEOM instruments were replaced and upgraded, respectively, to FDMS units in 2009 as they were no longer considered equivalent to gravimetric methods. The Council has also operated a partisol (gravimetric sampler equivalent to the EU reference method) at the Earls Court Road since May 2002. As the North Kensington site is affiliated to the AURN, Defra has also operated partisol instruments at the North Kensington site.

The monitoring data included in the report includes correction factors where applicable. Where TEOM data has been included the Volatile Correction Method (VCM) correction factors have been included. Partisol and FMDS data does not require any correction.

The North Kensington and Cromwell Road sites are representative of public exposure for both the long and short term objective values according to the definition in Defra"s LAQM TG (09) whilst the Earls Court site which is as a kerbside location is not considered representative. However it is important to note that this is not a reasonable conclusion as there is no known threshold level at which no health effects are detectable and current objectives are weaker than the provisional more stringent objectives which were not adopted.

Table 2.6 shows particulate data collected in the borough and at other central London locations (for comparative purposes) using various methods and adjustments between 2008 and 2013. Comparisons with air quality objectives should be treated with caution where concentrations are close to the objective level in 2013 data as the data is unratified.

All monitoring sites within the borough met the annual mean objective level in 2013. Only small increases have been observed at North Kensington and Cromwell Road however it is important to note that the more stringent objective for PM10 was never adopted.

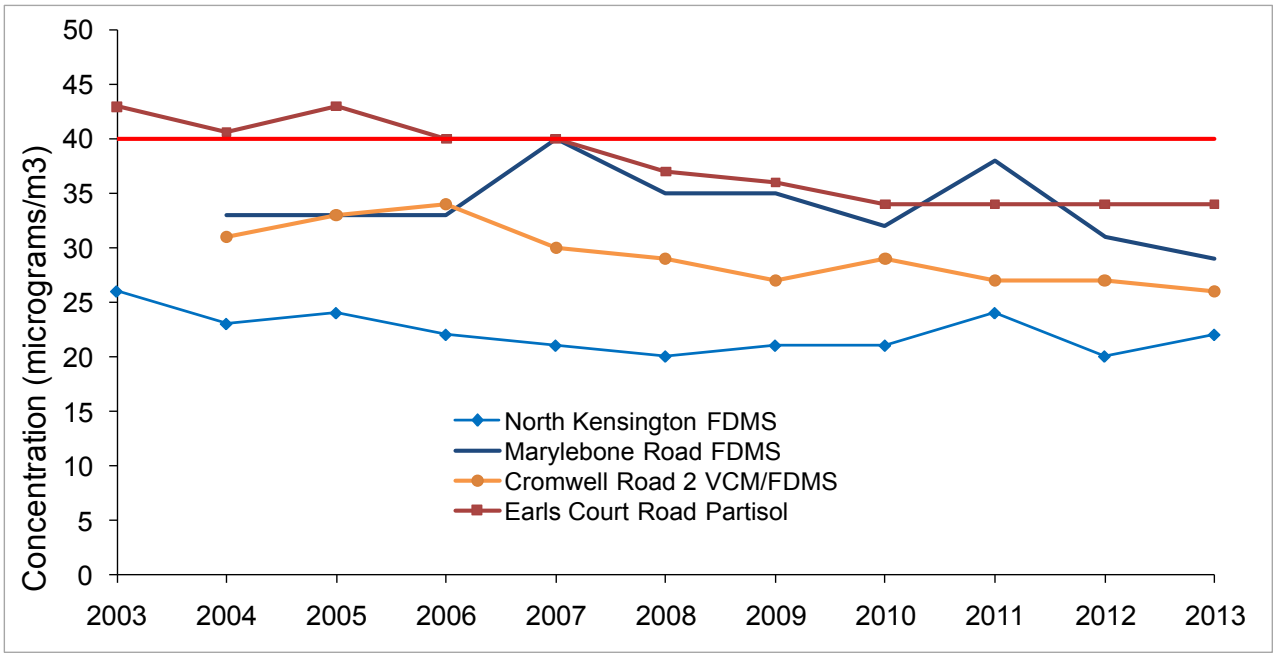
Table 2.6 Results of PM_{10} automatic monitoring: comparison with annual mean objective

Site ID	Location and method	Adjst. Method	Within AQMA?	Data Capture				Annual mean concentrations ($\mu g/m^3$)				
				2010 %	2011 %	2012 %	2013 %	2009	2010	2011	2012	2013
KC1	North Kensington TEOM	VCM	Y	96	93	97	99	21	20	23	20	21
KC1	North Kensington FDMS	None	Y	64	84	81	95	21	21	24	20	*22*
AURN	N Kensington Partisol	None	Y	95	95	98	98	20	16	19	18	*19*
KC2	Cromwell Rd 2 VCM corrected /FDMS from 2010	VCM	Y	62	74	67	91	27	29	27	27	*26*
KC5	Earls Court Partisol	None	Y	98	87	96	87	36	34	33	34	*34*
AURN	Marylebone Rd TEOM	VCM	-	96	97	93		42	35	41	37	34
AURN	Marylebone Rd FDMS	none	-	91	93	85	93	37	32	38	31	29
AURN	Marylebone Rd Partisol	none	-	82	81	96	98	33	30	35	31	*29*

Data in *italics* is provisional and should be treated with caution.

The chart below (Figure 2.7) indicates that sites in the borough over the longer term show an overall downward trend though more recently concentrations remaining steady. The concentration at Earls Court in particular has remained stable between from 2010 through to 2013.

Figure 2:7 Trends in annual mean PM_{10} concentrations measured at automatic monitoring sites



The table below shows data for exceedences of the daily mean objective for three sites in the borough and other sites in central London. The data includes various monitoring methods. As with last year, all sites within the borough met the daily mean objective level apart from the Earls Court site. There continues to be a notable number of days above 50μg/m^3 at North Kensington and Cromwell Road, 12 and 14 respectively, though this is well within the objective level.

Table 2.7 Results of PM_{10} automatic monitoring: comparison with 24-hour mean objective

Site ID	Location and method	Factor	**Within AQMA?**	Data Capture					Number of exceedences of 24 hourly mean >50 μg/m^3 - 35 are permitted 90th %tile shown in brackets where data capture less than 90 %				
				2009 %	2010 %	2011 %	2012 %	2013%	2009	2010	2011	2012	2013
KC1	N. Kensington TEOM	VCM	Y	98	96	93	97	99	6	3	15	7	*6*
KC1	North Kensington FDMS		Y	86	65	84	81	95	3	3	17	12	*9*
AURN	North Kensington Partisol	None	Y	81	95	95	98	98	7	2	14	11	*8*
KC2	Cromwell Rd2 TEOM/FDMS	VCM to 2010	Y	95	62	74	67	91	14	11	8 (42.1)	13	*12*
KC5	Earls Court Partisol	None	Y	95	90	98	96	87	43	30	42	43	*39*
AURN	Marylebone Rd TEOM	VCM	Y	97	96	97	93		37	46	76	44	25
AURN	Marylebone Rd FDMS	none	-	96	91	93	85	94	44	22	57	23	21
AURN	Marylebone Rd Partisol	none	-	97	82	81	96	98	36	15	34	27	*23*

Data in *italics* is provisional and should be treated with caution. Very low data capture for 2008 partisol data at KC1 and Marylebone Rd

Figure 2:8 Trends in daily mean PM_{10} concentrations measured at all monitoring sites

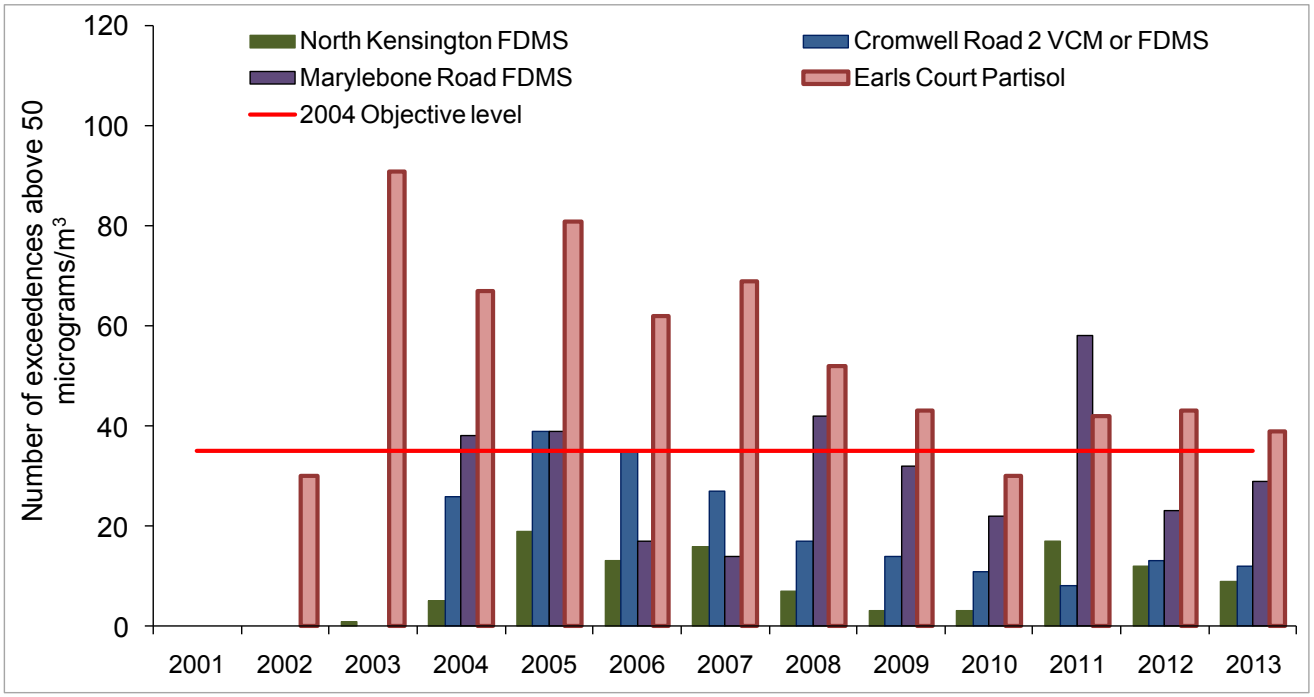


Figure 2.8 shows the longer term trend in number of 24hr periods exceeding the permitted allowance of 35. There is considerable variation in the number of exceedences from year to year but overall the number have declined over the long term. However since 2011 the levels have become more stable; the Earls Court monitoring site continues to exceed the daily mean objective level.

PM_{10} conclusions

Monitoring at the three sites in the borough reveals that all sites, including Earl‟s Court, have met the annual mean objective for PM_{10} since 2008. The daily mean objective has been met at the North Kensington and Cromwell Road sites but not at the Earls Court site. It is likely that there are other locations in the borough that are be close to or above the objective level for the daily mean objective, but we are only able to comment on those areas where monitoring is in place.

Particulate Matter ($PM_{2.5}$)

The latest Air Quality Strategy[1] set a cap of 25µg/m^3 for particulate matter ($PM_{2.5}$) and a likely target of a 15 per cent reduction in annual mean concentrations at urban background locations by 2020. This reduction approach is a replacement for the indicative 2010 objectives set for PM_{10} in the 2000 strategy and 2003 addendum. However, there is no requirement for local authorities to report against these exposure reduction targets. Nevertheless as the PM_{10} annual mean objective now appears to have been achieved across London, this $PM_{2.5}$ metric will become increasingly more relevant. Information on current levels has therefore been included below.

[1] Defra (2007) The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland

Table 2.8 shows $PM_{2.5}$ data for sites in the borough and two other central London sites for comparison purposes. These results indicate that levels at these locations are currently within the cap level. Levels for 2012 have declined slightly compared to 2011. The concentration at Marylebone Road is 21.6µg/m^3 which suggests that other locations may be close to the cap. Also it should be noted that the data is not fully ratified and should be treated with caution.

Monitoring data

Monitoring of $PM_{2.5}$ is only undertaken at a relatively small number of locations in the London area. $PM_{2.5}$ has been monitored in the borough by Defra, using a gravimetric instrument, at the North Kensington site since 2002. This monitoring was interrupted in October 2007 following concerns about the filters used in these instruments. Monitoring restarted in 2008 and is now additionally monitored with an FDMS instrument (a continuous method). It has also been measured at Cromwell Road since the autumn of 2009.

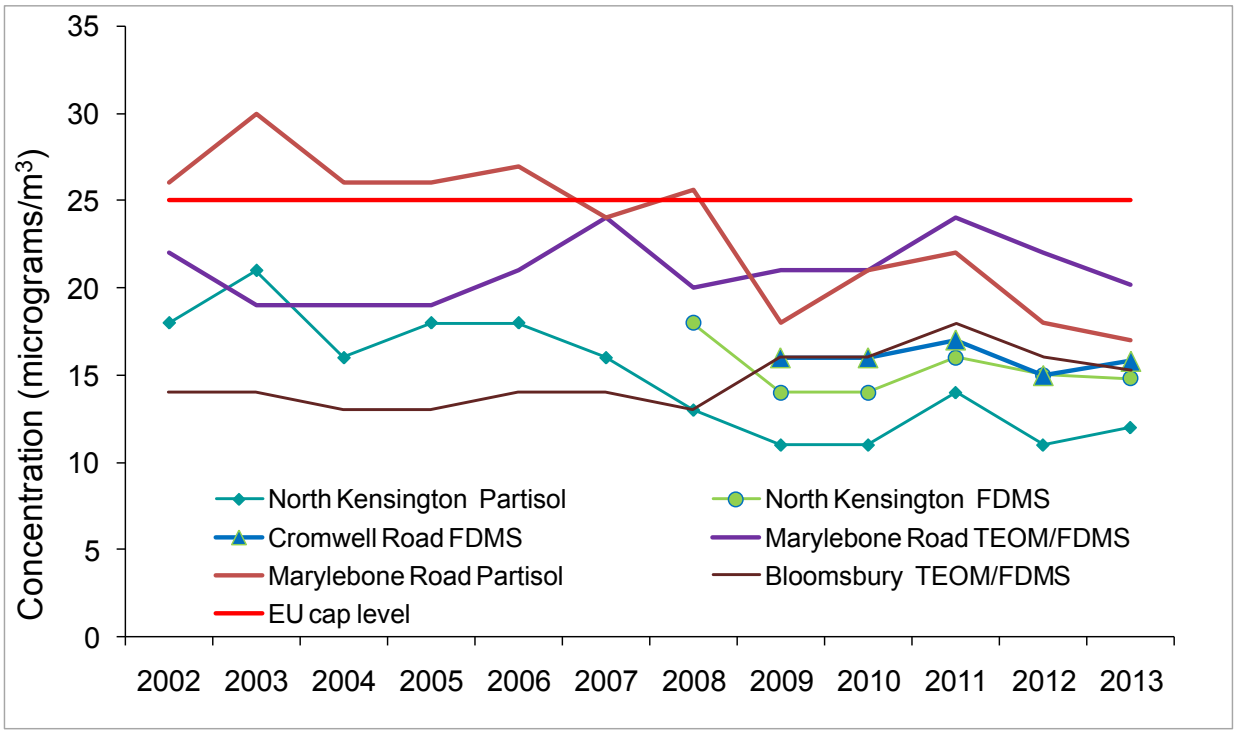
Table 2.8 Annual mean level of $PM_{2.5}$ automatic monitoring

Site ID	Location	Within AQMA ?	Data Capture %					Annual mean concentrations (Cap Level 25µg/m3) (µg/m^3)				
			2009	2010	2011	2012	2013	2009	2010	2011	2012	2013
KC1	North Kensington FDMS	Y	97	93	92	89	97	14	14	16.4	14.5	14.8
AURN	N Kensington Partisol	Y	89	88	87	94	95	11	11	14	11	*12*
KC2	Cromwell Rd 2 FDMS	Y	33	14	41	75	90	16	16	16.6	14.8	*15.8*
AURN	Bloomsbury TEOM/FDMS	-	91	89	98	98	96	16	16	17.5	16.2	15.3
AURN	Marylebone Rd FDMS	-	-	58	95	92	96	21	21	24.5	21.6	20.2
AURN	Marylebone Rd Partisol	-	81	28	82	80	99	18	21	22	18	*17*

*Monitoring of $PM_{2.5}$ at Cromwell Road began in 2009. Data in *italics* (2009) is provisional and should be treated with caution. **Bold** indicates an exceedence of the hourly mean objective (Table 1.1). *Italics* represent unratified data.

The figure below shows concentrations have been below the EU cap level since 2002 for sites in the borough. Overall the levels in more recent years appear to be lower compared the period prior to 2008. This may be in part due to changes in the monitoring networks which affected the equipment and methods used, note for example, the difference in results measured by partisol and FDMS units at North Kensington.

Figure 2:9 Trends in annual mean $PM_{2.5}$ concentrations measured at all monitoring sites



In addition to the cap there is also a requirement for a percentage reduction level based on the Average Exposure Index (AEI) to be calculated from the national average $PM_{2.5}$ concentrations for 2009-2011. The average $PM_{2.5}$ concentration for 2009-2011 was calculated as being between 13-14 µg/m^3, based on data from Jan 2009 to Jul 2012 from 47 $PM_{2.5}$ stations, this would require the UK to comply with a 15% reduction target for 2020[2]. The estimated reduction that would be required is an average concentration of around 2.0µg/m^3. It is therefore important that measures to reduce $PM_{2.5}$ are not deferred by an apparent meeting of PM_{10} objectives.

[2] PM2.5 Average Exposure Index Report for Defra and the Devolved Administrations AEAT/ENV/R/3241 ED57002030 01/12/2011

Sulphur Dioxide (SO_2)

Three objectives have been set for sulphur dioxide (SO_2), a one hour mean of 350 $\mu g/m^3$ (not to be exceeded more than 24 times per year), a 24 hour mean of 125$\mu g/m^3$ (not to be exceeded more than 3 times per year) and a 15 minute mean of 266 $\mu g/m^3$ (not to be exceeded more than 35 times per year).

Monitoring data

Monitoring data is currently collected at one site in the borough and is shown in the table below. Data from Bloomsbury (outside the borough) is also included. These monitoring sites are representative of levels at residential areas away from busy roads and at the façade of residential buildings near busy roads.

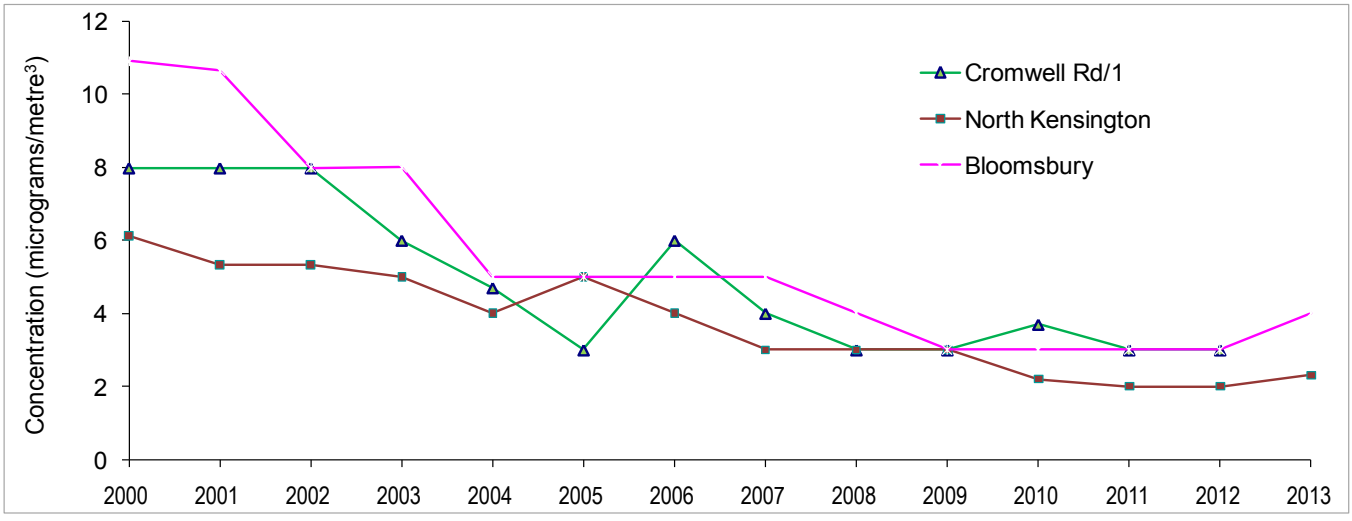
Table 2.9 Results of sulphur dioxide automatic monitoring: comparison with objectives

Site ID	Location	Within AQMA?	Data Capture 2013 %	Annual Mean	Number of Exceedences 2013		
					15-minute Objective (266 $\mu g/m^3$)	1-hour Objecti (350 $\mu g/m^3$)	24-hour Object (125 $\mu g/m^3$)
KC1	North Kensington	Y	97	2	0	0	0
AURN	Bloomsbury	-	98	4	0	0	0

Cromwell Road ceased to operate as an AURN station in September 2012 therefore no data for SO2 was collected at this site in 2013. No exceedences of any of the objectives were observed at North Kensington. Annual mean levels increased very slightly compared to 2012. Elevated SO_2 does occasionally occur as a result of plume grounding episodes arising from industrial sources in the East Thames area but none have resulted in any exceedences of the objectives.

There has been a decline in annual mean concentrations over the longer term but more recently levels have tended to stabilise. The 15 minute, one-hour, and 24 hour mean objectives for SO_2 continue to be met in the borough.

Figure 2:10 Trends in Annual Mean Sulphur Dioxide Concentration Measured at Automatic Monitoring Sites



Benzene

Two objectives have been set for the assessment of benzene, a running annual mean of 16.25μg/m^3 to be met by 31.12.2003 and a more stringent annual mean of 5μg/m^3 to be achieved by 31.12.2010.

Monitoring Data

We currently undertake sampling at five locations using diffusion tubes, these include two roadside, two background, and one site in close proximity to a petrol station forecourt. The petrol station has operated stage two (in addition to stage one) vapour recovery since 2007.

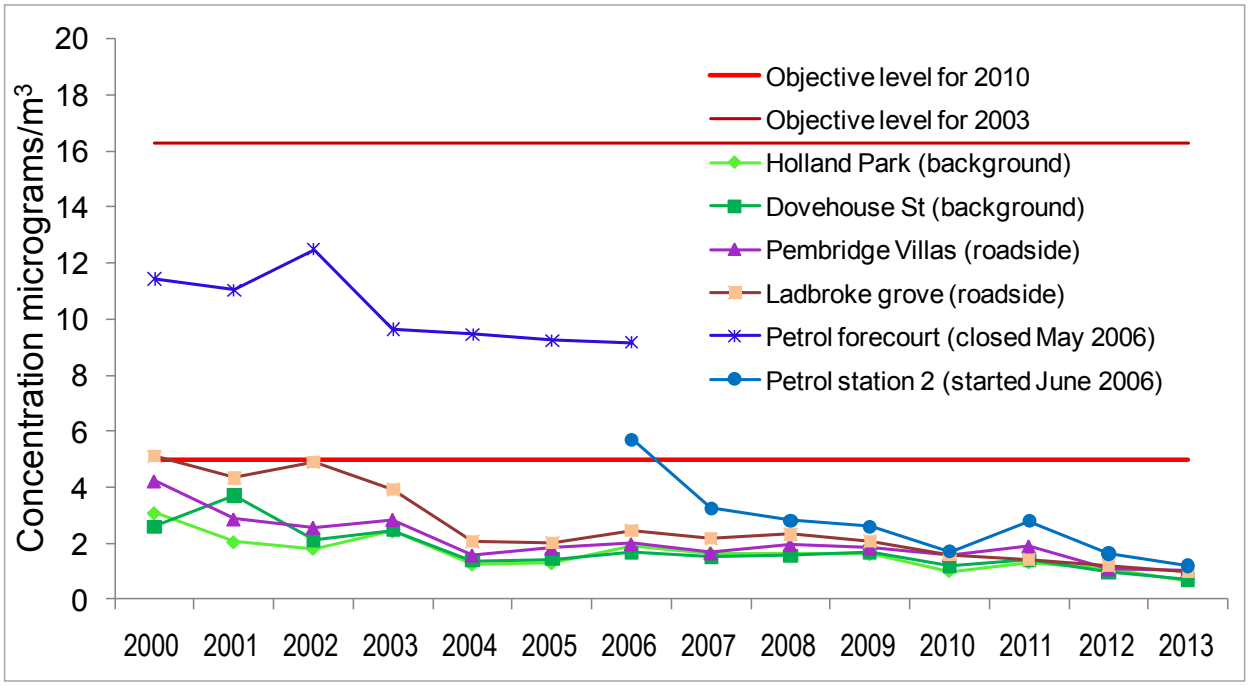
The highest levels of benzene have generally been recorded at the petrol station sites. The table below shows the 2010 objective has been met at all sites since 2007; the 2003 (16.25μg/m^3) objective has been met since 2000 (the measured annual mean is assumed to be the equivalent of the running annual mean). Results for 2012 show a decrease compared to 2011 at all sites. There was a loss of one sample at three of the sites in 2012.

Table 2.10 Annual average benzene levels using diffusion samplers (μg/m^3)

Year	KC01 Ladbroke Grove/Nth Ken Library	KC02 Holland Park	KC03 Warwick Rd Petrol St. (forecourt)	KC04 Dovehouse St	KC05 Pembridge Square Library	KC0X Old Brompton Rd/Clareville Grove Petrol station
2000	5.1	3.1	11.4	2.6	4.2	-
2001	4.3	2.0	11.0	3.7	2.9	-
2002	4.9	1.8	12.5	2.1	2.6	-
2003	3.9	2.4	9.6	2.5	2.9	-
2004	2.1	1.2	9.5	1.4	1.6	-
2005	2.0	1.3	9.2	1.4	1.8	-
2006	2.3	1.9	9.2	1.7	2.0	5.7
2007	2.2	1.6	Closed	1.5	1.7	3.2
2008	2.3	1.6	-	1.6	2.0	2.8
2009	2.1	1.6	-	1.7	1.8	2.6
2010	1.6	1.0	-	1.2	1.6	1.7
2011	1.4	1.3	-	1.4	1.9	2.8
2012	1.2	1.1	-	1.0	1.1	1.6
2013	1.0	0.7	-	0.7	0.9	1.2

Figure 2:8 (overleaf) shows the longer term trend. After an initial decline all sites apart from the petrol forecourt /station sites have generally shown fairly steady levels between 2004 and 2011. The petrol station levels had declined more slowly meeting the objective level in 2007. All sites showed a small reduction between 2012 and 2013.

Figure 2:8 Trends in Annual Mean Benzene Concentration Measured at Diffusion Tube Monitoring Sites



Other pollutants monitored

Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic Aromatic Hydrocarbons (PAHs) are a complex mixture of organic compounds some of which are carcinogens. The Government has set an objective for these pollutants. It would be very difficult and expensive to monitor a selection of these pollutants, consequently, the Government has selected benzo(a)pyrene (BaP) as a marker for PAHs and set an objective based on this pollutant: 0.25ng/m^3 [3] (footnote 3) as an annual average to be achieved by the end of 2010. Whilst this objective has been set, it has not been included in regulations for local air quality management purposes.

In addition the EU Fourth Daughter Directive has set a target value for polycyclic aromatic hydrocarbons (PAH) which is also defined in terms BaP. The annual mean value may not exceed 1 ng/m3. The target value enters into force 31.12.2012.

Monitoring data from the London area (Brent, Marylebone Road and historically Victoria) has been included in this report.

The main source of BaP is residential and commercial combustion of coal and wood; other sources include industrial combustion, metal production and road transport. However vehicles are not a major source. This pollutant may become of increasing concern if the use of biomass or biofuels becomes more widespread.

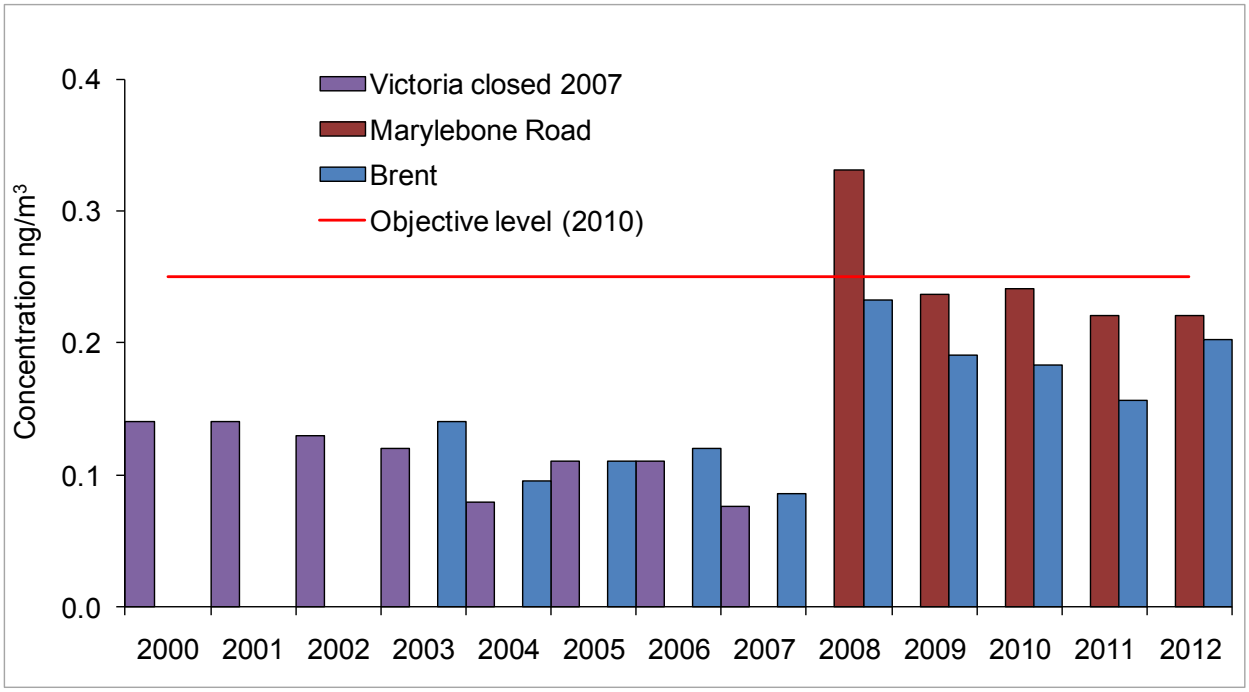
[3] ng stands for nanogram. A nanogram is one millionth of a milligram or one thousandth of one millionth of a gram

The most recent data available from monitoring at sites in Marylebone Road and Brent are included in the chart below (monitoring at Victoria ceased in 2007). Only data up to the end of 2011 was available from the Defra data archive at the time of preparing the report. Monitoring methods at the Brent site changed between 2007 and 2008. The chart shows levels increased after this time. It is possible that this change in method is the reason for this. However, we cannot be certain as the monitoring at Marylebone Road only commenced at the start of 2008 and there is no long term data set available prior to then.

Of the available data it appears that the objective was exceeded only at Marylebone Rd in 2008. Indications are that the levels of benzo(a)pyrene were below the objective level in 2012 and also met the EU directive value which came into force in that year. The concentrations remained stable at Marylebone Road between 2011 and 2012 but increased at the Brent site. This is consistent with other findings which are believed to be due to an increase in commercial and residential heating activity.

Data for 2013 was not available.

Figure 2:11 Trends in Annual Mean Benzo(a)pyrene Concentration Measured at Monitoring Sites in London



The monitoring method at Brent changed between 2007 and 2008. Marylebone Road monitoring began in 2008.

As the borough has no industrial processes and relatively little coal and wood burning, concentrations of BaP would be expected to be similar to the levels indicated by the above monitoring results and are therefore likely to be within the 2010 objective.

Ozone (O_3)

The objective for ozone (O_3) is 100µg/m^3 not to be exceeded more than 10 times a year (calculated as the daily maximum 8 hour mean) by 2005. This objective is not included in the LAQM process as ozone reduction requires action at a regional and European level. However, due to its health effects, monitoring is undertaken at the North Kensington background site. Ozone formation is dependent on high temperatures and sunny weather as well as the necessary precursor pollutants such as oxides of nitrogen (NO_x) and volatile organic compounds. Unlike most pollutants, ozone tends to be higher at background locations away from busy roads, often the highest levels being reached in rural locations. This is because NO_x emitted from vehicle exhaust and building flues will react with ozone removing it from the atmosphere.

Figure 2:12 shows levels of ozone at a background location in the borough, in comparison to the objective level (as shown by the red line). There has been no clear overall trend between 2000 to the present time. In 2013 the number of exceedences just met the objective level.

Figure 2:12 Trends in the 8-hour ozone exceedences measured at automatic monitoring sites

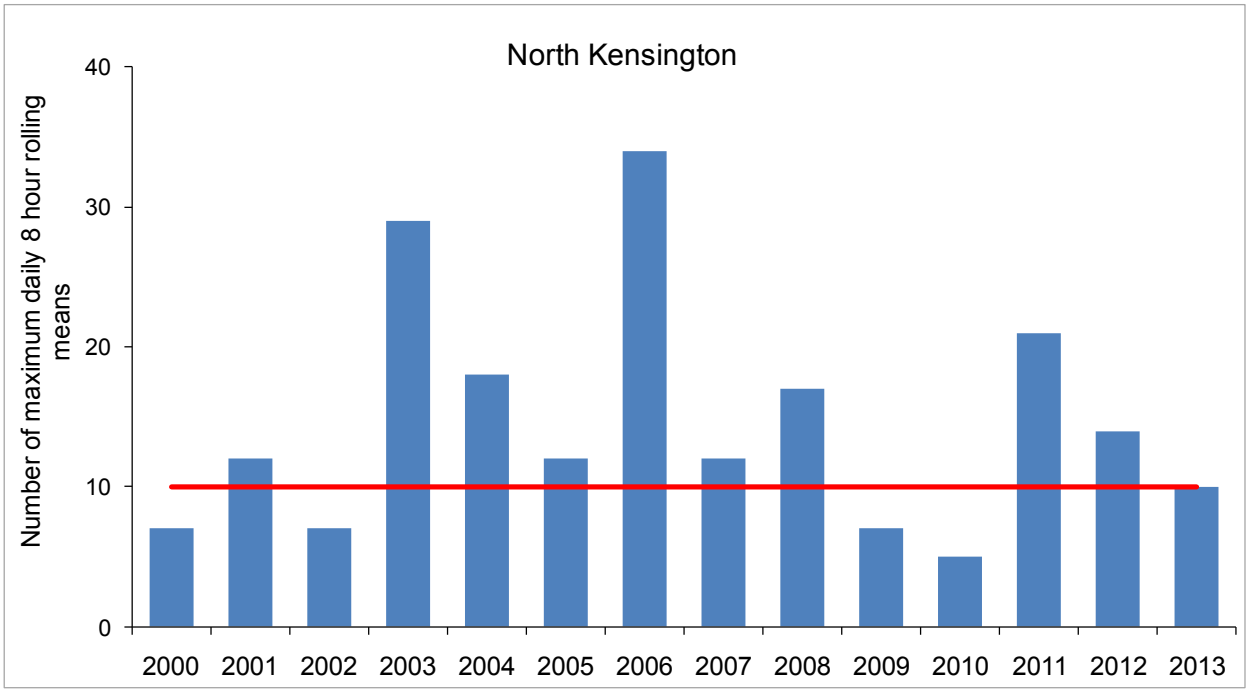
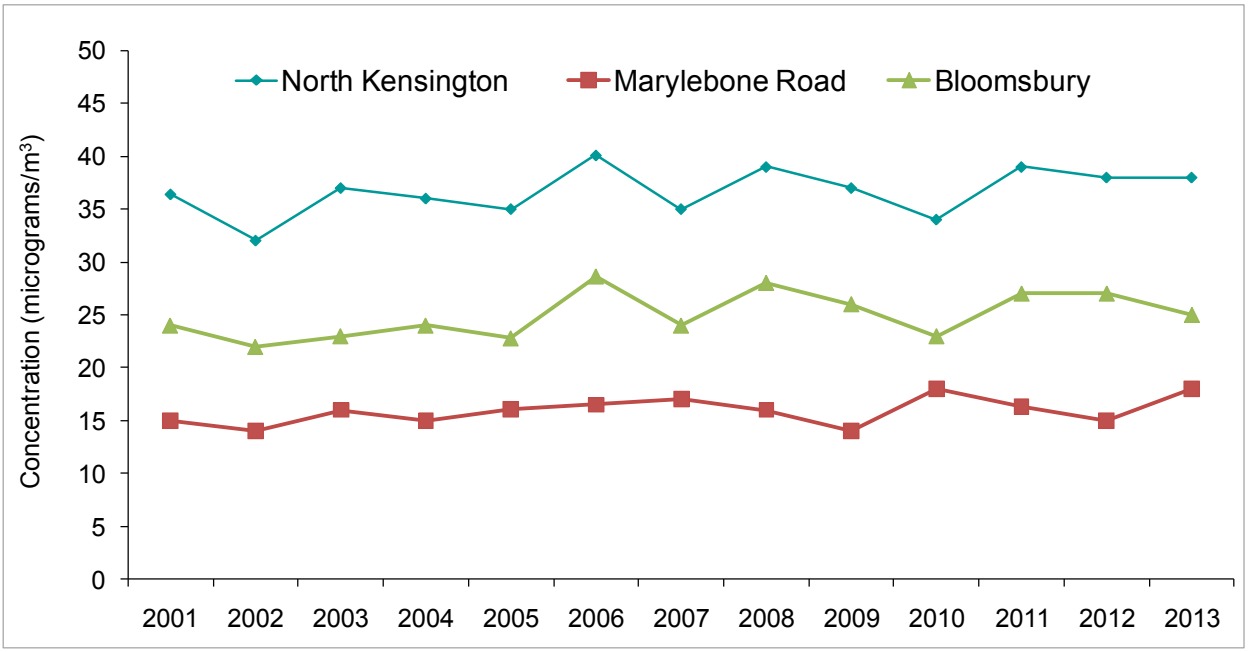


Figure 2:13 overleaf shows annual mean levels of ozone measured at North Kensington, Bloomsbury (background site) and Marylebone Road (a roadside location site) from 2001. Marylebone Road and Bloomsbury are located outside the borough but are useful in showing a range of concentrations. Concentrations of ozone at the roadside location are lower due to its oxidation by traffic pollutants. This chart shows that, overall, annual mean levels have increased over the period shown.

Figure 2:13 Trends in annual mean ozone concentrations measured at automatic monitoring sites



Lead

There are two annual mean objectives for lead, 0.5 µg/m^3 (to be achieved by 2004) and an objective of 0.25 µg/m^3 (to be achieved by 2008).

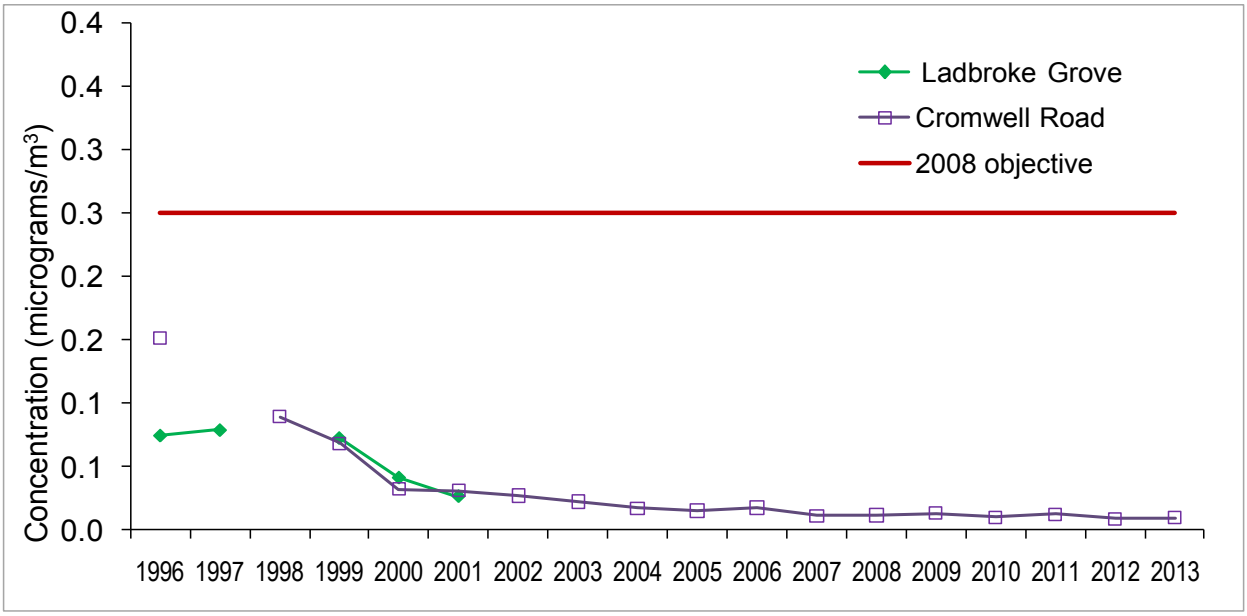
Lead monitoring in the borough is undertaken by Defra at the Cromwell Road monitoring site. Monitoring was previously also undertaken by the Council at Ladbroke Grove. When leaded petrol was phased out, monitored levels dropped significantly so the decision was taken to close the site at the end of 2001. Monitoring data is shown in the table below.

Table 2.10 Annual Mean Lead levels within the Borough

Year	Ladbroke Grove (µg/m^3)	Cromwell Rd (µg/m^3)
1999	0.073	0.068
2000	0.041	0.032
2001	0.026	0.031
2002	-	0.027
2004	-	0.017
2005	-	0.015
2006	-	0.017
2007	-	0.011
2008	-	0.012
2009	-	0.013
2010	-	0.010
2011	-	0.012
2012	-	0.009
2013	-	0.009

The objectives for 2004 and 2008 have been met at the Ladbroke Grove site since 1992 and at the Cromwell Road site from 1994. The chart below showing long term monitoring data shows a downward trend between the late 1990s and 2000. However in the past few years levels have stabilised.

Figure 2:14 Trends in Annual Mean Lead Concentrations



Carbon Monoxide (CO)

The objective for carbon monoxide (CO) is 10 mg/m^3 [4] as a maximum daily 8 hour running mean. CO monitoring data recorded in the borough since 2007 (monitoring is no longer carried out at Cromwell Road following the closure of the gaseous anaylsers by Defra) is shown in Table 2.11 including data from one other busy kerbside location from central London (Marylebone Road). Data recorded in 2013 shows we continue to meet the objective.

Table 2.11 Concentrations of CO in the Borough and at one central London site

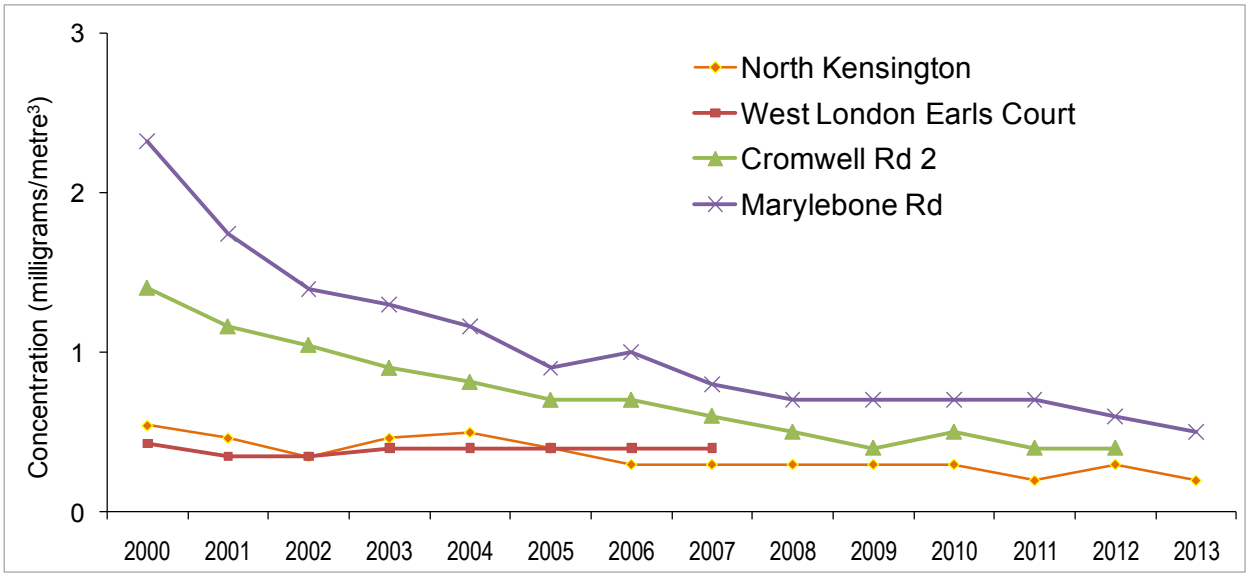
Year	Site	Annual mean (mg/m^3)	Max daily 8-hour running mean (mg/m^3)	No. of hours above 10mg/m^3	% Data capture
2009	North Kensington Cromwell Rd 2 Marylebone Rd	0.3 0.4 0.7	1.7 2.3 2.5	0 0 0	98 97 98
2010	North Kensington Cromwell Rd 2 Marylebone Rd	0.3 0.5 0.7	2.8 3.4 2.7	0 0 0	97 68* 96
2011	North Kensington Cromwell Rd 2 Marylebone Rd	0.2 0.4 0.7	1.5 1.3 1.9	0 0 0	97 97 96
2012	North Kensington Cromwell Rd 2 Marylebone Rd	0.3 0.4 0.6	1.2 1.4 1.6	0 0 0	99 97 95
2013	North Kensington Marylebone Rd	0.2 0.5	1.8 2.1	0 0	99 99

* low data capture

[4] mg (milligram) = one thousand of a gram

The maximum daily 8 hour running mean values remain well within the 10 mg/m^3 objective level. Generally, annual mean levels at roadside locations are higher than concentrations at background locations. The figure below shows the longer term trend in annual mean levels, this demonstrates a fairly steady downward trend at most sites. Levels have generally stabilised in more recent years with only slight further reductions.

Figure 2:15 Trends in Annual Mean Carbon Monoxide Concentrations Measured



1,3-Butadiene

Measurements should meet the 2003 objective as a running annual mean of 2.25µg/m^3. 1,3-butadiene is not monitored in the borough, although data are collected by Defra. Whilst this is limited to a few sites within London, it can be used to indicate local levels (see table 2.12 below).

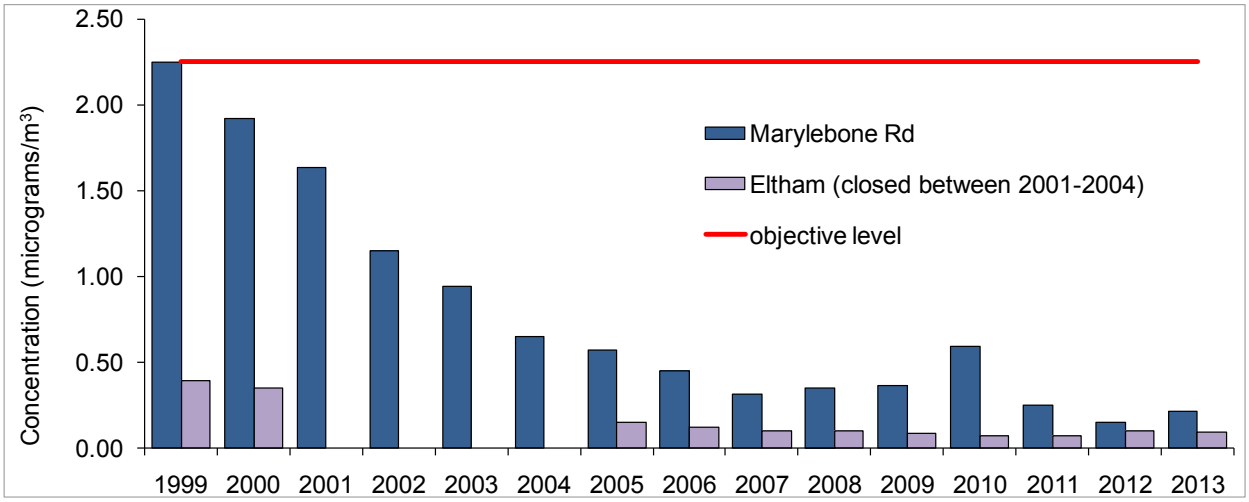
Table 2.12 Levels of 1,3-butadiene (maximum annual running means) in London

Year	Site	Annual Mean (µg/m^3)	% Data Capture
2003	Marylebone Rd	0.64	92
	Eltham	-	-
2004	Marylebone Rd	0.57	81
	Eltham	0.15	91
2005	Marylebone Rd	0.45	89
	Eltham	0.11	94
2006	Marylebone Rd	0.45*	71
	Eltham	0.09	80
2007	Marylebone Rd	0.31	78
	Eltham	0.10	83
2008	Marylebone Rd	0.35	80
	Eltham	0.10	82
2009	Marylebone Rd	0.36	83
	Eltham	0.08	85
2010	Marylebone Rd	0.59	71
	Eltham	0.08	80
2011	Marylebone Rd	0.24	44
	Eltham	0.06	64
2012	Marylebone Rd	0.15	90
	Eltham	0.10	88
2013	Marylebone Rd	0.21	94
	Eltham	0.09	79

*Incomplete data. Data in italics is provisional

Data for two sites with long term monitoring are shown in Table 2.12. The annual mean concentration has been met at both locations since 1999. Overall levels have declined at these sites though an increase was measured at Marylebone Road (roadside) site between 2008 and 2010. Levels in 2012 continue to be low. These results indicate that there are unlikely to be any exceedences of the 2003 objective in the borough.

Figure 2:16 Trends in the Maximum Running Annual Mean 1,3-Butadiene Measured at Automatic Monitoring Sites



Summary of compliance with AQS objectives

Kensington and Chelsea Council has examined the results from new monitoring in the borough and other comparable sites over the last twelve months. Preliminary monitoring at the borough"s five continuous monitoring sites shows concentrations of sulphur dioxide, benzene, lead, carbon monoxide and 1,3- butadiene meet the relevant air quality objectives. Ozone also met the daily maximum 8 hour mean objective.

Continuous monitoring shows that exceedences of the annual mean NO_2 objective level have occurred at all sites apart from the North Kensington background site. The number of exceedences of the hourly mean objective vary from site to site, from none at North Kensington to 445 at Knightsbridge (compared to the 18 exceedences permitted).

Monitoring of PM_{10} at our three sites shows that these have all met the annual mean objective since 2008, and two sites met the daily mean objective level. However one site continues to exceed the daily mean objective. It is therefore possible that there are other locations in the borough that may be close to or above the daily mean objective level. Therefore no changes are proposed to the air quality management area.

3 New Local Developments

3.1 Road traffic sources

No other new roads are currently planned.

3.2 Other transport sources

The Council continues to support a campaign for a Crossrail station to be built in North Kensington or for a good connection to Crossrail and HS2. The case for a new station is strong and the Council has committed to underwrite the £33m construction costs. Currently a station is proposed at Old Oak Common. In addition the council supports Crossrail 2 - or the Chelsea-Hackney Line as it has previously been called. Transport for London carried out its first public consultation on Crossrail 2 between May and August 2013. Prior to responding the council carried out a survey of Chelsea residents. Approximately 3000 responded with 70 per cent supporting the line and a station in Chelsea; 25 per cent opposing the idea. The council responded to the consultation in August 2013.

3.1 Industrial Sources

The Council has been notified about a proposal to install a pyrolysis and gasification plant at Imperial College. The plant will generate energy by pyrolysis/gasification and the thermal oxidation of waste arising from the South Kensington Campus. It is intended that it will process 400 tonnes of mixed municipal waste and 150 tonnes of clinical waste annually and will run continuously. The process will be classed as a small waste incineration plant and must have a permit to operate. The planning and permit applications have yet to be submitted.

3.2 Commercial and domestic sources

There are no new/newly identified commercial or domestic sources which have not been considered as part of a planning application. However CHP plant, which is not currently included in the requirements for updating and screening assessments, is being widely installed in existing and new buildings resulting in power generation in urban areas which emit much higher levels of NOx emissions per kWh than gas boilers.

3.3 New developments with fugitive or uncontrolled sources

There have been no new/newly identified uncontrolled sources in the borough.

Kensington and Chelsea Council confirms that there are no new or newly identified local developments which may have an impact on air quality within the Local Authority area.

4 Local / Regional Air Quality Strategy

In February this year the European Commission sent the Government a „Letter of Formal Notice" for breaching NO_2 limit values in 16 of 43 zones including London. The UK is the first of the EU"s 28 Member States to receive enforcement action on NO_2. This is the beginning of the legal enforcement process, which is likely to lead to the imposition of fines that may be passed on to regional and local government.

In April, Public Health England published a report providing estimates of the number of deaths that can be attributed to long-term exposure to particulate air pollution for each UK local authority area. In the Royal Borough the estimates show that in 2010 8.3 per cent of deaths (equivalent to 68) were attributable to particulate pollution. This (with the City of Westminster) was the highest in London.

In view of these two developments highlighting the seriousness of the air pollution situation, the Council"s Health and Wellbeing Board is discussing further initiatives that may be needed. Consequently the Cabinet Member responsible for air quality will be considering the new Air Quality Action Plan due at the end of 2014.

5 Planning Applications

The Council ensures that air quality is a consideration from the early planning stages. Developers are asked to follow the guidance within the Council‟s Air Quality Supplementary Planning Document (SPD), adopted in June 2009 to ensure that our preferred approach is taken (for more information on the Council‟s planning policies see Section 6).

Major planning applications which have been granted permission during April 2012 – March 2013 and are subject to conditions or section106 agreements that require a low emission strategy and that follow the best practice guide for demolition and construction phases include:

- Earls Court (and West Kensington) opportunity area Reserved Matters applicationsWarwick Road master plan sites including the Telephone Exchange 213-215 Warwick, 245 Warwick Road and Warwick Road school
- 253-259 Kensal Rd
- Grand Union Centre,
- Middle Row school
- Marlborough school
- Clearings
- Sloane Buidling
- Kings Rd & Chelsea Manor St ,

We also include observations for adjoining applications, scoping/framework development documents in neighbouring boroughs e.g. White City OAPF, Lillie Road, Empress State Building

Requests for the discharge of conditions on major sites are also a significant process which involves discussions with developers to ensure that low emission strategies are implemented, and that methods to control and monitor construction impacts are in place. In 2013/2014 this included the following sites:

- Former Commonwealth Institute
- The Kensington Academy and Leisure Centre Site
- Silchester Garages
- 205 Holland Park Avenue,

A number of development sites (that have been granted permission in previous years) are also the subject of on-going review of real time monitoring data. These include re-developments at:

- Holland Park School,
- Wornington Green,
- Chelsea Manor Street and the former Charles House
- Kensington Academy and Leisure Centre Site.

In addition, to ensure air quality considerations are fully incorporated in the development proposals, including the energy strategy (which can have a considerable impact on air quality), early discussions are essential. To assist with this, we respond to site specific

Supplementary Planning Documents, scoping reports, and take part in pre application discussions and provide written comments. The pre-application discussions that take place before formal applications are submitted for major and strategic redevelopment schemes can be useful to highlight the Council"s position and drawing the developer"s attention to the Council"s AQ SPD. For example, in 2013/14 this included Brompton Hospital, Odeon, Holland Park Avenue, Kensal Road, Southern Row and Lancaster Road.

In addition we have reviewed the Local Impact Draft Report for the proposed Thames Tunnel scheme and negotiated amended wording for some of the sections of the Code of Construction Practice

6 Air Quality Planning Policies

The Council"s Core strategy was adopted on the 8th December 2010, it sets out the vision, objectives and detailed spatial strategy for future development in the borough. The Council has a number of air quality objectives contained in Policy CE 5 and requires that„the Council will carefully control the impact of development on air quality, including the consideration of pollution from vehicles, construction and the heating and cooling of buildings. The Council will require development to be carried out in a way that minimises the impact on air quality and mitigate exceedences of air pollutants."

The Council"s Air Quality SPD adopted in 2009, sets out our requirements for reducing air pollution emissions from new development, conversions and change of use. The SPD is a significant material planning consideration when determining applications for planning permission and forms part of the Local Development Framework.

In assessing the potential impacts from the operational phase of developments, the Council is requesting low emission strategies to be submitted rather than considering air pollutant concentrations alone. The developer must submit a strategy for reducing emissions from all areas of the new development including transport, heating and energy use. The extent of the measures will depend on the location, size and traffic generated by the development and will need to be agreed by the Council. However a significant conflict that is emerging is the push for decentralised energy which is prioritising CHP plant and encouraging novel combustion methods which generate more local pollution.

Policy CE5

To deliver this the Council will:
a. require an air quality assessment for all major development;

b. resist development proposals which would materially increase exceedences of local air pollutants and have an unacceptable impact on amenity, unless the development mitigates this impact through physical measures or financial contributions to implement proposals in the Council's Local Air Quality Management Plan;

c. require that the Code for Sustainable Homes and BREEAM assessments obtains all credits available for reducing pollution and emissions, and improving air quality;

d. resist biomass combustion unless its use will not have a detrimental impact on air quality.

Developers are also expected to assess the impacts that demolition and construction works may have on local air quality by undertaking a risk assessment using the London Councils" Best Practice Guidance and expected to include appropriate measures in their construction management plans.

With our Planning colleagues we have also introduced an air quality action fund (as part of Section 106 agreements) as a means to counteract adverse effects of new developments, although our first priority will be to steer developers towards technology

that reduces emissions. We currently have approximately £32K available to us from s106 contributions.

In January 2012 Cabinet decided that RBKC would become a Community Infrastructure Levy (CIL) charging authority. It will allow financial contributions which will fund a wide range of infrastructure in the Borough to be collected when planning permission is granted. Measures to improve air quality have been incorporated into the draft planning infrastructure delivery plan which will inform the community infrastructure levy and how the money is spent. The borough submitted its Draft Charging Schedule to the Planning Inspectorate for examination on 31 March 2014. The public examination is due to take place in June 2014.

With the publication of the National Planning Policy Framework our polices and SPD have been reviewed to ensure that the policies are aligned. A Partial Review of the Core Strategy Publication Planning Policies was published in July 2013 for public consultation.

7 Local Transport Plans and Strategies

The Mayor of London published his Transport Strategy (MTS) in May 2010 and asked all London boroughs to produce Local Implementation Plans (LIPs) to show how they will support the Strategy locally. Our LIP, which the Mayor of London approved in October 2011, sets out how we intend to implement the Mayor's Transport Strategy, as well as our other local transport-related priorities. We have prepared our LIP in line with LIP Guidance from Transport for London who will be assessing all LIPs on behalf of the Mayor of London.

Transport Objectives - Our Transport Objectives reflect local issues and priorities as well as the goals of the MTS and the challenges identified in TfL"s evolving Sub-Regional Transport Plans. We developed them by reviewing the objectives of our current key strategies, such as our Local Development Framework (LDF) Core Strategy, our Community Strategy, our Air Quality Action Plan and our Climate Change Strategy.

Our Objectives are set out below:

- Improve accessibility to places and services, especially for those with special mobility needs
- Make it easier for residents to choose walking, cycling and public transport over private car ownership and use
- Improve the quality, reliability and inclusivity of public transport
- Reduce transport-related air pollution and carbon dioxide emissions
- Manage on-street parking and loading to achieve a better balance between the competing demands on kerb-side space
- Improve journey time reliability for all road users
- Improve the appearance and efficiency of our streets and places, and make them inclusive for all
- Reduce the number and severity of road accident casualties

An Executive summary of the document is available on the Council"s Web Pages.
A Performance Monitoring Plan for 12/13 has been published and we will also report progress in a Three Year LIP Impact Report which will be submitted to TfL in 2014.

Funding through the LIP continues to be used for a number of air quality projects, including air quality monitoring along the Earls Court Road and Cromwell Road (monitoring $PM_{2.5}$). In 2013-14, the LIP provided match funding (of approximately £80K) for a number of projects. Funding was also obtained from the Mayors AQ fund, Defra AQ Grants and the Council"s own budget. This funding supported schools and business engagement projects which resulted in twelve large businesses introducing their own air quality programmes targeting boiler renewal, taxi use, travel planning and consolidating deliveries and two schools now have green walls and input into the curriculum to exploit the educational opportunities. A further green installation between the West Cross Route and Multiple Use Games Areas, and a green corridor for Cromwell Road is planned. We also funded an analysis of the impact of the latest phase of the LEZ on the Earls Court Road, and the impact of taxis and road works on air quality.

8 Climate Change Strategies

In 2008, the Council adopted a Climate Change Strategy[5] covering seven years from 2008 – 2015. The Council has a Climate Change Programme, to implement the strategy. The focus is to „lead by example", looking at our own internal carbon management, though we also remain committed to working with communities.

The Carbon Management Plan (CMP), published by the Council in August 2009, is a key component in delivering the Council"s Climate Change Strategy 2008-2015. The CMP set out the Council"s ambition to reduce carbon emissions from its own operations by 40% by 2020. To meet this goal, the Council is reducing energy and resource usage throughout its offices and other public buildings. It also states that the Council will establish a mechanism to continue reducing its carbon footprint beyond the 40% target. The CMP was designed to be ambitious both in its wide scope and in its objectives.

In 2011/12 we had reduced emissions 12.9% from our baseline. We"re sharing our data on our website to show the improvements we"re making and to provide transparent information about the Council"s energy use.

In 2012/13, the Council reduced its carbon emissions by 15.6% compared to 2007/08 baseline. We estimate the cumulative savings since 2007/08 are £822,000, from our reduction in energy and resource use.

We have prepared plans for up to 2020 to reduce emissions as far as possible. The future outlook of the Programme will be focused on improving the efficiency of existing and new buildings, and strengthening sustainability in procurement. Example projects will include:

- Conducting building energy audits, waste audits and efficiency projects.
- Ensuring all new development or major refurbishment work incorporate energy efficiency measures. The BREEAM Excellent energy efficiency standard is required for all new Council development.
- Creating real-time energy use displays for Council buildings and engaging with staff to help them reduce their energy use at work.

[5] RBKC (2008) The Climate Change Strategy 2008-2015
http://www.rbkc.gov.uk/environmentandtransport/climatechange.aspx

9 Implementation of Action Plans

Summary and conclusions for year five of the current five year plan

With our current five year action plan coming to a close, our thoughts are turning to our achievements so far and where efforts should be concentrated in the new action plan which will be launched in 2014. The current plan has achieved some notable successes which are highlighted below.

Another year shows air quality conditions are little better (see earlier review conclusions) with only a few signs of improvement such as the decrease in NO_2 concentrations at a small number of sites, however these remain significantly above the objective levels.

Looking back over the past year there has been progress with most plans, with only one or two remaining static such as the lack of expansion in the car club. There have certainly been encouraging advances in tackling static emissions and raising awareness amongst local schools and businesses.

We continue to comment on planning applications and secure emissions reductions through the implementation of planning conditions that require abatement where CHP plant is proposed. Officers from Kensington and Chelsea and Hammersmith and Fulham met with the GLA to discuss the potential negative impact of the decentralised energy strategy on air quality when CHP plant is installed and we will continue to lobby on this issue until it is addressed in more detail by the GLA.

The renovation of Kensington Town Hall is now complete so more staff than ever are working within our most energy efficient facility. This will have resulted in many staff moving out of older, inefficient offices. Photo-voltaic electricity generation and substantially improved insulation within the building is realising savings in energy use with financial, air quality and climate change benefits. Projects focused on improving energy efficiency in schools and the replacement of street lighting are also underway, in order to reduce the Council‟s own emissions of NO_x and PM_{10} as well as carbon dioxide. Reducing the Council‟s own emissions is an ongoing task and this action will be carried over to the new Action Plan.

Old boilers in Tennant Management Organisation (TMO) buildings continue to be replaced by low emission “SEDBUK” boilers. Further funding has been secured for improving energy efficiency by installing heating and insulation for vulnerable householders. The Council commissioned a study into Energy Performance Certificates available for properties in the borough and this will be used to target areas of the borough where energy efficiency improvements are most required.

The Council continues to improve its fleets with more efficient vehicles in order to reduce emissions. The Parks Police have predicted that their updated fleet, which includes an electric van, will lead to a reduction in carbon dioxide emissions of up to 30%, NO_x and PM_{10} emissions reductions will also be likely. The TMO will be installing electric charging points within several TMO car parks in the Borough which will encourage the use of electric vehicles by residents. Since the graduated tariff structure

for residents‟ parking permits was introduced in 2008 the price differential between the lowest and highest bands has risen to over £130, providing a strong incentive to choose a change to smaller engine sizes. Following a trial of two on-street electric charging points, the Council is looking into the feasibility of providing more on-street charging points in residential areas of the borough. Expanding the availability of electric charging in the borough will be carried on in the new Action Plan.

The Council continues to be active in encouraging cycling and has invested money in providing more cycle parking in the borough. The Mayor of London‟s cycle hire scheme continues to develop with more docking stations in the borough (and expansion into Hammersmith and Fulham and Wandsworth). Since 2008 the Council has seen an increase in the number of staff cycling to work which stood at 7.4% in 2013.

Several projects funded by Defra, the Mayors Air Quality Fund, LIP funding as well as our own funds have been underway this year. These include the business and schools engagement projects and the evaluation of the effectiveness of the latest stage of the London LEZ. The evaluation of the introduction of the latest (2012) stage of the London LEZ (this requires larger vans and minibuses to meet Euro 3 standard for PM emissions) unfortunately showed no improvement in the local increment of PM_{10} and elemental Black Carbon (eBC) concentrations at Earl‟s Court Road. The NO_X concentration increment slightly decreased in 2012 but the NO_2 increment remained very similar in both years. The results of this study will be considered when we assess the costs and benefits of the borough being included in the proposed ULEZ area, which will also form part of our new Action Plan.

The Business Engagement project successfully connected with local businesses (e.g. Harrods, Peter Jones, Natural History Museum, Royal Brompton Hospital, Royal Garden Hotel, etc.) to enable them to make changes to improve local air quality. These changes range from upgrading with more energy efficient heating to consolidating freight and travel. This project culminated in the signing of pledges by these businesses to make bespoke changes to ensure they continue to tackle poor air quality.

Green screens were successfully installed in the playgrounds of two schools and educational programs are currently underway in these schools to raise awareness of the impacts of air pollution on health and what can be done to improve air quality. Early indicative monitoring of the effectiveness of the green screen installed at one of the schools is positive and shows a reduction in PM_{10} concentrations on the playground side of the screen in comparison to PM_{10} concentrations on the road side of the green screen. The picture we have of the difference in NOx concentrations is not so clear at this present time but will become more apparent in the final research report.

The Public Health Team has been part of the Council for a year now and we have seen increased liaison and joined up working since the amalgamation, an example of this being the collaboration of Environmental Health and the Public Health Team to host a Public Health Presents event. The aim of the event was to raise the profile of the health impact of poor air quality to healthcare professionals. We envisage that this collaboration will strengthen as time goes on.

Exceedences of NO_2 and PM10 are still considered likely and therefore a renewed Air Quality Action Plan laying out the measures required to meet the relevant objectives is required. Although our current Plan has seen significant progress in reducing emissions

since its publication in 2009, there is still progress to be made with many of the actions. This is not due to a lack of achievement, but because many of our actions are ongoing and strive for continuous improvement. We are proposing to carry over many of our existing actions to the new Air Quality Action Plan as well as introducing some actions in relation to areas not previously focused on. Future Tri-Borough working will allow us to implement larger scale projects that will lead to more significant improvements on the local air quality.

The ultimate success of our work will depend on continuing and perhaps increased central government support. The continued threat of fines by the European Court for breaching air quality objectives should focus attention on the economic and health damage being inflicted by the excessive levels of nitrogen dioxide and unacceptable levels of fine particles in inner London, and re-invigorate national action to remedy the situation.

Table 9.1 Action Plan Progress 2013-2014

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1	Review scope for $PM_{2.5}$ monitoring	Review the scope of the current monitoring network to account for the increasing concerns for health effects of fine particles ($PM_{2.5}$)	LA	2009	2010	At least one road side $PM_{2.5}$ monitoring station in the borough by Dec 2010	N/a	$PM_{2.5}$ monitoring has been undertaken at Cromwell Road (roadside) monitoring station since August 2009. The annual mean concentration was 15.8µg/m^3 in 2013. This is a slight increase compared to 14.8µg/m^3 measured in 2012. The level measured at Cromwell Road compared to the Marylebone Rd site (a kerbside location) is lower. Also Marylebone Rd data is at the cap level of 20µg/m^3 which would suggest that more congested roads will experience higher levels and are at risk of exceeding the cap level.	Installation was completed in August 2009. Monitoring is on-going	The monitoring of $PM_{2.5}$ indicates that levels at similar locations are below the EU cap level but could be higher in closer proximity to busy roads. Emissions reductions need to target vehicles.
2	Public Health Collaboration	Work to strengthen collaboration with local health organisations and coordinate efforts in tackling pollution related illness and health inequalities by raising awareness of asthma and indoor air quality and the dangers of second-hand smoke.	LA	2009-2010	2009-2014	A number of joint initiatives on asthma and indoor air quality covering issues such as smoking, carbon monoxide and boiler emissions.	N/a	Links with Breathe Easy groups were maintained. Our asthma and indoor air quality awareness raising with these groups continues. Smoking cessation and the smoke free service promotional activities remain the responsibility of the Public Health Team and are undertaken by a Tri borough Smoke free homes officer. We continue to attend events to provide advice and distribute air quality and Indoor Air Quality information leaflets where opportunities arise. Promotional materials were distributed to local community groups at a Health and Well Being event organised by the Council.	Ongoing, unless otherwise stated	N/a

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								Promotional materials have also been distributed to schools. The Council continues to distribute a series of posters produced by TfL to discourage idling engines. Posters are displayed in Kensington Town Hall and Chelsea Old Town Hall. (See action 20 for further details). TFL posters are also used as a teaching aid in sessions held for school pupils. Posters are also displayed at promotional events. Meetings with Public Health England continue to be held to further develop air quality awareness raising opportunities and project collaboration. The Council collaborated with the Public Health Team at a Public Health Presents event. A presentation was given about raising awareness of air pollution to businesses and organisations. A financial contribution to the AirText scheme running costs was made by the Public Health Team to assist in the maintenance of the AirText service.		
3	Raising awareness	Continue to raise awareness of air pollution and its effects on health and promote air quality issues by	LA	2009	2009-2014 (ongoing)	No. of airTEXT users to reach target of 300. Provide presentations	N/a	The Council continues to implement this plan. This year we attended a Health and Well Being event to promote the airTEXT and walk-it.com services and the London Air webpage link to daily pollution data.	Monitoring of airTEXT subscription numbers ongoing until otherwise	N/a

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		participation in schemes such as airTEXT and Walkit.com, and working with schools.				and awareness workshops to schools and community groups. Establish links with all schools in the borough.		Officers from our Transportation Department continue to promote idling engine awareness in schools through school transport plan initiatives. Awareness is focused on the contribution idling can make to poor air quality and its impact on asthma. The Council, in partnership with four other London boroughs, has made successful bids for Defra and GLA Clean Air for London funding. The Council has co-ordinated two projects: A schools engagement project (Clean Air for Schools Zones) and a business engagement project. The fund has successfully been used for local air quality improvement initiatives including green screens and an educational programme in two schools, and the promotion of air quality issues to the local and business community. RBKC has continued to work in collaboration with other London Boroughs and CERC to support and develop the airTEXT service and its promotional material. During 2012/13, to reduce service costs, there was a change to the method of subscribing to the airTEXT service. Existing airTEXT members were asked to unsubscribe and then re-subscribe to the	stated. General promotional opportunities will be ongoing (2009-2014).	Early indicative monitoring of the effectiveness of the green screen installed at one of the schools is positive and shows a reduction in PM_{10} concentrations on the playground side of the screen in comparison to PM_{10} concentrations on the road side of the green screen.

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								free delivery channels (e.g. airTEXT Apps, RSS feed and twitter). Using this method of re-subscription it was not possible to record the number of people subscribing to each Local Authority. As a result the total number of new subscribers for this period could not be established. Prior to the change, 255 people were known to have subscribed within RBKC. There were 13 recorded new subscribers during 2012/13. During 2013/2014 the total number of alerts sent by email, SMS and voicemail was 2874.At the end of April 2013, The last recorded total number of subscribers with active accounts for these channels was 7125. For the period between March2013 – April 2014 the total number of downloads of the airTEXT service iPhone app was 1232. For the same period, the total number of downloads of the airTEXT service Android app was 546. There is currently no way of obtaining the number of subscribers receiving SMS alerts through the Twitter delivery channel. During 2013/2014 open access to the airTEXT service was once again established. This was to allow the public to sign themselves up for alerts by emails, texts or voice messages, as well		

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								as to be able to access the service via the airTEXT App, RSS feed, twitter, Facebook or website. This open access also allowed subscription numbers to be recorded to provide a way to monitor the effectiveness of airTEXT service promotional campaigns. To reflect the new changes, CERC have updated the airTEXT leaflets & website. The Council"s air quality web pages have also been updated with the addition of newly designed AirText webpage banners to advertise the AirText service. Daily Health Bulletins with daily UV index, air pollution index, pollen and minimum and maximum temperature information continue to be distributed at air quality promotional events. A page on the Council"s intranet continues to be used to upload and distribute Daily Health Bulletins to Council staff for personal use and to be cascaded to partner organisations outside the Council. New AirTEXT business cards with SMART phone QR (quick response) codes continue to be distributed to schools and the local community. Business cards provide a link to air pollution forecasts and daily health		

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								bulletins.		
4	Council and contractors" fleet	Improve emissions from Council and contractors" fleet by requiring the latest Euro Standard, where possible, increasing the number of alternatively fuelled "low emission" vehicles, fitting abatement equipment and providing green driver training.	LA	2009	2009-2014 (ongoing)	Achieve the emission reduction target from the NI194 baseline toolkit (2008/09).	8%	The Parks Police have reduced and updated their fleet of vehicles to include 4 Dacia Dusters and 1 Renault Kangoo electric van. The change in fleet is predicted to reduce carbon emissions by up to 30%. The Council"s Carbon Plan for SITA continues to be implemented. The Tennant Management Organisation (TMO) has received funding to install 10 electric charging points within several car parks that the TMO manages on behalf of the Borough. The charging points will be available for any resident of the borough to use and will also be leased out to an electric mini-cab firm. The Council is continuing to keep up to date with advances in low emission vehicle technology by attending relevant events when they come up.	2014 2014 Ongoing	The reduction in number of vehicles used by the service and the electric van will reduce local NOx and PM10 emissions. Installation of these additional charging points is likely to encourage the uptake of electric vehicle ownership in the borough and help reduce vehicle related emissions of NOx and PM10.
5.	Council staff travel	Continue to improve emissions from Council staff commuting and business travel and maintain an up to date Council	LA	2009	2009-2014 (ongoing)	Green Travel Plan in place Targets within the plan include:	N/a	The Council"s Travel Plan (2009-2012) reviews current modes of staff travel and sets measures and targets for increasing sustainable transport, e.g. cycling. Since 2008 the proportion of staff driving to work has decreased from 13.4 per cent to 3.9 per cent, which is a considerable	The Travel Plan is in place- this measure is complete. The annual staff travel	

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		Green Travel Plan.				• To reduce the number of staff driving to work from 13.4% (2008) to 10% (2012) • To increase the number of staff cycling to work for the whole or part of their journey to work from 5.1% (2008) to 8% by (2012)		achievement. At the same time the proportion of staff cycling to work as a main mode has increased from 5.1 per cent (2008) to 7.4 per cent (2013) despite some fluctuations over four years. A continuing barrier to choosing cycling may be the larger number of staff with a commuting time of more 60 minutes (and more than 90 minutes in some cases), suggesting a greater distance from work. Also in common with most London commuters, there is a justifiable perception among staff that cycling on the capital"s main roads is dangerous. The number of highly publicised cycling fatalities during the past two years reinforces this view, although when compared with the increase in cycling in the capital, proportionally the number of casualties is lower. The Council"s staff benefit of a zone 1 and 2 travel card encourages staff to use public transport , but the cycling support schemes e.g. cycle training and cycle maintenance sessions do not seem to be inducing more staff to cycle to work.	survey was carried out in Summer 2012.	
6.	Council and contractor buildings	Improve emissions from Council owned and/or leased	LA	2009-2010	2009-2014 (ongoing)	NI194 toolkit Reduction target in emissions from 2008/09 baseline	N/a	The renovation of Kensington Town Hall was completed this year so more staff than ever are working within our most energy efficient facility. This will have	2009-2014 (ongoing)	The energy efficiency improvements made within

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		premises by improving energy efficiency and increasing the use of renewable technology.				level. On-site renewables in at least one Council building		resulted in many staff moving out of older, inefficient offices. Buildings that have become vacant as a result of the revocation works will be decommissioned in the future to further reduce the Council"s emissions. Energy efficiency in schools was addressed through a low cost/no cost pilot project with 9 schools in the borough through the Carbon Countdown Project. Most of the schools reduced energy consumption since the project began in Jan 2013. One school in particular has estimated that £3K of savings could be made per year by making adjustments to the boiler timers and reducing the hot water temperature. This reduction in energy use will also reduce emissions of NO_x. The Council will be initiating a project that will replace the lighting units in 604 columns on main roads throughout the borough. This will save the Council significant amounts of energy, resulting in savings of over 73 tonnes of carbon annually. The Council have employed a new facilities management company that are working on improvements to the way the Council"s buildings are run by producing an Action Plan. Reduction in energy		Council Offices and schools in the borough will result in reductions of air pollutant emissions as well as reductions in carbon emissions. Although the improvements in street lighting aren"t directly reducing air pollutant emissions in the borough, the reduction in energy consumption will reduce the amount of air pollution released in the location of the

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								usage as a result of these actions will benefit air quality. The amount of energy used by each main Council worksite and school is available for staff and public to view on our internal intranet site here: http://www.rbkc.gov.uk/environmentandtransport/climatechange/carbonmanagement.aspx		electricity generation.
7.	Social and TMO housing stock	The Council will assess its social housing and TMO building stock as part of work on NI194 and set targets for reducing emissions	LA	2009-2010	2010	Baseline year data collected and entered into the NI194 toolkit and target set.	N/a	There is no longer a requirement for NI 194 to be reported. All domestic boiler replacements within TMO properties are SEDBUK A rated with low NO_x and CO_2 emissions. When central boiler plant is replaced the most energy efficient and low emission boiler is sourced for the available budget. The TMO continue to improve thermal efficiency by undertaking loft and cavity wall insulation projects and communal boiler upgrades. In 2012/13 421 TMO properties received replacement new boilers. No data is currently available for 2013/14.	December 2011	The replacement of old boilers with low NO_x A rated boilers will reduce NO_x emissions.
8.	Air Quality SPD and LES	Adopt a revised Supplementary Planning Document (SPD) which requires	LA	2009-2010	2009-2014 (ongoing)	Air Quality SPD adopted and requirements being implemented	N/a	We continue to request low emission strategies and set conditions for low NOx boilers and combustion plant assessment for all major applications. We also make observations on applications that are	Revised SPD was adopted in June 2009. Action	Studies undertaken by Imperial college and AEA have shown potentially significant

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		large developments to submit a Low Emission Strategy and implement mitigation measures in order to offset impact of the development.						located in close proximity to the borough boundary. Negotiations with developers have led to a number of developments agreeing to the fitting of abatement equipment and in also agreement to install renewable technologies such as photo voltaic panels and air source heat pumps instead of CHP plant. The borough has also submitted a consultation response to the GLA regarding the recently adopted Sustainable Design and Construction SPD.	complete Requests for low emission strategies are ongoing. Further revision of the SPD is likely to be required as a result of changes to the NPPF	increases in NO_X emissions (of 4.3µg/m^3) in central London as a result of the decentralised energy strategy. Therefore significant reductions in emissions from new developments can be secured where developers agree to meet carbon targets by using more energy efficiency measures and non combustion renewable technologies.
9.	Air Quality Action Fund	Make use of S106 obligations to require large new developments to make a one-off financial contribution to an air quality action fund.	LA	2009-2010	2009-2014 (ongoing)	Section 106 Planning Obligations SPD adopted and contributions recorded.	N/a	The Council"s Section 106 Planning Obligations SPD sets out the approach, policies and procedures in respect of planning obligations. The document outlines the standard contributions for air quality and justifies the approach. To date, contributions for air quality have been sought and we currently have approx £32K available to us at the moment. We have identified air quality	The Section 106 Planning Obligations SPD was adopted in August 2010 Action complete Requests for financial	We will use the funds to further develop action plan measures.

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								monitoring and action plan projects in the draft planning infrastructure delivery plan which will inform the community infrastructure levy and how this money is spent.	contributions will be ongoing.	
10.	Green Developers Guide	Produce a Green Developers Guide which will provide guidance to developers on energy efficient building design and use of renewable technology.	LA	2009	2010	Green Developers guide in place. Energy assessment submitted with proposed developments.	N/a	The Green Developers guide was removed as an action from this plan after the completion of the Builders Advice section (see web address in plan 11).	N/a	N/a
11.	Construction Emissions	Continue work to minimise emissions from construction sites by requiring all developers to follow the London Council"s (2006) *Best Practice Guidance –The control of dust and emissions from construction and demolition* as a minimum standard.	LA	2009	2009-2014 (ongoing)	Planning conditions imposed on all large developments, requesting construction risk assessments.	N/a	Construction risk assessments continue to be requested for large developments. The contractors" construction method and environmental management statements are examined to verify that a suitable approach to dust and air quality management will be adopted (in line with the Mayor of London"s Guidance). The Council"s web based best practice guidance tool for builders and developers, covering air quality can be referred to using the link: http://www.rbkc.gov.uk/environmentandtransport/airquality/adviceforbuilders.aspx On planning applications, the Council adds a condition to permissions granted	2009-2014 (Ongoing)	The majority of large redevelopment sites e.g. Warwick Road and Wornington Green, now generate 15 minute average air quality data that provides an alert if dust level thresholds are breached to prompt site managers to take remedial action. These alerts are also available to

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								to ensure the development is assessed in accordance with the Mayor"s Best Practice Guidance.		Council officers.
12.	Energy Efficiency	Continue to promote energy-efficiency measures in homes in the borough, within the Council"s HECA and Affordable Warmth work.	LA	2009	2009-2014 (ongoing)	100% RSL and TMO homes in the borough meet "decent homes" thermal efficiency standards. Year on year increase in the number of qualifying households taking grants.	N/a	This information is no longer collected by the Council; the latest figures from the Homes and Communities Agency show that 1.8 per cent of Registered Providers total housing stock in London did not achieve the Decent Homes standard. The percentage of TMO properties that reached the Decent Homes Standard in 2013/14 is not yet available. The TMO Annual Report for 2012-13 reported that the percentage of homes not meeting the standard was likely to rise in 2013-14. A number of schemes are available to help people improve the energy efficiency of their living accommodation: *Kensington and Chelsea 'Keep Warm Grant*" Financial assistance is available to homeowners and private tenants on benefits or low income to upgrade or install heating and insulation. Changes are being made to the Keep Warm Grant in order to make it more accessible to residents *DECC Fuel Poverty Fund* The DECC Fuel Poverty Fund is now finished. The Council received 80K of	Uncertain exactly when 100% of RSLs will be achieved but will continue to work towards this. TMO continue to work towards meeting 100 per cent of stock meeting DH standard. The Keep Warm grant has been retained despite the reduction in the overall grants programme and will continue into	The energy efficiency measures and heating upgrade work carried out with funding from the various grants available will be reducing local emissions of NO_x and PM_{10} as well as CO_2.

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								funding from this scheme this year and installed 18 new boilers in residential properties in the borough. £66K of Department of Health and Warm Zones funding allowed boiler repairs and replacements in several residential properties. 16 new boilers, assorted repairs and radiator replacements were carried out with the funding. *Green Deal* The Council is not actively promoting the Green Deal at the current time. The Green Deal pilot project went ahead in Summer 2013 which involved two local properties being retrofitted with insulation. This was carried out with 14.5K of grant funding obtained by the Council. This project allowed the Council to see what could be done to typical housing stock in the borough to reduce both air pollutant and carbon emissions from domestic properties. The Healthy Homes project continues to provide assistance to the elderly and vulnerable in the borough. This includes installing or updating heating systems and providing insulation and draught proofing.	next year. Completed Summer 2013 Ongoing	

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								The Council has commissioned a study into the current (baseline) energy performance and the retrofit potential of the domestic properties within the borough using EPC data. This will allow areas of the borough with poor energy performance to be targeted and for the most cost effective energy efficiency improvement measures to be promoted. The report is due to be finalised soon. The Council is involved in the European Funded Decumanus project and hopes to get high resolution heat loss maps for the borough, along with other information in order to help address energy efficiency within the Borough"s buildings.	Summer 2014	Improvements in the energy efficiency of the boroughs housing stock will lead to a reduction in associated NOx and PM10 emissions, particularly where older boilers are being replaced with new ones.
13.	Borough-wide Boiler Survey	Research emissions associated with existing heating plant in RBKC by carrying out a borough- wide boiler survey	LA	2009-2011	2011	Compiling an emissions inventory	N/a	A survey of large boilers and CHP plant in commercial buildings in the borough has been carried out this year. The size and output of each plant has been recorded, along with make and model, use and mitigation measures. The data will be used to gain an understanding of the likely emissions from large CHP plant in the borough, which will inform future policies relating to the installation of new CHP units. The information gathered shows that CHP plant is widely installed in many of the borough"s larger buildings and supports the findings of a report commissioned by the borough into CHP. The findings have implications for the	Action completed 2012/13	The findings have implications for the dispersal of emissions from such plant where pre-existing chimneys are used. Also emissions of NOx are significantly higher than for CHP compared to efficient new boilers.

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								dispersal of emissions from such plant where pre-existing chimneys are used and the higher emission NOx rates from such plant.		
14.	Integrating air quality and climate change measures	Aim to identify the most effective emission reduction measures which provide the greatest benefits in terms of CO_2 and air quality emissions.	LA	2009-2010	2011	Produce a NI194 toolkit/ policy changes	N/a	NI194 has been withdrawn. A consultant was commissioned to review the cost and benefits of individual measures that could be taken to improve air quality in central London. The findings of the review highlighted increasing cycle infrastructure and promotion as having the biggest CO_2, No_x and PM_{10} saving, (around 150,000, 249 and 18 tonnes/yr respectively) although this would be very expensive to implement. The second most significant saving of CO_2 and air pollutants could be via the expansion of car club schemes (nearly 27,000 tonnes/yr), with campaign days saving slightly less (20,000 tonnes/yr). Apart from fitting DPF"s on taxis, vertical exhausts on buses and Euro V requirements and engine reprogramming for buses, all the measures would lead to a reduction in CO_2. The following measure suggested in the report is being progressed: Engaging local businesses and schools to	2011	Estimates of emissions reductions of NOx, PM_{10} and CO_2 are reported in the "14 Cost Effective Actions to Cut Central London Air Pollution

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								reduce their air pollutant emissions Environmental Health has attended the quarterly Climate Change Programme Board meetings, which will lead to more joint working around the Council. This will result in the most effective measures for both air quality and climate change being implemented.		
15.	Controlling Emissions from Biomass, Biofuel and CHP	Make use of planning conditions and obligations in order to set requirements for controlling pollutant emissions from biomass and biofuel boilers and CHP.	LA	2009	2009-2014 (ongoing)	Planning conditions or obligations.	N/a	A detailed air quality assessment with dispersion modelling is requested for all major developments proposing to use biomass and biofuel or Combined Heat and Power Plant. In addition discussions are held with developers to ensure that alternative non combustion renewable technologies are considered. However the push for decentralised energy is resulting in significant number of CHP plant being proposed. This presents risks to improvements in air quality (see comments in Action 8 relating to the decentralised energy strategy) as it is often proposed in preference to non-combustion renewable technologies despite the combined benefits that these measures can have for both climate change and local air quality. Officers from Kensington and Chelsea and Hammersmith and Fulham have met with the GLA to discuss the potential negative impact of the decentralised	2014	Emissions reductions have been achieved through the implementation of conditions requiring abatement were CHP plant is proposed. Emissions of NOx without abatement can be orders of magnitudes higher.

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								energy strategy on air quality when CHP plant is installed.		
16.	School Travel Plans	The focus of this measure has now changed from requiring school travel plans in all schools (LEA and independent) in the borough to „monitoring travel plans within LEA and Independent Schools in the borough".	LA	2009	2010	50% of all schools have an active travel plan (meaning that the school has submitted an updated travel plan document including mode of travel to school data)	N/a	The Council continues to implement sustainable travel initiatives in our local schools. At the time of going to print the most recent travel plan data from 2012/2013 showed that 67 per cent of schools (42 schools out of 63) in the borough had reviewed their travel plans and received free training resources and funding from the Road Safety and Travel Plan Team. About 50 per cent of the schools are LEA and the other half are independent. We also released school travel plan grants amounting to £25,000 to a total of 28 schools to support their own road safety and sustainable travel projects. The percentage of pupils cycling, walking and scooting to school has increased from 41 per cent in 2011-12 to 46 per cent in 2012-13. Car use has decreased from 24 per cent to 23 percent for the same period. In 2012-13, 28 schools were awarded Transport for London's Sustainable Travel Accreditation: 2 schools received the gold level, 8 schools the silver level and 18 schools the bronze level. A further 14 schools had an active travel plan. In total 42 schools were engaged in the school travel plan process.	Target complete, but ongoing process – each school monitors their travel plan annually.	School Travel Plans promote sustainable transport through initiatives such as free cycle, scooter and pedestrian skills training. Facilities such as scooter and cycle storage areas are also installed in the schools. The modest but definite increase in pupils cycling and scooting to school points to the success of investing resources in school travel planning.
17.	Encouraging	Continue to	LA	2009-2010	2009-	Annual increase	N/a	In 2012-13 the Council delivered 283 free	2014	Until the Mayor of

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	Cycling	encourage safe cycling in the borough by improving facilities and providing free cycle training to residents			2014 (ongoing)	in cycling numbers		adult cycle training lessons and 617 children received cycle training. It also provided 100 free cycle maintenance sessions (Dr Bike) to the public and workplaces and delivered 20 cycle mechanic training sessions shared with LB Hammersmith and Fulham. A number of training sessions were again arranged with police - „exchanging places programme" to highlight the blind-spot dangers of large vehicles. In 2012-13 £145,582 was invested in cycle parking e.g. cycle stands and cycle hoops. In 2013-14 the Council invested a further £68,507. Several initiatives to encourage social activities around cycling are active e.g. All Ability Cycling Club, Recycle the Way you Travel and Bikeminded promotion campaign which involved five cycle tours – attracting 150 people.		London implements his radical proposals to create a grid of bicycle „super-highways" and „quiet-ways" in the capital, and there is greater segregation of cyclists from other vehicles, there is unlikely to be a step change increase in the number of cyclists. Consequently the likelihood of a significant reduction in vehicle emissions from a mode shift to cycling remains uncertain.
18.	London Cycle Hire Scheme	The Council will support TfL in implementing a Central London Cycle Hire Scheme based on the Paris model.	TfL and LA	2009-2010	2010	50 docking stations installed in the borough	N/a	With phase 3 of the Scheme completed in December 2013, the total of docking stations in the borough is now 86. The scheme now extends as far as Westway in the north and covers much of the south of the borough. Over 2000 bikes are now available for hire. As part of this expansion, the cycle hire	30th July 2010 Action completed	This scheme aims to encourage bicycle use, especially for short journeys and has grown in popularity They can help to reduce the impact of using cars for

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								scheme was also introduced to parts of Wandsworth and Hammersmith and Fulham, providing more than 100 docking stations. This gives greater coverage of bikes across West and South West London which will greatly benefit our residents. Over three quarters of the borough is now covered by the cycle hire scheme. There are now a total of 10,000 bikes available in London at 700 docking stations.		short journeys.
19.	Car club Expansion	Double the number of on-street car club bays available in the borough and increase the number of low emitting vehicles in the car club fleet.	LA	2009-2010	2014	No. of car club members in the borough 200 on-street car club bays in the borough. 33% of the fleet within VED band A-B.	N/a	The number of car club members has levelled off. We are waiting for the Mayor of London/TfL to publish more details of the electric car hire scheme proposal and in the meantime will look for an opportunity to introduce stricter emission criteria in the new Air Quality five year Action Plan. Although more than 50 per cent of the fleet are already within VED band A-B (Based on 118 vehicles with 12 month permits). Virtually all residents are within a three minutes walk of a bay.	2014	Each car club vehicle takes at least 4 private vehicles off the road and reduces the mileage driven by its members.
20.	Idling Engines	Undertake an awareness raising campaign to inform drivers of the idling engines	LA	2009-2010	2009-2014 (ongoing)	Number of warnings and complaints	N/a	The Highways Enforcement Team continue to conduct checks at known trouble spots. These areas include Kings road, Kensington High Street, Exhibition road and Cromwell Road. Areas likely to	Ongoing Ad-hoc checks will continue	When a vehicle is waiting for longer than 30 seconds then engine should be switched off to

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		regulation and continue to monitor hotspots and use the available enforcement powers to encourage drivers to switch off their engines.						cause nuisance are also targeted such as cab ranks, bus stops, coach stops and areas around schools. Leaflets have been distributed to car/van/bus/coach drivers who are sitting in vehicles running idle engines. During 2013/2014, officers received 28 complaints of vehicles parked with idling engines running. This is an increase of 25 reported complaints from the previous year (2012/2013) figure of 3 complaints. Of the 28 reported idling engine complaints received during 2013/2014, 11 of these complaints arose in the north of the borough while 17 complaints originated in the south. Complaints were associated primarily with construction site heavy goods vehicles (11), commercial delivery vans (5), residential cars (5) coaches (3), taxis (3) and lorries (1). The marked increase in idling engine complaints may be considered to be due to the implementation of London wide initiatives raising the profile of idling engine issues In addition to increased awareness of AQ issues following reports on national news channels and in the press in response to high profile, high pollution events. During 2013/2014 no Fixed Penalty	throughout the year	stop emissions and fuel consumption.

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								Notices were issued. This was the same as 2012/2013 figures that also recorded no Fixed Penalty Notices issued. TFL anti idling engine posters will continue to be distributed and displayed where opportunities arise. The issue of idling engines continues to be an integral component of the Councils Schools engagement programme where children, parents and the wider school community are informed about the adverse impacts to local air pollution caused by idling engines.		
21.	Investigate the effects of a more robust LEZ	Assess the effectiveness of a number of scenarios for an alternative central London Low Emission Zone (LEZ) and lobby the Mayor of London to implement the most cost-effective option.	LA	2010	2011	Investigation completed and results submitted to TfL and GLA. in the form of the Best Practice measures. Since the inception of this measure the Mayor of London in February 2013 announced his intention to develop an Ultra Low Emission Zone (ULEZ) in	N/a	The borough was successful in bidding for funding to evaluate the effectiveness of the introduction of the latest stage of the London LEZ introduced in 2012. The study quantified the impact of the latest stage of the London Low Emission Zone on NO_2, PM_{10} and black carbon concentrations focussing on the Earls Court one way system which has a large number of light goods vehicles. Disappointingly the analysis of the impact of the third phase showed no improvement in the local increment of PM10 and elemental Black Carbon (eBC) concentrations at Earl"s Court Road after the introduction of the third phase of the LEZ. The NOX concentration increment slightly decreased in 2012 but the NO2	2011	

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
						central London by 2020.		increment remained very similar in both years. ULEZ: The council"s officers have attended a number of meetings and workshops which have been held with other stakeholders to discuss the proposals. The latest event attended in March detailed the analysis undertaken by TFL on the latest proposals for the ULEZ.		
22.	Parking Charges	Review the surcharge for diesel vehicles Review the graduated parking permits system to incorporate discounts for low emission vehicles (electric vehicles)	LA	2009	2010-2011	Changes implemented to residents parking permit charges	N/a	Residents parking charges are reviewed every year. Currently the price of all seven bands has been increased to reflect the increase in the Retail Price Index (around 3.2 %). The price of Band 7 permits remains 33% higher than those in Band 6 to provide further incentive to residents to choose less polluting vehicles. The diesel surcharge, which is levied on pre-Euro 5 diesel vehicles, stands at £18 which affects most diesel cars produced before 2011), Electric vehicles continue to be charged at the lowest parking permit rate. A charge of £65 is levied for second and subsequent vehicles in a household.	The parking charges will continue to be reviewed on an annual basis.	The Council continues to reward residents who have chosen low emission vehicles such as electric, and place a surcharge on vehicles which are most polluting. Since the graduated tariff structure for residents" parking permits was introduced in 2008 the price differential between the lowest and highest bands has risen to over £130, providing a strong incentive to

No	Measure	Focus	Lead	Planning phase	Implementation phase	Indicator	Target annual emission reduction	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
										choose a change to smaller engine sizes.
23.	Encourage the creation of electric recharging infrastructure	Actively encourage the creation of electric recharging infrastructure within the borough by requiring charging points to be incorporated in development and promoting grants to local businesses.	LA	2009	2009-2014 (ongoing)	Electric Charging Points (ECPs) installed by developers and on business premises: 50% of on-site parking spaces in new development with ECPs by March 2012 100% parking spaces with ECPs by March 2014	N/a	The Council continues to require ECPs with all new developments. This is enforced through the use of planning conditions. The Council is currently requesting that ECPs are installed at around 20 per cent of on-site parking spaces in new developments. However we are urging developers to install passive provision for connection later on if demand justifies it. We introduced two on-street electric vehicle charging points in April 2013. The charging points are located in pay and display bays in Seville Street and Talbot Road and are operating as part of the Source London scheme. Each point will provide both a 13 and 32 amp charging socket. Following the introduction of on-street electric vehicle charging points as a trial, we are now considering the feasibility of providing on-street charging facilities in residential areas. A new electric parks van is part of a trial to explore the potential for electric vehicles in the Council"s fleet.	On target for completion of reduced Mayoral targets.	This is an ongoing commitment

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

The Progress report has not identified any significant changes to the air quality in the borough; NO_2 levels remain high at many of the boroughs monitoring stations exceeding both annual and hourly mean objective levels. The daily mean PM_{10} objective continues to be exceeded at one monitoring location. In summary the results for nitrogen dioxide and particulate matter continue to exceed one or more of the Government"s air quality objectives within the borough, therefore it is necessary to continue to maintain the AQMA. As no significant changes have been identified, no changes to the AQMA are required as a result of new monitoring data.

10.2 Conclusions from new local developments

New local developments have the potential to impact on air quality the council will continue to work to minimise these impacts however integrated policies are required to avoid the continuing conflict between some carbon reduction measures such as the push for decentralised energy in urban areas which will have a detrimental effect and have the potential to erode improvements in other sectors.

10.3 Other Conclusions

No new processes /fugitive emissions were identified. However an application for a permit for a gasification and pyrolysis plant under the Environmental Permitting Regulations 2010 is expected. The process will be classed as a small waste incineration plant. An air quality assessment will also be required as part of the planning process.

10.4 Proposed Actions

A review of the LAQM regime is due to be consulted on in the next few months. The proposals may affect the way that the review and assessment process is undertaken. However currently the next progress report is due to be completed and submitted in 2014, which will include a review of new monitoring data collected for the key strategy pollutants.

11 References

Maggs, R., Harrison, D., Carslaw, D. , Stevenson, K. (2009) Analysis of Trends in Gravimetric Particulate Mass Measurements in the United Kingdom

Defra (2007) The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland

Defra (2009) Local Air Quality Management Technical Guidance LAQM.TG (09)

London Councils (2006) Best Practice Guidance. The Control of Dust and Emissions from Construction and Demolition

RBKC Local Implementation Plan (LIP)
http://www.rbkc.gov.uk/environmentandtransport/transportandstreets/policiesandstrategies/localimplementationplan.aspx

RBKC (2008) The Climate Change Strategy 2008-2015
http://www.rbkc.gov.uk/environmentandtransport/climatechange.aspx

Appendices

Appendix A: QA/QC Data

Appendix B: Residential locations in relation to diffusion tube locations

Appendix C: Glossary

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

NO_2 diffusion tubes

Bureau Veritas manage the data from the London Wide Environmental Programme (LWEP) diffusion tube networks, however the supply and analysis of the tubes is undertaken by Gradko International Ltd. The preparation method is 50% TEA v/v in Acetone and the analytical method is U.V. Spectrophotometry.

Factor from Local Co-location Studies

Bureau Veritas conduct an „in-house" co-location study to establish an LWEP bias adjustment factor based on triplicate NO_2 diffusion tubes sampling concurrently located with continuous analysers for a number of local authorities. They employ the DIFTAB.xls spreadsheet to calculate the factor.

NO_2 diffusion tube bias adjustment factors for 2006 to 2013

Year	Mean Adjustment	Mean% Bias
2006	1.06	-4.00
2007	1.01	-1.06
2008	0.98	3.92
2009	1.00	1.14
2010	1.06	-5.00
2011	1.02	-1.20
2012	1.04	-3.00
2013	1.14	-10

Bias Adjustment Factor and % Bias of LWEP Co-Location Study 2013 (North Kensington)

Diffusion Tube	**Continuous Analyser**	**Correction Factor (A)**	**% Bias based on continuous monitor (B)**
32	37	1.14	-12

Source: Annual NO2 Diffusion Tube Report 2013 prepared for Royal Borough Kensington and Chelsea and the London Borough of Hammersmith and Fulham Veritas

Choice of Factor

For 2013 a local bias adjustment factor based on the North Kensington monitoring station was considered to be the most suitable as it is based on data from the borough"s AURN affiliated site which has triplicate diffusion tubes co-located with it.

Benzene diffusion tubes

Benzene data is also collected as part of the LWEP managed by Bureau Veritas. The tubes are analysed using desorption scanning gas chromatography/mass spectrometry (GC/MS). Comparison of the LWEP data with the calculated mean data for the Automatic Hydrocarbon Monitoring Network (AHMN) indicates that the concentrations recorded were very comparable. However there is no bias adjustment factor for benzene measurements.

PM Monitoring Adjustment

TEOM
In the past TEOM data was corrected using a simple multiplication factor of 1.3. Co-located instruments (TEOM and Partisol) at North Kensington in the past enabled us to compare the results, this had shown that adjusting the TEOM data by a factor of 1.3 gave a reasonable approximation of the annual average as less reliable when applied to exceedences of the daily objective. However co-location studies have shown that the instrument was not equivalent to the reference method and the FDMS measurement device was developed to correct the problem and in comparisons was shown to be equivalent to the EU reference method. In 2008/09 Defra began the replacement of TEOM units with FDMS units on the particulate monitoring network. Government guidance LAQM TG(09) states that the Volatile Correction Model (VCM) should be used to correct TEOM measurements for Local Air Quality Management purposes.

Data has been collected from the London Air Quality Network (LAQN) website (www.londonair.org.uk) operated by King"s ERG. TEOM measurements on the website are now adjusted by the CVC. The VCM uses FDMS purge measurements to correct TEOM measurements for the loss of volatile material. This method is now recommended in Defra"s TG (09) as the preferred method for correcting TEOM measurements for Local Air Quality Management purposes. This correction has been undertaken for data in the Council"s two TEOM sites from 2004. Data corrected using both the simple multiplication factor and the VCM method is included in the report.

QA/QC of Automatic Monitoring

Data collection, screening and validation

Monitoring data is stored as 15-minute averages within the analysers. Air quality data, including full instrument status information, is collected hourly via modem by the King"s ERG on the borough"s behalf from the monitoring sites via the data loggers within the analysers. This data is stored within the LAQN database. Data is validated by a combination of automatic and manual checks. The procedures used comply with the validation requirements of the UK Automatic Urban and Rural Network (AURN) Management and Co-ordination Units. Manual validation is carried out daily. Data is ratified in three to six month blocks using service records, calibration records, and the results of inter-calibration and audit. Data is passed on to the Defra"s Quality Assurance and Quality Control Unit for final ratification.

Routine calibration and independent checks

Local site visits are undertaken fortnightly at the urban background site and weekly for the roadside Tapered Element Oscillating Microbalance (TEOM-FDMS) for the purposes of calibration, filter changes and instrument cleaning. Equipment is additionally serviced at regular intervals. Routine calibrations are undertaken by contractors.

Independent calibration and audit is carried out by Defra appointed contractors as part of their AURN responsibilities for the North Kensington site and for the Cromwell Rd site through a separate contract. Calibration certificates are provided by AEAT. The National Physical Laboratory (NPL) undertake the London affiliate inter-calibration exercise. The following checks are performed for the oxides of nitrogen, sulphur dioxide and carbon monoxide analysers:

Analyser response factors: The analyser samples a stable „inter-calibration standard" which has been validated against a network primary standard. The analyser also samples from a certified zero air source.

Analyser linearity: The analyser response to a series of known concentrations covering the analyser range is noted. A linear regression is then performed on the results.

Analyser „noise" levels: This is the standard error of ten successive spot readings of analyser readings when fully stabilised on zero.

Nitrogen Oxides analyser converter efficiency: NO_x analyser converter efficiency is determined using Gas Phase Titration at a range of concentrations, this uses a high concentration of NO and a known amount of O_3 which is subsequently converted to NO_2.

Estimation of site cylinder concentrations: The concentrations are evaluated by sampling from the site cylinder and comparison to analyser response factors determined from the „inter-calibration standard".

For particle analysers the following checks are performed: Mass transducer calibration: The mass transducer is calibrated by placing pre-weighed filters on it and noting the change in the frequency that is induced.

Analyser flow rates**:** Flow rates are measured by calibrated flow audit measurement systems. Leak checks are also carried out.

QA/QC of Gravimetric monitoring-Partisol

The Partisol operating at the Earls Court Road site since May 2002 is a gravimetric sampler which is equivalent to the EU reference method. Reference to the report has also been made to other Partisols operating in the borough by Defra. However the co-location trail[6] raised concerns over the filter media used in these instruments

[6] Maggs, R., Harrison, D., Carslaw, D. , Stevenson, K. (2009) Analysis of Trends in Gravimetric Particulate Mass Measurements in the United Kingdom

and showed that an over estimation in measured concentrations resulted from the use of quartz filters. The filters used at the site are Teflon coated glass fibre (Emfab) filters which are not affected in the same way as quartz filters[7]. No correction factor is required for gravimetric instruments.

Verification of ambient temperature, verification of filter temperature, verification of ambient pressure and humidity, internal leak check, external leak check and flow verification are undertaken for the partisol at the time of audit and service.

QA/QC of Diffusion tube data

Nitrogen dioxide
The laboratory of Gradko International Ltd follows the Practical Guidance document "Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for users and laboratories (Feb 2008)" (AEA on behalf of Defra). The preparation method: 50% TEA v/v in Acetone and the analytical method is U.V. Spectrophotometry. Analysis is carried out in accordance with documented in-house Laboratory Method GLM6. Results are not blank subtracted

Uncertainty of measurement: 3.82%+/- Limit of Detection: 0.06mg/m3*

Gradko International Ltd participates in the Workplace Analysis Scheme for Proficiency (WASP). This is a recognised performance-testing programme for laboratories undertaking NO_2 diffusion tube analysis as part of the UK NO_2 monitoring network. The scheme is designed to help laboratories meet the European Standard EN48213.

The Laboratory performance was deemed satisfactory for 100% of samples that were submitted between Jan 2013 and December 2013 (WASP Rounds 120-123, 2013. [7]

They also participate in the Network Field Inter-comparison Exercise which complements the WASP scheme in assessing sampling and analytical performance of diffusion tubes under normal operating conditions. This involves the regular exposure of a triplet of tubes at an Automatic Urban Network site (AURN) site. These sites employ continuous chemiluminescent analysers to measure NO_2 concentrations. The results indicate that Gradko International Ltd diffusion tubes are well within the performance targets set by NETCEN.

Summary of NO_2 Network Field Inter-comparison Results, 2013

Annual Mean Bias		Precision	
Performance Target	Gradko Annual Mean Bias	Performance Target	Gradko Precision
±25%	**10.6%**	**10%**	**Good**

[7] Defra"s Local Air Quality Management Support Pages
http://laqm.defra.gov.uk/documents/WASP-NO2-Scheme-for-Rounds-105-113-(April-2009---June-2011).pdf

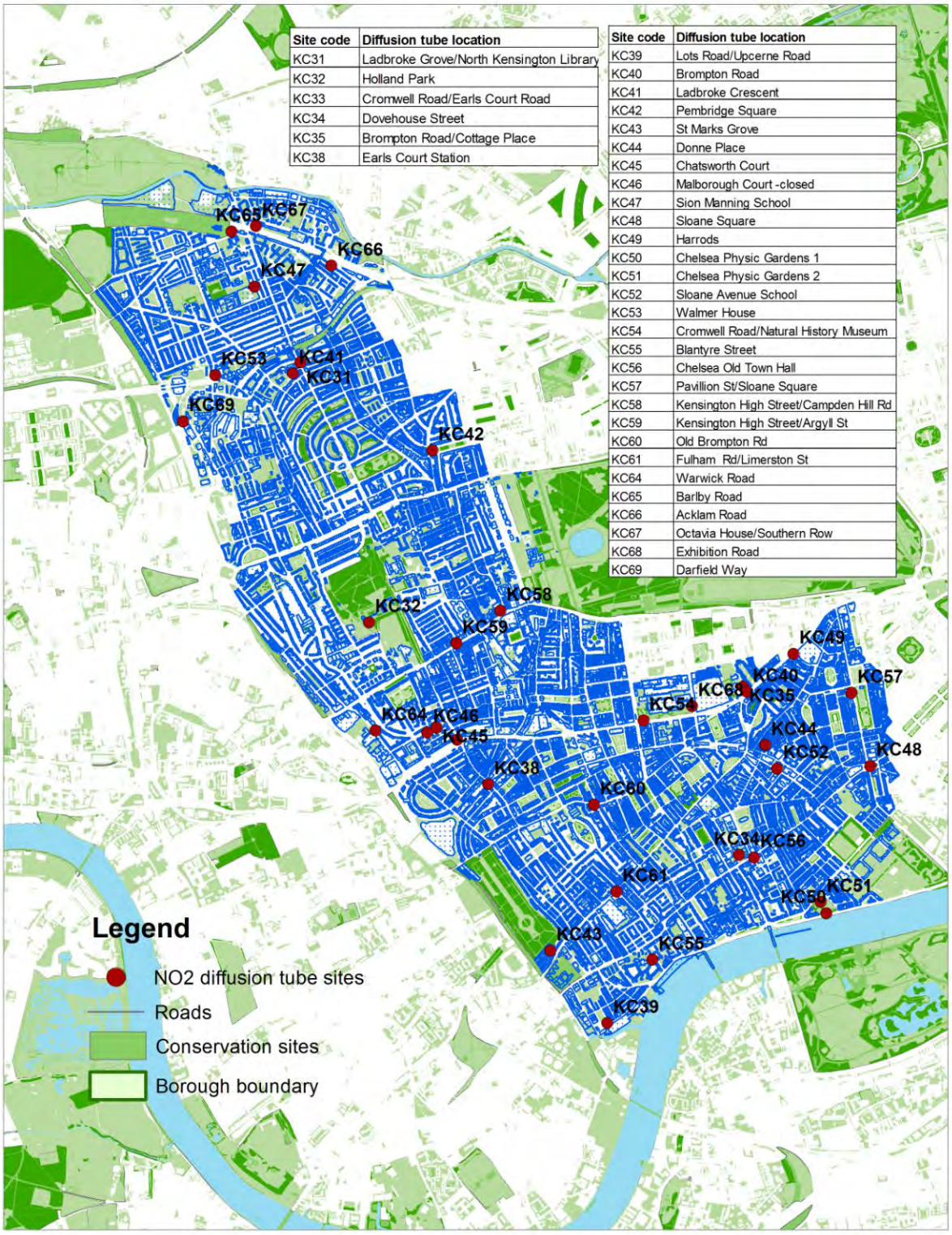
Benzene

All benzene tubes were analysed by a UKAS accredited laboratory using desorption scanning gas chromatography/mass spectrometry (GC/MS). This method of analysis gives unequivocal identification of BTEX peaks. The analysis is carried out in accordance with the Gradko International Laboratory Quality Procedure GLM 4.

The accuracy of the Laboratory measurements are monitored by participation in the Laboratory Measurement Proficiency Scheme.

The measurement method used in the benzene survey was consistent with the sampling, analysis and QA/QC requirements of EN 14662-4: 2005 Ambient air quality – Standard method for measurement of benzene concentrations – Part 4: Diffusive sampling followed by thermal desorption and gas.

Appendix B
Residential locations in relation to diffusion tube locations. Residential property is marked by a blue point.



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Appendix C: Glossary

AQMA - Air Quality Management Area - an area designated by a local authority where it is likely that the air quality objectives in the National Air Quality Strategy will not be achieved by the appropriate future year specified by each pollutants‟ objective.

AQAP - Air Quality Action Plan**-** a plan of initiatives that is being implemented to improve air quality.

Automatic monitoring sites- sites producing high-resolution measurements typically hourly or shorter period averages.

AURN- Automatic Urban and Rural Network- A Defra air quality monitoring network.

AURN affiliate- a monitoring site owned and operated by a local authority but included in the Defra network of sites.

AHMN- Automatic Hydrocarbon Monitoring Network

Urban background site- a sampling site in an urban location distanced from sources and broadly representative of city-wide background concentrations e.g. elevated locations, parks and urban residential areas.

Benzene- an aromatic hydrocarbon

1,3-Butadiene- colourless gaseous hydrocarbon

Carbon monoxide (CO)- gas formed by the incomplete combustion of carbon containing fuels

Defra- Department for Environment, Food & Rural Affairs

Diffusion tube- a small tube used to monitor pollutants by passively absorbing a pollutant over a specific time period, and is then collected and analysed

Emissions inventory- a comprehensive data set of pollution emitted from a variety of sources

FDMS- Fluid Dynamic Measurement System**-** an airborne particulate monitor based on TEOM technology measuring the core and volatile fractions of the collected mass

Fine particles- see Particles

Gravimetric method- a method of sampling particulate matter by collecting it on a filter which is then weighed later under controlled conditions, e.g. Partisol

HGV- heavy goods vehicle, a goods carrying vehicle of 3.5T (tons), or more, gross laden weight

8 hr running mean- an average taken over an 8-hour period, which progresses hour by hour

Intermediate site - a sampling site within 20-40 metres of the source/road

Kerbside site- a site sampling within 1 metre of a busy road

Lead (Pb) - one of the heavy metals that are a toxic and acts as a cumulative poison

LWEP- London Wide Environmental Programme- provision and analysis of diffusion tubes led by Bureau Veritas in a number of London boroughs

LAQN- London Air Quality Network - a network run by a consortium including local authorities, the Environmental Research Group- King"s College, to co-ordinate air pollution monitoring

Microgram µg) – a unit of mass equivalent to one millionth of a gram or one thousand of a milligram

Milligram (mg) – a unit of mass equivalent to one thousand of a gram

µg/m^3- a microgram of pollutant in a cubic metre of air

Nanogram (ng)- a unit of mass equivalent to one thousandth of one millionth of a gram

ng/m^3 nanogram of pollutant in a cubic metre of air

Oxides of nitrogen (NO_X)- a mixture of NO and NO_2

Nitric oxide (NO)- a colourless toxic gas arising from the combination of atmospheric nitrogen with oxygen in high temperature combustion

Nitrogen dioxide (NO_2)- a stable brown gas largely produced by the oxidation of NO. NO_2 is more toxic than NO

Particles- or fine particles, these are microscopic particles of varying composition, and for the purposes of this report the term „particles" refers to a range of particle sizes from 10µ to 0.1µ

Pollutant specific guidance- issued by Defra, provides advice on review and assessment for each pollutant identified in the air quality regulations

Objective- we have used the word objective throughout this report. This is the term used by the Government to describe standards which have a set timescale (i.e. a target date) for their achievement

PM_{10}- particulate matter less than 10µ (micrometres) in diameter

$PM_{2.5}$- particulate matter less than 2.5µ (micrometres) in diameter

Roadside site- a sampling site between 1 metre of the kerbside of a busy road and the back of the pavement, typically within 5 metres of the road

Screening models- give a preliminary level of assessment and only require simple input data

Source apportionment- the degree to which various sources of pollution contribute to air quality problems

Sulphur dioxide (SO_2) - a colourless toxic and acid forming gas, it is the main product of the combustion of sulphur contained in fuels

TEOM- Tampered Element Oscillating Microbalance- a monitor to measure the mass of particles collected on a filter continuously

VCM- Volatile Correction Model- a model to correct measurements of PM_{10} by the TEOM so that they can be used to compare against the EU Limit Value in the UK.