2013 Air Quality Progress Report for Nottingham City Council

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

Date August 2013

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Executive Summary

The Progress Report 2013 fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act 1995, the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007, and the relevant Policy and Technical Guidance documents. All local authorities are required to regularly review and assess air quality in their areas, and to determine whether or not specified air quality objectives are likely to be achieved.

The air quality objectives applicable to the Local Air Quality Management process in England are set out in the Air Quality (England) Regulations 2000 (SI 928) and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043).

This report gives information about 2012 annual monitoring results and about new local developments that may impact on air quality. A brief overview is given of the Council's air quality related planning policies and climate change strategies. An update on the air quality aspects of the Local Transport Plans along with the implementation of the associated action plans has also been included.

During 2012 pollutant levels were measured, using automatic (continuous) and non-automatic monitoring, at a number of sites within the Nottingham City area.

The monitoring results showed that no exceedences of the air quality objectives for PM_{10}, sulphur dioxide, carbon monoxide and benzene were measured. The 1-hour objective for nitrogen dioxide was not exceeded.

The annual mean air quality objective for nitrogen dioxide is 40 $\mu g/m^3$; levels in excess of this were measured at the 3 roadside automatic monitoring sites and at a number of nitrogen dioxide diffusion tube sites. All but two of these locations are within the Nottingham No.2 and No.3. Air Quality Management Areas 2010.

The two diffusion tube sites of exceedance outside AQMAs are located on the façades of residential properties – one at the junction of Abbey Bridge/Castle

Boulevard and the other at the Nottingham Road/Valley Road junction on the ring road. Diffusion tubes similarly sited at different locations on the ring road did not measure exceedance.

New local developments that may affect air quality mainly affect road traffic sources, for example, the Station Hub and NET (Nottingham Express Transit) Phase 2 - tram network extensions.

NET Phase 2 has the potential to impact positively on air quality by encouraging modal change from cars and reducing congestion however there could be a detrimental effect during construction. Construction work on the new lines has started and passenger services across the extended tram network could be fully operational by the end of 2014.

Current Local Transport Plan (LTP) schemes recently completed/progressing:

- Connecting Eastside Phase 1: the scheme is under construction and the highway works are largely complete;
- the Station Hub: advanced highway and public realm improvements are underway and the multi-storey car park is now operational;
- 'Centre link' Link Bus development – electric/battery buses have been procured and are operational on routes in and around the City Centre.

The tram and Nottingham Station 'Hub' construction works are resulting in noticeable daily periods of congestion in parts of the City, particularly University Boulevard, Beeston Road, Abbey Street, Castle Boulevard, and Queens Street.

Some of schemes in the LTP2 Air Quality Action Plan have been carried through into the LTP 3 AQAP along with new measures - progress with these will continue to be reported in future Local Air Quality Management reports.

The report concludes that, as a consequence of the 2012 monitoring results, it is necessary to complete a Detailed Assessment for annual mean nitrogen dioxide at two locations where there is relevant exposure of members of the public.

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1 Introduction

1.1 Description of Local Authority Area

The City of Nottingham covers an area of 7,470 hectares and has a population of approximately 300,800 (Key Facts, November 2010). The City boundaries contain urban residential, suburban residential, commercial and industrial areas, and an area of large suburban parkland.

Geographically the Nottingham City area is made up of the River Trent valley basin which extends outside the City's southern boundary to Rushcliffe Borough Council and southwest to Broxtowe Borough Council.

Throughout the 18th and early 19th Centuries the City was dominated by the textile industry which has reduced significantly. Industry is now diverse ranging from some heavy industry through to biotechnology. Currently the Council regulates 69 Part B 'permitted installations' under the Pollution Prevention and Control Act 1999. There are 11 Part A1 installations permitted by the Environment Agency. The whole of the City is subject to Smoke Control Orders, the smoke control programme having been completed in 1991.

Nottingham is a major centre of commerce in the East Midlands, this together with the A453, A610, A60 and A52 road links to greater Nottingham's suburban districts and the M1 and A1 results in large volumes of traffic entering the City via a number of primary arterial routes. Significant numbers of people commute into the city for work, and visit for tourism, leisure and entertainment. The city also has two universities with over 55,000 students.

Thus in Nottingham City Council's area road traffic is the principal source of the air pollutants to which the Air Quality objectives apply and particularly nitrogen dioxide and particles. Industrial sources contribute, but to a lesser degree.

The city centre is mainly retail and service sector/office use with two large shopping centres; Victoria Centre and Broadmarsh to the north and south respectively, each of which has a bus station. The centres are connected by busy pedestrianised areas.

There are proposals for extensive development of both shopping centres which include moving the existing bus stations and altering road layouts.

Nottingham's railway station is located approximately 200 metres south of the Broadmarsh bus station and is undergoing major redevelopment – The 'Hub' scheme.

The scheme includes a new multi-storey car-park (completed), a new concourse, improving passenger interchange and connecting with lines two and three of the Nottingham Express Transit tram extension, is currently under construction. The railway station work is due to be completed by 2014.

Nottingham's tram network is made up of NET Line One and NET Phase Two.

NET Line One is the first part of the network and started operating in March 2004. It links the transport centres with the northern suburbs and 'park and ride' sites providing an integrated transport system.

NET Phase Two, which is currently under construction, is the collective name for the two extension routes. Passenger services across the extended tram network should be fully operational by 2014/2015.

Both the NET Phase 2 and the redevelopment of the station, by providing an alternative to private motor vehicles and encouraging 'modal shift' will contribute to the range of measures being implemented via the local transport plan that will reduce emissions of in nitrogen dioxide and particles from road transport in the Nottingham City area.

1.2 Purpose of Progress Report

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

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

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre µg/m^3 (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 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
Particulate Matter (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

Table 1.2 below gives details of the previous rounds of Review and Assessment (R&A) and a brief outline of the conclusions of the reports. All reports are available on Nottingham City Council's internet site.

Table 1.2 Previous Review and Assessment Reports

Title	Date	Outcome	**AQMA Declared/ Revoked?** (Date of AQMA Order/s)
City of Nottingham Air Quality Review & Assessment First & Second Stage	April 2000	Concluded a third stage assessment for sulphur dioxide, nitrogen dioxide and particles,PM_{10} was necessary. No further assessment of 1,3 Butadiene, benzene, carbon monoxide and lead required.	
City of Nottingham Air Quality Review & Assessment Second & Third Stage Report	Sept 2001	Areas of the city where unlikely to meet air quality objectives for nitrogen dioxide or sulphur dioxide. Proposed 1 AQMA for SO_2 and 2 AQMAs for NO_2	**Declared** AQMA No:1 (Sulphur dioxide) (2002) AQMA No:2 (Nitrogen dioxide) (2002) AQMA No:3 (Nitrogen dioxide) (2002)
City of Nottingham Stage Four Review & Assessment of Nottingham's Air Quality Management Areas	July 2003	Determined that AQOs for sulphur dioxide – hospital chimney and nitrogen dioxide – traffic sources, unlikely to be exceeded by 'due dates' therefore no Air Quality Action Plans needed	
City of Nottingham Local Air Quality Management Updating and Screening Assessment	October 2003	Necessary to proceed to a Detailed Review and Assessment for nitrogen dioxide with respect to a number of roads and for sulphur dioxide in the vicinity of the Nottingham Main Line Station.	

Title	Date	Outcome	**AQMA Declared/ Revoked?** (Date of AQMA Order/s)
City of Nottingham Local Air Quality Management Detailed Assessment	August 2004	Sulphur dioxide 15-minute mean AQO likely to be met at locations of 'relevant exposure' at Nottingham Mainline Station. Nitrogen dioxide annual mean AQO likely to be met. Concluded insufficient monitoring data available to allow revocation of any of the AQMAs.	
City of Nottingham Local Air Quality Management Progress Report	April 2005	Concluded that SO_2 monitoring data sufficient to propose revocation of AQMA No:1 (Sulphur dioxide). Necessary to maintain AQMAs No 2 & 3 (nitrogen dioxide)	
Nottingham City Local Air Quality Management Updating and Screening Assessment	June 2006	Necessary to proceed to a Detailed Assessment for PM_{10} for 2 roads in the city centre and for nitrogen dioxide for a number of roads and junctions based on guidance criteria and some diffusion tube data. AQMA No:1 (Sulphur dioxide) to be revoked - agreed by Defra	**Revoked** AQMA No:1 2002 (Sulphur dioxide) (5 April 2007)
Nottingham City Local Air Quality Management Detailed Assessment Consultation Document	May 2008	**Proposed amendments to existing AQMAs No.2 & No.3 for nitrogen dioxide.** **Further work for nitrogen dioxide to be undertaken following comment and assessment by Defra.** Conclusion that no further action required for PM_{10} accepted by Defra.	
Nottingham City Local Air Quality Management Progress Report	July 2008	Confirmed findings of Detailed Assessment 2008 and need to vary extent of the AQMAs.	

Title	Date	Outcome	**AQMA Declared/ Revoked?** (Date of AQMA Order/s)
2009 Air Quality Updating and Screening Assessment for Nottingham City Council	April 2009	Concluded that there was no need to undertake an additional detailed assessment because all areas of potential exceedence are being considered in the revised DA May 2008 - accepted by Defra	
Nottingham City Council Local Air Quality Management Detailed Assessment 2008 Annex 1 - Supplementary Information for Nitrogen Dioxide	October 2009	Confirmed the DA May 2008 findings - **need for amended AQMAs for annual mean NO_2.** Accepted by Defra on 31 December 2009.	
Nottingham City Council Local Air Quality Management Detailed Assessment 2009	January 2010	For clarification this is a consolidated report of DA May 2008 PM_{10} findings and DA 2008 Annex 1 NO_2 findings	**Declared** AQMA No:2 2010 (nitrogen dioxide) AQMA No:3 2010 (nitrogen dioxide) BY AQMA Variation Orders dated 22 June 2010
2010 Air Quality Progress Report for Nottingham City Council	October 2010	Concluded that there was no need to undertake a Detailed Assessment for any of the regulated pollutants - accepted by Defra	
2011 Air Quality Progress Report for Nottingham City Council	July 2011	Concluded that it was necessary to undertake a Detailed Assessment for annual mean nitrogen dioxide at two diffusion tube sites outside the existing AQMAs - accepted by Defra	
Air Quality Management Areas 2010 - Further Assessment Report	January 2012	Confirmed decision to alter the AQMA boundaries was correct. Concluded that it was necessary to broaden the scope of the DA being undertaken as a result of the 2011 PR findings. Report accepted by Defra	

Title	Date	Outcome	**AQMA Declared/ Revoked?** (Date of AQMA Order/s)
2012 Air Quality Updating and Screening Assessment for Nottingham City Council	July 2012	Confirmed PR 2011 findings that it is necessary to undertake a Detailed Assessment for annual mean nitrogen dioxide air quality objectives outside the existing AQMAs – accepted by Defra	
Detailed Assessment - currently being prepared (2013)		Being undertaken as a consequence of measured exceedance of annual nitrogen dioxide concentrations outside AQMAs. Results have been reported in PR 2011 and USA 2012 and the need for a Detailed Assessment confirmed by Defra.	

AQMA = Air Quality Management Area

AQO = Air Quality Objective

DA = Detailed Assessment Report

NO_2 = nitrogen dioxide

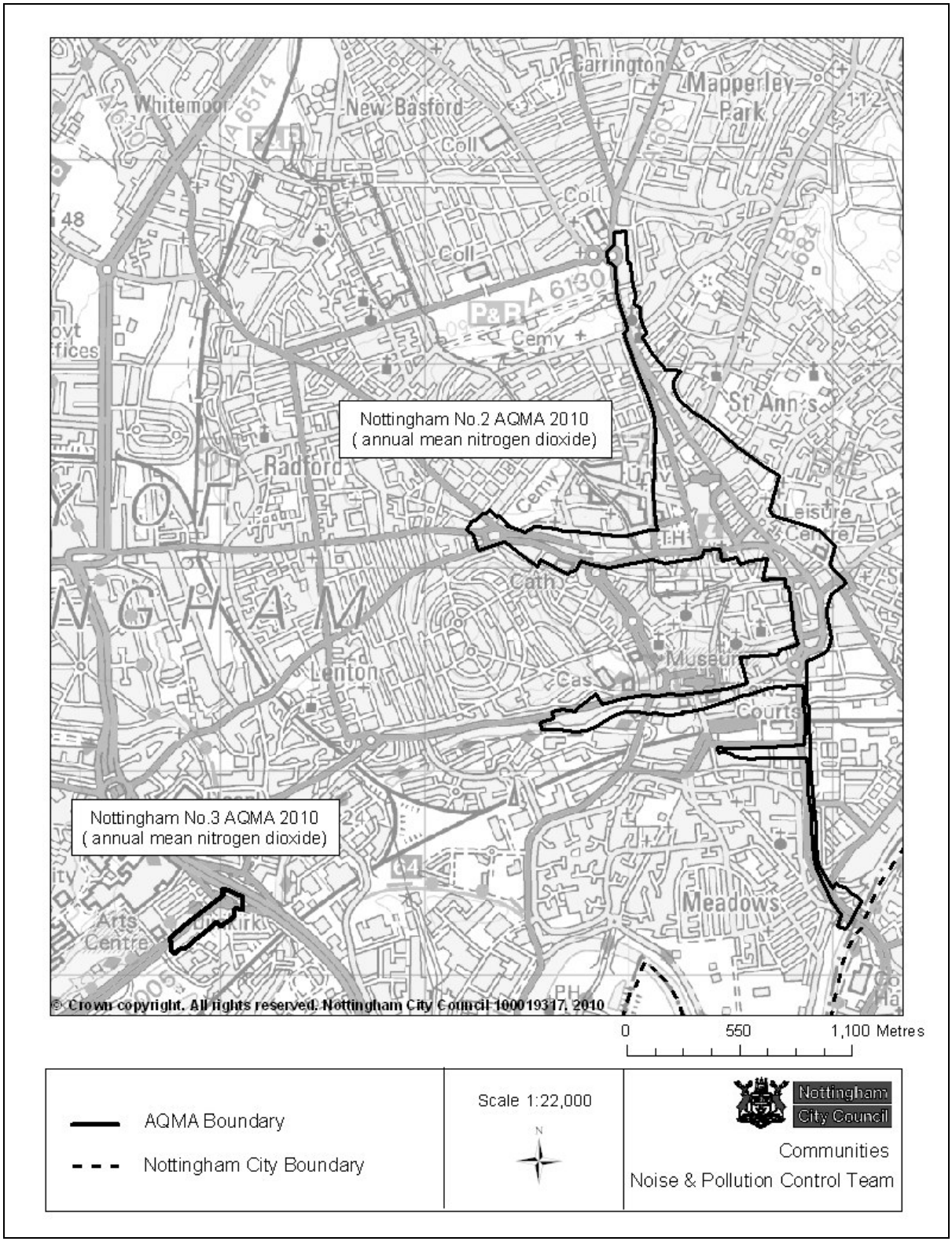
SO_2 = sulphur dioxide

PM_{10} = particles

PR = Progress Report

USA = Updating and Screening Assessment Report

Figure 1.1 Map of AQMA Boundaries



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Nottingham City Council undertakes continuous automatic monitoring at a number of locations in its area and Defra have an Automatic Urban and Rural Network (AURN) site in the city centre. Figure 2.1 is a map showing the locations of the continuous monitoring sites.

AURN, Clinton Street East, City Centre

The AURN station is located in the city centre and classified as an 'Urban Background' (previously 'Urban Centre') site. The surrounding area comprises retail outlets and city centre business premises in an urban pedestrianised area. The nearest road, the A6008, approximately 30 metres from the site, is no longer a through-route for private motor vehicles following completion of the City Centre Major Scheme. Relevant exposure is at residential properties approximately 40 metres to the south and approximately 23 metres to the north east of the site.

Carter Gate NOx (CG NOx), Carter Gate, City Centre

This unit has been located at Carter Gate monitoring since December 2003. The site is a suburban mixed commercial/residential area of the City adjacent to the A60. It is approximately 10 metres from the A60 which is a major traffic route and, approximately 3 metres from a busy B road. It is classed as a 'Roadside' site. There are residential properties approximately 12 metres from the unit and 8 metres away from the A60.

Lace Street NOx (LS NOx), Lace Street, Dunkirk

This is a fixed unit located at Lace Street since March 2007. The site is a suburban, mixed commercial/residential area of the City adjacent to the A6005, a busy road traffic route. It is approximately 4 metres from the A6005 and 1 metre from a minor road and is classed as a 'Roadside' site. The unit is sited on the pavement at the boundary with a residential property and in-line with the facade building line.

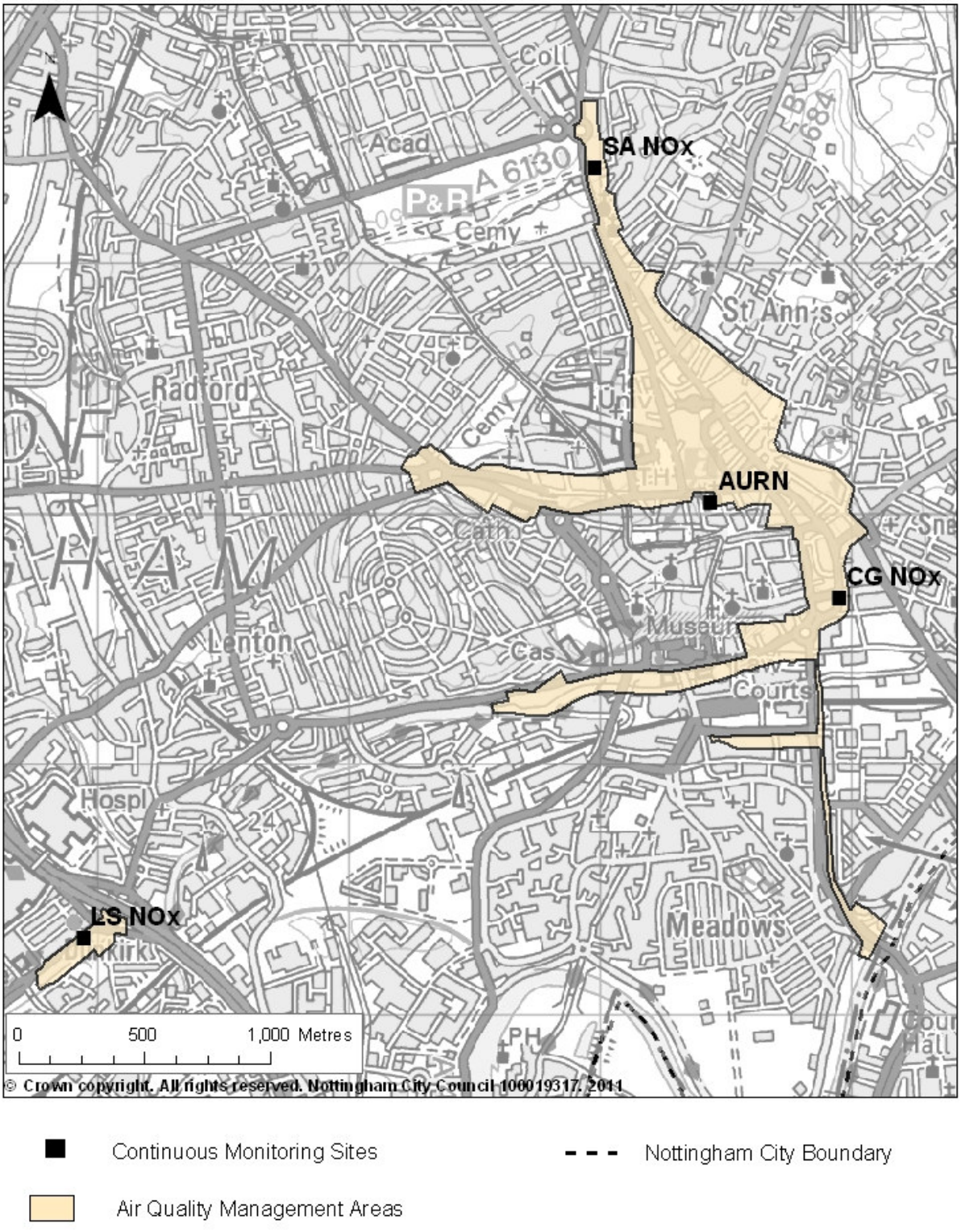
St Andrews Road NOx (SA NOx), Off Mansfield Road, City Centre

This site was established in June 2010 following the expansion of Nottingham City Council's Air Quality Management Area No.2. The monitoring unit is located on a small residential street - St Andrews Road, approximately 13 metres from A60 Mansfield Road. The A60 is a major traffic route into and out of the north of the City.

The SA NOx is a fixed unit sited on the pavement at the boundary of a residential property. It is classed as a 'Roadside' site.

No new monitoring sites have been initiated and there have been no site closures. Details of the automatic monitoring sites e.g. location, sample inlet height etc. are given in Table 2.1.

Figure 2.1 Map showing Automatic Monitoring Sites



Details of quality assurance and quality control (QA/QC) for the automatic monitoring sites are given in Appendix B.

Table 2.1 Details of Automatic Monitoring Sites

Site Name & Location	Site Type	Inlet height	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	Does this location represent worst-case exposure?
AURN Clinton St East.	Urban Background	3m	457437	340049	$PM_{2.5}$	FDMS	N	Y (0m)	35m	N
					PM_{10}	FDMS				
					NO_2 NO NOx	Chemi-luminescence				
					O_3	Ultra Violet Absorption (UVA)				
					SO_2	Ultra Violet Fluorescence (UVF)				
CG NOx Carter Gate	Roadside	2.5m	457946	339668	NO_2 NO NOx	Chemi-luminescence	Y	Y (12m)	4m	Y
LS NOx Lace St.	Roadside	1.5m	454941	338315	NO_2 NO NOx	Chemi-luminescence	Y	Y (0m)	9m (main rd.) 1m (minor rd.)	Y
SA NOx St Andrews Rd	Roadside	1.7m	456967	341382	NO_2 NO NOx	Chemi-luminescence	Y	Y (0m)	13m (main rd.) 2m (minor rd.)	Y

2.1.2 Non-Automatic Monitoring Sites

Nitrogen Dioxide (NO_2) Diffusion Tube Monitoring

Nottingham City has diffusion tubes sited at a number of locations and are shown on the map - Figure 2.2. During 2012 diffusion tubes were placed within and near AQMAs No.2 and 3 and in other areas where there may be 'hot spots' due to road and/or traffic changes. They were also co-located in triplicate with continuous monitors at the CG NOx, LS NOx and SA NOx sites.

The diffusion tubes were placed on building façades of residential properties at sites classified as 'roadside'. Table 2.2 gives details e.g. location, sample inlet height etc of non-automatic monitoring sites.

The tubes are exposed for a month before being sent for laboratory analysis by Gradko International, Hampshire. The laboratory is United Kingdom Accreditation Service (UKAS) accredited; is assessed annually for compliance to ISO 17025 and participates in a number of proficiency schemes.

See Appendix A for details of:

- the tube type and the laboratory that supplies and analyses the tubes
- diffusion tube QA/QC and the bias adjustment factor that has been applied to the annual mean NO_2 diffusion tube data.
- Nottingham City Council's diffusion tube and continuous monitoring 2012 co-location study including comparison with the reference method.

Benzene Pumped Tube Monitoring

Benzene is measured at the AURN, as part of the Non-Automatic Hydrocarbon Network, using a controlled flow pumped tube sampler.

The 2 tubes are changed every two weeks and returned to ESG, Bretby for analysis.

The equipment is audited twice a year by AEA, Oxfordshire. The sample flow is calibrated and adjusted as required; the system is leak checked and preventative maintenance performed.

The geographical location of the AURN site is shown on Page 19 Figure 2.1.

Figure 2.2 Map Showing Diffusion Tube Monitoring Sites

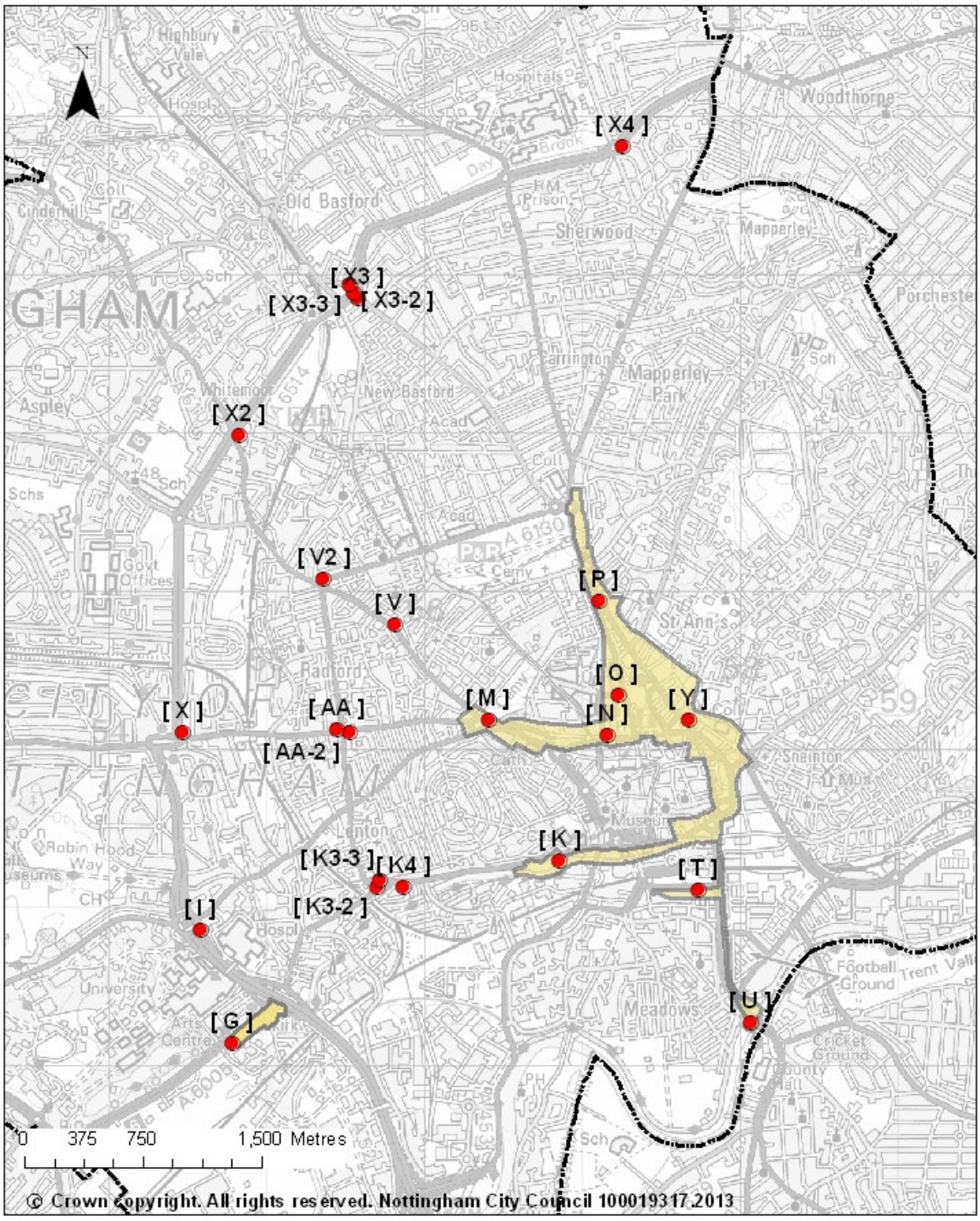


Table 2.2 Details of Non-Automatic Monitoring Sites

Site Id & Street		Site Type	OS Grid Ref		Site Height (m)	Pollutant Monitored	In AQMA?	Relevant Exposure? Y/N (distance (m) to relevant exposure)	Distance to kerb of nearest road (m)	Worst-case Location?
G	Beeston Rd	R	454782	338146	1.5	NO_2	Y	Y (0m)	9	Y
I	Derby Rd	R	454577	338860	1.5	NO_2	N	Y (0m)	25	Y
X	Western Blvd	R	454466	340111	1.5	NO_2	N	Y (0m)	16	Y
X2	Wilkinson St	R	455823	341993	2	NO_2	N	Y (0m)	18	Y
X3	Nottingham Rd 413	R	455573	342860	2	NO_2	N	Y (0m)	8	Y
X3-2	Nottingham Rd 419	R	455543	342894	1.5	NO_2	N	Y (0m)	7	Y
X3-3	Highland Crt	R	455521	342944	2.3	NO_2	N	Y (0m)	4	Y
X4	Danethorpe Vale	R	457250	343815	1.7	NO_2	N	Y (0m)	15	Y
AA	Ilkeston Rd	R	455446	340132	3	NO_2	N	Y (0m)	3	Y
AA-2	Rayner Crt	R	455519	340114	3	NO_2	N	Y (0m)	3	Y
V	Bentinck Rd	R	455808	340799	1.9	NO_2	N	Y (0m)	6	Y
V2	Gregory Blvd	R	455358	341086	3	NO_2	N	Y (0m)	10	Y
K4	Castle Gardens	R	455870	339133	2.5	NO_2	N	Y (0m)	3	Y
K3-2	Castle Blvd 309	R	455693	339137	3	NO_2	N	Y (0m)	4	Y
K3-3	Sherwin Rd	R	45511	339181	1.5	NO_2	N	Y (0m)	5	Y
K	Castle Boulevard 87	R	456852	339303	2.5	NO_2	Y	Y (0m)	4	Y
M	Canning Terrace	R	456399	340191	2.5	NO_2	Y	Y (0m)	4	Y
N	Up. Parliament. St	R	457154	340095	2.5	NO_2	Y	Y (0m)	4	Y
O	Shakespeare St	R	457221	340351	2.5	NO_2	Y	Y (0m)	2	Y
P	Mansfield Road	R	457103	340944	2.5	NO_2	Y	Y (0m)	4	Y
Y	Beck Street	R	457673	340194	2.5	NO_2	Y	Y (0m)	3	Y
U	Trent Bridge PH	R	458051	338328	2.5	NO_2	Y	Y (0m)	5	Y
T	Queens Road	R	457729	339122	2.5	NO_2	Y	Y (0m)	2	Y

Site	Site Type	OS Grid Ref		Site Height (m)	Pollutant Monitored	In AQMA?	Relevant Exposure? Y/N (distance (m) to relevant exposure)	Distance to kerb of nearest road	Worst-case Location?
AURN Clinton St East.	UB	457437	340049	3	Benzene	N	N/A	35m	N

R = Roadside UB = Urban Background

Pollutant monitored - NO_2 by passive diffusion tube, benzene by pumped diffusion tube

Throughout 2012 NO_2 diffusion tubes were located in triplicate at the CG NOx, LS NOx and SA NOx continuous monitoring sites – Table 2.1 above gives the sites' details. The resultant concentrations have been used to determine the bias adjustment factor – see appendix A for further information.

2.2 Comparison of Monitoring Results with Air Quality Objectives

Nottingham City Council's 2012 automatic (continuous) and non-automatic monitoring data are given in subsections 2.2.1 to 2.2.4. Comparison with Air Quality Objectives (AQOs) has been made and where a relevant AQO has been exceeded the figure is highlighted in bold type.

2.2.1 Nitrogen Dioxide, NO_2

Information is shown for both continuous and diffusion tube 2012 nitrogen dioxide monitoring results. Exceedences of the NO_2 annual mean AQO (i.e. greater than 40μg/m^{-3}) were measured at the three roadside automatic sites and twelve diffusion tube sites - three of which are not in the existing AQMAs.

The results also show that the 1-hour AQO was not exceeded at any site as no 1-hour means above 200μg/m^3 were recorded at the continuous sites, and there were no diffusion tube concentrations greater than 60μg/m^3.

Automatic Monitoring Data

CG NOx and SA NOx sites are located in the Nottingham No.2 AQMA 2010 whilst LS NOx is within the Nottingham No.3 AQMA 2010. These three continuous monitoring stations are close to residential properties and were all initiated as a result of previous rounds of Review & Assessment.

In 2012 the nitrogen dioxide annual mean AQO concentration of 40 μg/m^3 was equalled at the LS NOx site, and exceeded at the CG NOx and SA NOx roadside sites - see Table 2.3.

Table 2.3 Results of 2012 Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Data Capture %	Annual Mean Concentration (µg/m^3)
AURN	UB	N	97.7	37
CG NOx	R	Y	95.4	**42**
LS NOx	R	Y	95.1	40
SA NOx	R	Y	93.4	**44**

1 January 2012 – 31 December 2012 ratified data

R = Roadside UB = Urban Background

Automatic Monitoring Nitrogen Dioxide Trend Data

The trends in annual mean nitrogen dioxide levels for those automatic sites with more than 5 or more years of data, i.e. AURN, CG NOx and LS NOx, are shown in Figures 2.3 A – C. The trend lines shown on each graph were drawn using the Microsoft Excel spreadsheet package.

Figure 2.3 A shows that at the AURN the overall trend has been a decrease in annual mean NO_2 concentrations over the 12 years that it has been operational. However on closer examination the graph shows that after the most noticeable decrease between 1998 and 2000, NO_2 levels were relatively steady between 2001 and 2009 with minor year on year variations with concentrations no greater than 36µg/m^3.

While the 2010 value represents a significant increase in the annual mean concentration (possibly attributable to the extreme meteorological conditions that occurred in the last few months of 2010); since 2009 the general trend is upward and increasing NO_2 concentrations.

Figure 2.3A

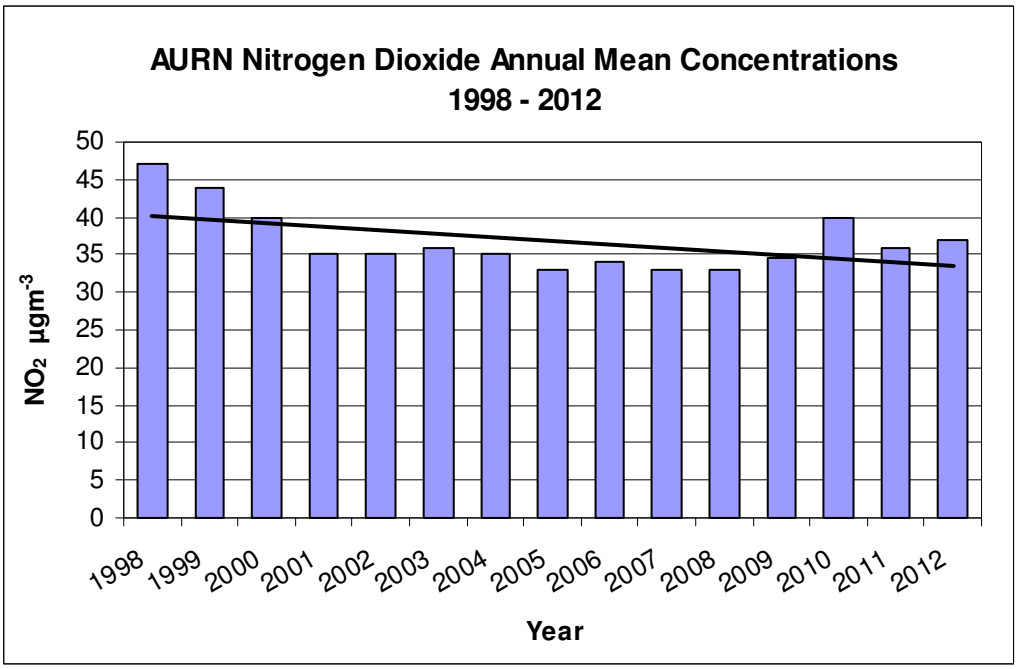


Figure 2.3 B shows that at the CG NOx roadside site the overall trend is increasing annual mean nitrogen dioxide concentrations that slightly exceed the annual mean NO_2 AQO which may be indicative of increasing road traffic levels. There is little year on year change for 2010 to 2012.

Figure 2.3 B

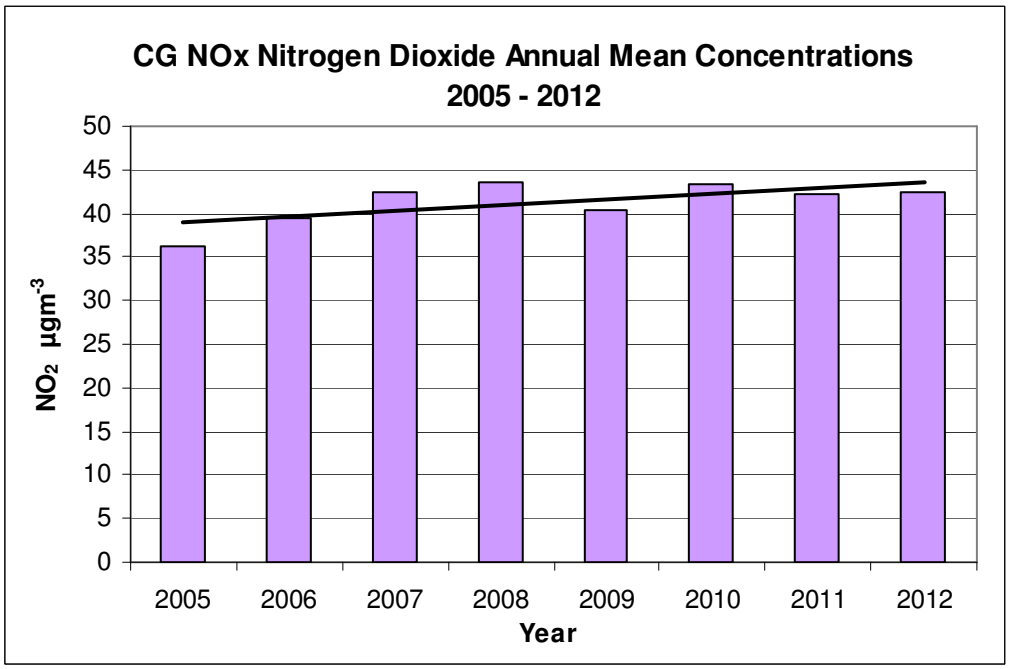


Figure 2.3 C shows that at the LS NOx roadside site in contrast to the AURN and CG NOx the overall trend is slightly decreasing annual mean nitrogen dioxide concentrations that vary between just exceeding and being just below the annual mean NO_2 AQO.

Figure 2.3 C

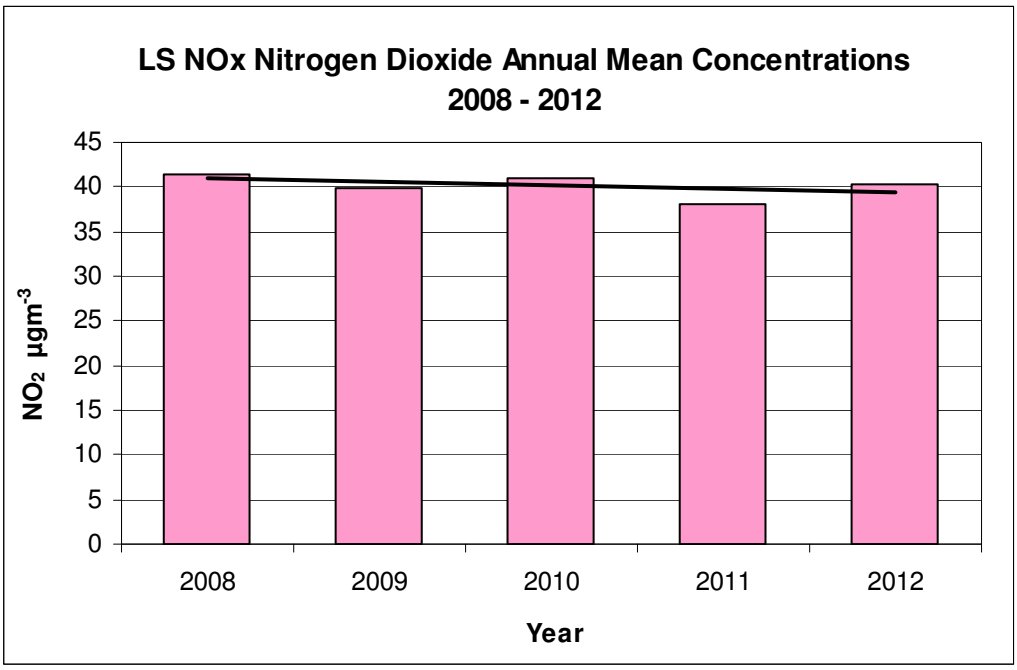


Table 2.4 Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Data Capture %	Number of Hourly Means > 200µg/m^3
AURN	UB	N	97.7	0
CG NOx	R	Y	95.4	0
LS NOx	R	Y	95.1	0
SA NOx	R	Y	93.4	0

No exceedences of the 1-hour AQO were recorded in 2012 at any of Nottingham City's automatic monitoring sites.

Diffusion Tube Monitoring Data

The annual mean NO_2 AQO was exceeded at 12 diffusion tube sites. The data is shown in Table 2.5 and exceedences of the AQO are highlighted in bold type. The 3 rows that are shaded i.e. X3, AA and K4 highlight sites where exceedences of the AQO were measured and which are not within AQMAs.

From the results it is apparent that where levels do not exceed the annual mean AQO the NO_2 concentrations are less than 36μg/m^3 – site V Bentinck Road being an exception. Measurements have been made at this site for a number of years and they are consistently below 40μg/m^3.

While all the sites with Site Id 'X' prefixes are located on residential properties adjacent to the outer ring road only X3 – Nottingham Road (1) measured an exceedance of the AQO i.e. 41.7μg/m^3. This is located at a junction where a busy local traffic route and the outer ring road cross. In contrast measured NO_2 was 35 μg/m^3 at site X3-1 which is across the road from X3.

Site K4, where an exceedance outside an AQMA was also identified, is close to a heavily trafficked roundabout on a residential development. It should be noted that the other 2 sites close to the junction and where tubes were also located on residential properties had considerably lower concentrations K4 = 50.8 μg/m^3 whilst K3-2 and K3-3 were 30 and 29 μg/m^3 respectively.

Similarly tubes at sites AA and AA-2 were located across the road from each on residential properties on a busy traffic junction. Tube AA measured NO_2 = 43 μg/m^3 an exceedance while at AA-2 - measured NO_2 = 33 μg/m^3.

These data will be used to inform the Detailed Assessment that is currently being prepared.

Table 2.5 Results of 2012 NO_2 Diffusion Tubes

Site ID		Site Type	Within AQMA 2010?	Data Capture 2010 %	2012 Annual mean NO_2 concentration - Bias Adjusted (Bias adjustment factor =0.97) ($\mu g/m^3$)
G	Beeston Road	R	Y	100	**41**
I	Derby Road	R	N	100	32
X	Western Boulevard	R	N	100	33
X2	Wilkinson Street	R	N	100	36
X3	Nottingham Road (1)	R	N	100	**42**
X3-2	Nottingham Road (2)	R	N	100	35
X3-3	Highland Court	R	N	100	31
X4	Danethorpe Vale	R	N	100	31
AA	Ilkeston Road	R	N	100	**43**
AA-2	Rayner Court	R	N	100	33
V	Bentinck Road	R	N	100	39
V2	Gregory Boulevard	R	N	100	33
K4	Castle Gardens	R	N	75	**51**
K3-2	Castle Boulevard (2)	R	N	100	30
K3-3	Sherwin Road	R	N	100	29
K	Castle Boulevard (1)	R	Y	100	**45**
M	Canning Terrace	R	Y	100	**57**
N	Upper Parliament St	R	Y	100	**53**
O	Shakespeare St	R	Y	100	**48**
P	Mansfield Road	R	Y	100	**48**
Y	Bloomsbury Court	R	Y	100	**48**
U2	Trent Bridge PH	R	Y	100	**42**
T	Queens Rd	R	Y	100	**51**

Diffusion Tube Nitrogen Dioxide Trend Data

Figure 2.4 shows trends at 3 diffusion tube sites where measurements have been made for least five years - all are within the AQMAs and all consistently measure exceedences of the NO_2 annual mean AQO.

While there are differences in the trends at the individual sites it is evident that generally NO_2 concentrations are relatively steady throughout the 7 years' data shown. At sites P and K there have not been any significant changes in measured levels whilst at Queens Rd (T) concentrations have increased slightly since 2006.

Figure 2.4

2.2.2 Particulate Matter (PM_{10})

The AURN station is the only site at which PM_{10} is measured in Nottingham City Council's area. No PM_{10} data for the months April to August 2012 are available from Defra's air quality data archive (http://uk-air.defra.gov.uk/data/) and consequently no values are given for the annual mean and 24-hour mean $PM_{10\ TEOM\ FDMS}$ concentrations.

The data capture for the year was 55.8%. Since the majority of the missing data was in consecutive months it is not meaningful to determine an annualised value from the remaining data using the methodology suggested in the TG (09) guidance.

The PM10 trend data 1997 to 2011 is shown in Figure 2.5 below.

Figure 2.5 shows only the $PM_{10\ TEOM\ FDMS}$ trend data for the AURN. Whilst there is an overall downward trend, PM_{10} levels have increased and decreased since 2005 but at no time have they approached 40µg/m^3 - the annual mean AQO.

Figure 2.5 PM_{10} Trend Data

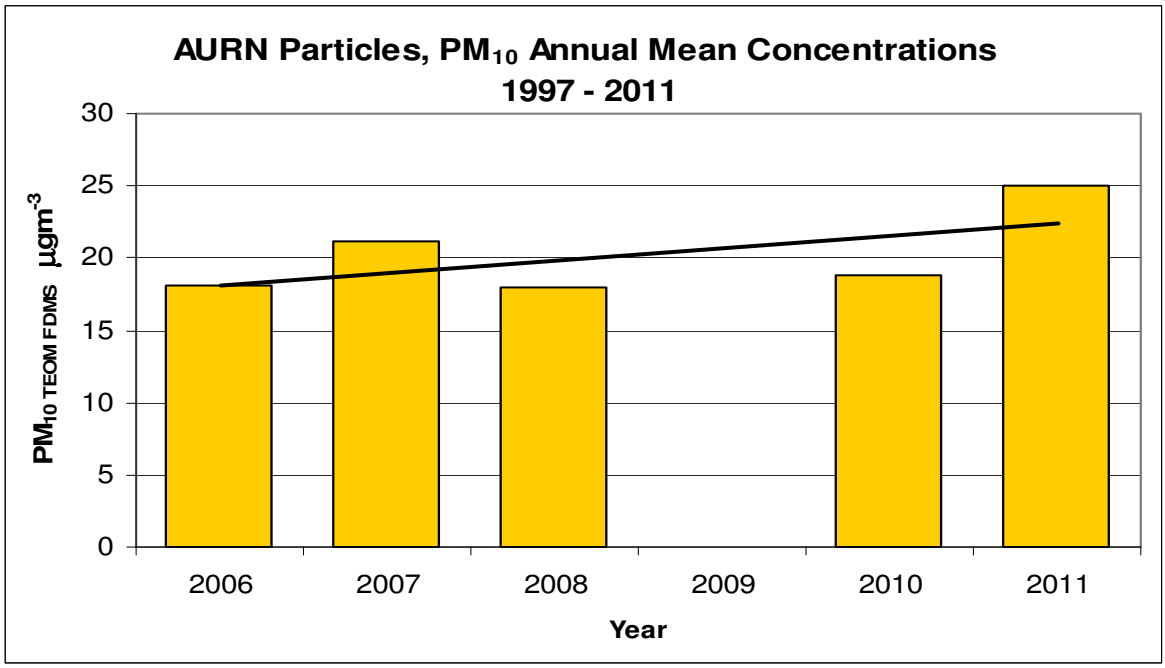


Table 2.6 Results of $PM_{2.5}$ Automatic Monitoring

$PM_{2.5}$ monitoring at AURN was initiated in 2009 and the 2012 results are given in the table - currently there are no LAQM AQOs for this pollutant.

Site ID		Within AQMA?	Data Capture for full calendar year 2012 %	Annual mean concentration ($\mu g/m^3$) $PM_{2.5\ TEOM\ FDMS}$ 2012	Number of times the daily mean >= 54 $\mu g/m^3$ (i.e. AQ Index = High or very high) 2012
AURN	Urban Background	N	90%	12	0

12 months data 01/01/2012 to 31/12/2012 ratified data

2.2.3 Sulphur Dioxide (SO_2)

Sulphur dioxide was monitored at the AURN during 2012. No exceedences of any of the objectives were recorded and levels were low.

Table 2.7 Results of SO_2 Automatic Monitoring: Comparison with Objectives

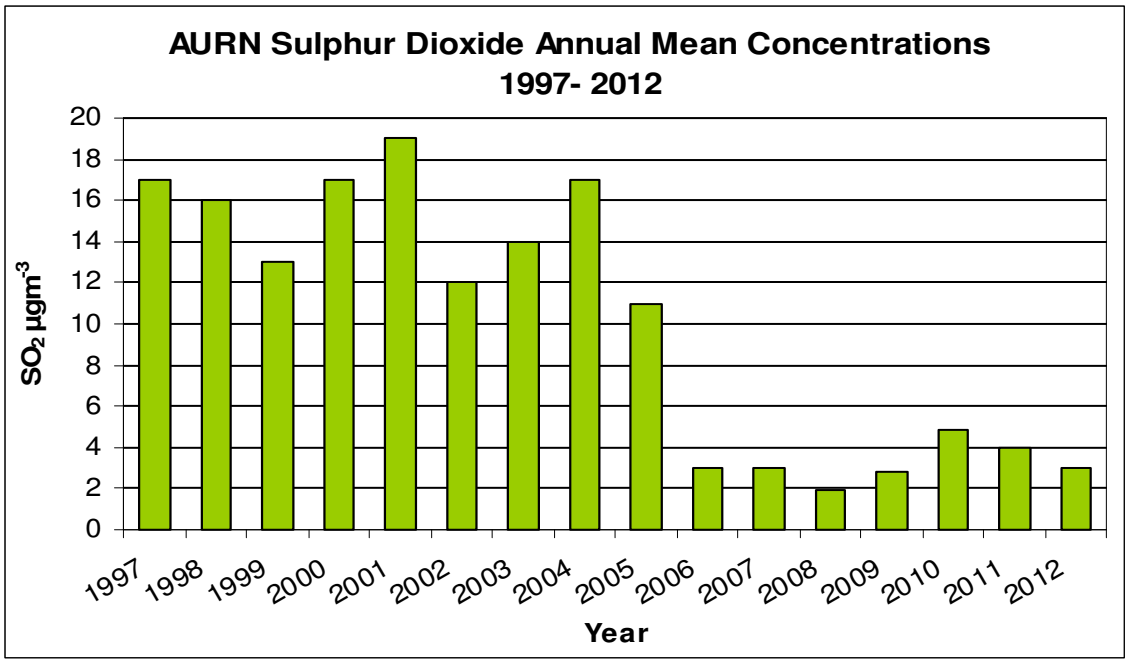
Site ID	Location	Within AQMA?	Data Capture 2012 %	Number of Exceedences of:		
				15-minute Objective (266 $\mu g/m^3$)	1-hour Objective (350 $\mu g/m^3$)	24-hour Objective (125 $\mu g/m^3$)
AURN	Clinton Street E	N	96.9	0	0	0

12 months ratified data 1 January 2012 – 31 December 2012

Sulphur Dioxide Trend Data

Figure 2.6 shows the trend for annual mean sulphur dioxide concentrations (there is no relevant AQO for this). As noted in previous reports the significant decrease in levels since 2006 is likely to be due to the completion of the Turning Point North traffic scheme.

Figure 2.6



2.2.4 Benzene

The benzene annual mean AQO is 5µg/m^3 and as can be observed from the results given in Table 2.8 the 2012 annual mean benzene concentration was low and the objective was not exceeded.

Table 2.8 Results of Benzene Pumped Tube Monitoring: Annual Mean

Site ID	Location	Within AQMA?	Data Capture 2010 %	2010 Annual mean concentration Benzene (µg/m^3)
AURN	Clinton Street East	N	95.5	0.9

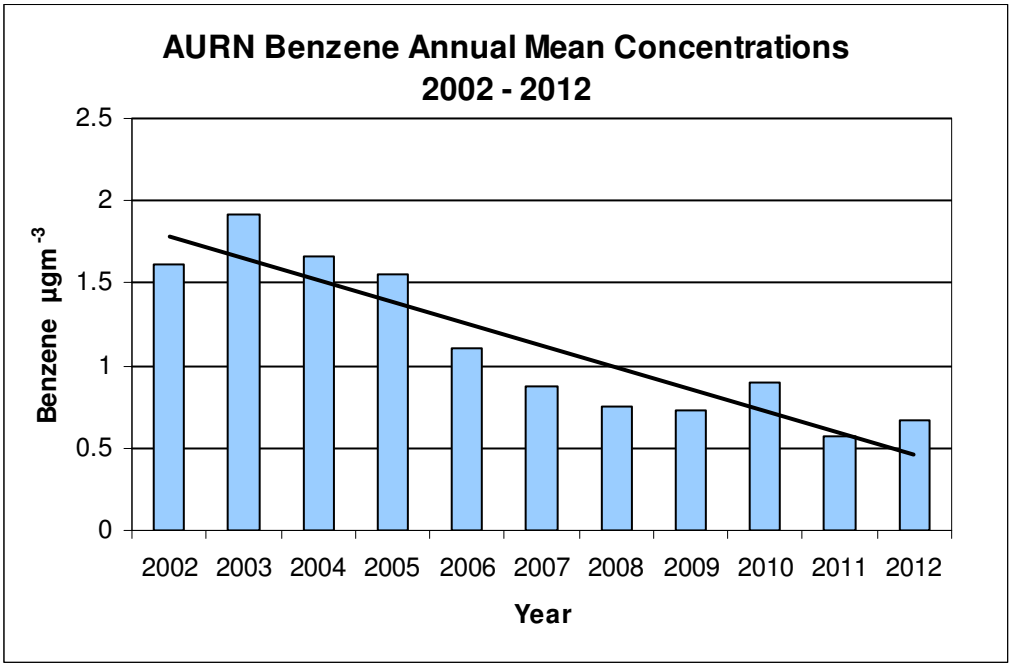
12 months ratified data – 01/01/2010 to 31/12/2010

Benzene Trend Data

Figure 2.7 shows that there is a general downward trend in measured levels of benzene at this site but that there was an increase in 2010. Whilst concentrations have been low throughout there is a noticeable reduction that is evident from 2006

onwards. This coincides with the implementation of the Turning Point North traffic management scheme.

Figure 2.7



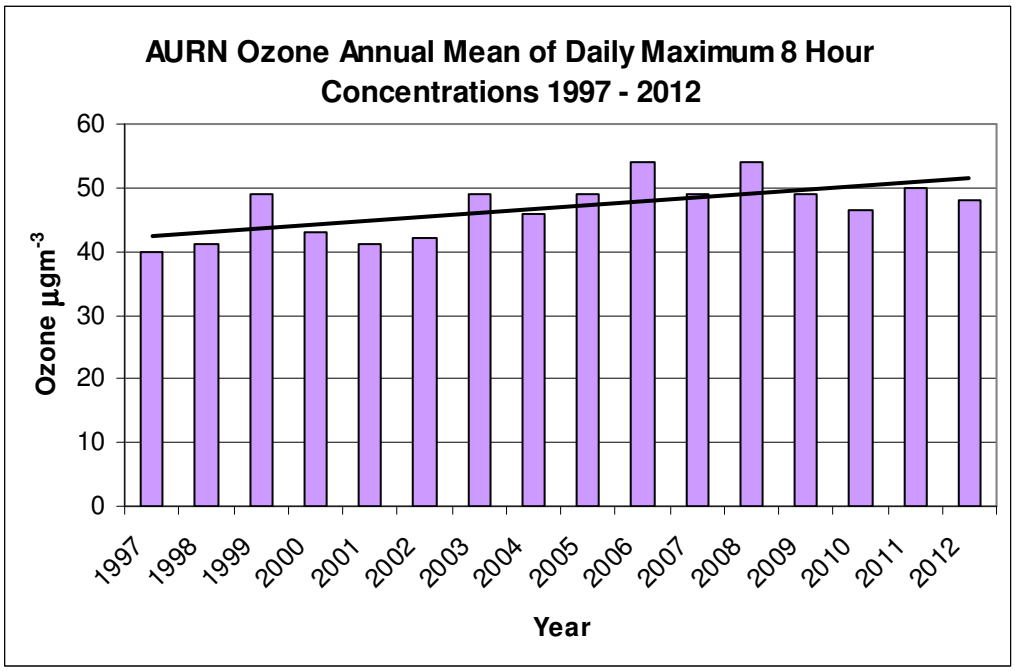
2.2.5 Other Pollutants Monitored

Ozone

Ozone has been monitored at the AURN since 1997. The trend for the daily maximum 8 hour yearly data at this site is shown in Figure 2.8. It can be seen that the highest value of 54 µg/m^3 was measured in 2006 and 2008.

The general trend shows increasing ozone levels between 1997 and 2006. However from 2008 to 2012 concentrations have been similar each year.

Figure 2.8



2.2.6 Summary of Compliance with AQS Objectives

Nottingham City Council has now measured concentrations of nitrogen dioxide above the annual mean objective, at relevant locations outside of the AQMAs, in the years 2010, 2011 and 2012 **and is currently undertaking a Detailed Assessment**.

The DA will includes the three areas outside the AQMAs where exceedence of the NO_2 annual mean AQO has been identified::

- around the junction of the Outer Ring Road (A6514) with Nottingham Road (B682) which is in a residential/commercial area approximately 3.5km to the north west of the City centre
- in the vicinity of the roundabout where Castle Boulevard (A6005) meets Abbey Bridge (A6005) - a mainly residential area approximately 1.7km southwest of the City centre.
- in the vicinity of the junction where Ilkeston Road (A609) meets Radford Boulevard/ Lenton Boulevard (A613) - a residential/commercial area approximately 2km west of the City centre.

The DA will also consider the wider City area approximately bounded by the outer ring road.

3 New Local Developments

The following have been considered for possible new local developments that may affect air quality:

- Road Traffic Sources – see 3.1 below
- Other Transport Sources – none identified
- Industrial Sources – see 3.2 below
- Commercial and Domestic Sources – see 3.3 below
- New Developments with Fugitive or Uncontrolled Sources – none identified

3.1 Road Traffic Sources

Nottingham City Council confirms that there are no new road traffic sources that have not been previously identified and assessed in previous rounds of the review and assessment process.

3.2 Other Transport Sources

Nottingham City Council confirms that there are no other transport sources that have not been previously identified and assessed in previous rounds of the review and assessment process.

3.3 Industrial Sources

A planning proposal and application was received (13/00757/PMFUL3) to develop the former Blenheim Gardens Allotments, Blenheim Lane (an area of former allotments) for manufacturing, research and development and energy generation. The application was granted with conditions on the 25 June 2013.

Please follow this link to view the EIA and committee reports:-

http://plan4.nottinghamcity.gov.uk/WAM/pas/findCaseFile.do?appNumber=13%2F00757%2FPMFUL3&action=Search

The EIA concluded that emissions from the process and ancillary activity would not lead to a breach of the Air Quality Objectives.

3.4 Commercial and Domestic Sources

Nottingham City Council confirms that there are no new commercial or domestic sources that have not been previously identified and assessed in previous rounds of the review and assessment process.

3.5 New Developments with Fugitive or Uncontrolled Sources

Nottingham City Council confirms that there are no new developments with fugitive or uncontrolled sources in its area nor have previous rounds of Review and Assessment identified such sources.

4 Local / Regional Air Quality Strategy

Nottingham City Council is a member of the Nottinghamshire Environmental Protection Working Group and a signatory to the Nottinghamshire Air Quality Strategy revised 2008 (the Strategy) entitled 'A Breath Of Fresh Air for Nottinghamshire - An Air Quality Improvement Strategy for the Next Decade'.

The Strategy was prepared by a partnership of Nottinghamshire Local Authorities, the Environment Agency, the Health Protection Agency and the Highways Agency It is designed to help local authorities and partner organisations manage and improve ambient air quality and to protect the health and wellbeing of the public in a co-ordinated and integrated manner. It considers actions that will be taken and should be supported in a number of sectors:-

- Public sector e.g. facilitate meetings of Nottinghamshire AQ Steering Group, review on a local basis and when practical reduce emissions to air from their own activities

- Transport e.g. use air quality targets in Local Transport Plans, restricted vehicular access where appropriate

- Planning and land use e.g. ensure AQ is a material consideration when assessing planning applications, develop and implement procedures for consultation with neighbouring Councils where deterioration in AQ is predicted

- Health and education e.g. work with Primary Care Trusts, HPA and others to raise awareness about poor air quality, the health effects etc.

- Energy efficiency e.g. review energy usage and put in place initiatives to improve energy efficiency where appropriate

- Industrial and commercial e.g. rigorously enforce legislation to control emissions of air pollutants, assist and advise businesses in complying with relevant legislation

- Climate change and global warming e.g. reduce CO_2 emissions caused by energy use in Council buildings, purchase low carbon green electricity

- Domestic sector e.g. encourage reduction and recycling of household waste, encourage domestic households to remove polluting appliances

Nottingham City Council has implemented and continues to implement a significant proportion of the actions recommended within the Strategy.

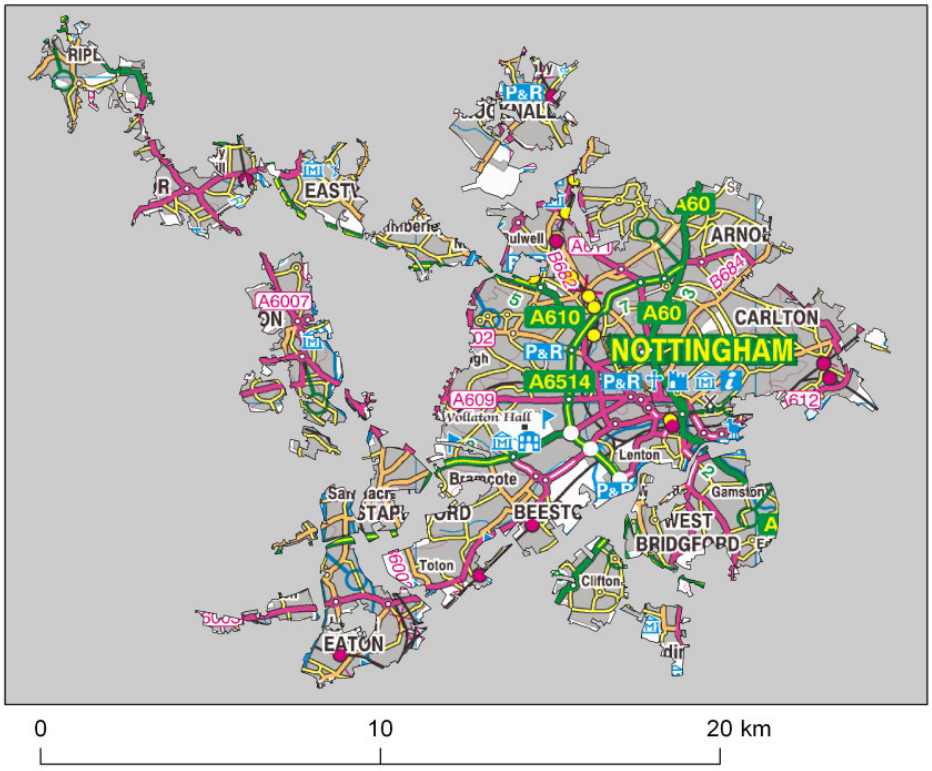
The Strategy may be viewed at:

http://www.nottinghamcity.gov.uk/CHttpHandler.ashx?id=2382&p=0

It is proposed to review the Strategy in 2015.

In addition to the local strategy devised by the Nottinghamshire local authorities the document "Air Quality Plan for the achievement of EU air quality limit values for nitrogen dioxide (NO2) in Nottingham Urban Area (UK0008)" was published by Defra in September 2011. It encompasses the City of Nottingham and outlying urban districts in Nottinghamshire and Derbyshire the 'Nottingham Urban Area agglomeration zone' and details how the air quality objective for nitrogen dioxide will achieved by 2015.

Map showing the extent of the Nottingham Urban Area agglomeration zone (UK2008)


A60
ARNOT
A610
A60
CARLTON
NOTTINGHAM
P&R
A6514
P&R
A609
Wollaton Hall
Lenton
Gamston
WEST
BRIDGFORD
Clifton
Toton
EATON
A6007
0
10
20 km

5 Planning Applications

5.1 Applications that might have impacts on air quality.

The planning applications listed below have been considered in detail due to either their location within or proximity to existing Air Quality Management Areas and potential impact on air quality, and any appropriate conditions included in their planning consent.

Planning Reference	Location/ relevant AQMA	Detail	Conditions with respect to Air Quality
12/03192/PFUL3	1 & 1A Canning Circus and Canning Chambers AQMA 2	Conversion of existing & four storey extension to form 10 flats	Air quality assessment required. Where necessary alternative ventilation to be installed.
11/02710/PFUL3	31 Huntingdon Street AQMA 2	Erection of 5 storey building comprising of 11 self contained flats	Air quality assessment required. Where necessary alternative ventilation to be installed.
11/04194/PFUL3	Car park/192 North Sherwood Street AQMA 2	Erection of 8 self-contained apartments and associated works.	Air quality assessment required. Where necessary alternative ventilation to be installed.
11/04238/POUT	Site of former 'Western Club', Derby Road AQMA 2	Outline application for new housing & creation of parking	Air quality assessment submitted as part of application.
11/00672/PFUL3	University of Nottingham campus AQMA 3	Creation of new 202 bed mid market hotel and assoc parking 130 spaces	Travel plan for site users, renewable/low carbon scheme required.
11/00673/PFUL3	Site of former 'Norton Print' 251 Mansfield Road	Erection of student accommodation following part demolition of existing	Refused.
11/03419/PFUL3	89 Talbot Street AQMA 2	Change of use from B1 office use to residential	None. No significant impact on air quality.
11/04204/PFUL3	24 Nottingham Road	Erection of 7 self-contained apartments	Application withdrawn.

	AQMA 2		
	209 North Sherwood Street	Conversion of existing public house to dwelling including	None. No significant impact on air quality.
12/00078/PFUL3	AQMA 2	erection of	
	32 Market Street	Change of use of first and second floors	Application withdrawn.
12/00556/PFUL3	AQMA 2	from A1 to student	
	32-44 Castle Gate	Change of use of 38-44 Castle Gate to	Not determined.
	AQMA 2	student accommodation in	
12/01688/PFUL3		the	
	Farnborough School		None. No significant impact on air quality.
	Technology College	Erection of new school building	
	Farnborough	including associated	
11/04172/NFUL3	Road	car and cycle	
	Eastcroft Energy From Waste Facility		None. No significant impact on air quality.
	Incinerator Road	Erection of extension to the existing waste	
12/02416/PFUL3	AQMA 2	reception hall	
	1 Hockley		Air quality assessment
	AQMA 2	Erection of new 8 storey building to create ground floor	required. Where necessary alternative ventilation to be
12/00640/PFUL3		retail and 56	installed.
	Nottingham City Council		None. No significant impact on air quality.
	Storage Land Redfield Road	Change use of to waste processing	
12/01411/PFUL3	AQMA 3	hub.	
	Formerly Rentco Nationwide Ltd		None. No significant impact on air quality.
	Redfield Road	change of use to metal recycling site including erection of	
12/02307/PFUL3	AQMA 3	two storey.	
	Site Of Part Of former Raleigh		None. No significant impact on air quality.
	Industries Limited	Erection of three storey academic	
	Triumph Road	research building.	
12/02343/PFUL3	AQMA 2		
	26 Nottingham Road	Extensions and alterations to form	None. No significant impact on air quality.
	AQMA 2	two storey temple	
12/03100/PFUL3		building and car park	

6 Air Quality Planning Policies

The Local Plan sets out the strategic and spatial land-use planning framework for Nottingham City and incorporates policies to protect the environment, including air quality.

- Adopted Local Plan
- New Local Plan
- Further Local Planning Documents
- Adopted Supplementary Planning Documents and Guidance

All Nottingham City Planning Documents are made available through Nottingham Insight. To view these links in a new browser window please hold CTRL on your keyboard and click the link.

6.1 The Adopted Local Plan

In Nottingham the current Local Plan comprises the 'saved' Local Plan policies, which were adopted in November 2005.

The Nottingham Local Plan was produced as part of the old planning system and will be 'saved' until it is replaced by the emerging Local Development Framework – further information given below.

Specific policies in the Local Plan that reference air quality can be found in Section 9 – Natural Environment:

Pollution

NE9: Planning permission will not be granted for development which would generate pollutants that would cause significant detriment to the users of the development, users of the adjoining land, or the environment; or where the level of existing pollutants would be a danger to users of the proposed development.

Click here to view the 'saved' Local Plan, Proposals Map and accompanying documents.

6.2 The New Local Plan

Work is currently underway to prepare a new Local Plan for Nottingham City. In the future the Local Plan will comprise two documents: the Nottingham City Aligned Core Strategy and the Nottingham City Land and Planning Policies which, together, once adopted, will replace the current Local Plan.

The Nottingham City Aligned Core Strategy (ACS) sets out strategic planning policies and development principles for Nottingham City to guide development until 2028. The ACS is being jointly prepared with Broxtowe and Gedling Borough Councils. The ACS is currently draft, at the Examination Stage.

The Nottingham City Land & Planning Policies (LAPP) Document contains both development management policies and site allocations. The LAPP will be accompanied by a Policies Map which identifies areas of protection and areas of land designated for particular land uses. The LAPP is currently draft, with the Preferred Option Stage scheduled for Autumn 2013.

7 Local Transport Plans and Strategies

7.1 Transport Policy

Transport Policy is an exciting part of the City Councils development section delivering various strategies relating to transport issues.

Information about Nottingham's strategies and objectives, what we're doing to improve accessibility and transport choice, the latest updates on our major schemes and why we're a Centre of Excellence for transport delivery can be found on our website:

http://nottinghamcity.gov.uk/index.aspx?articleid=846

Transport Plans

Local Transport Plans are a statutory investment document detailing the Council's transport strategy. The Local Transport Plan 3: 2011-2026 came into effect in April 2011 and remains the Council's current strategy.

Major Transport Schemes

The City Council is developing a variety of major transport schemes, to find out more information on its schemes please visit the My Nottingham Transport Schemes and Initiatives webpage which can be found via the above link. A brief outline is given in subsection 7.3.

The Big Wheel

The Big Wheel is a dedicated marketing brand influencing travel behaviour in Nottingham City and the conurbation, to find out more about the Big Wheels activities please visit The Big Wheel website

The Big Wheel's Hub - is the Big Wheel's vision for a world class transport interchange that will stimulate investment and revitalise the very heart of our city.

Local Sustainable Transport Fund (LSTF)

The LSTF is a government funded programme of initiatives to help local people connect to jobs and services and support the local economy through promoting sustainable transport. To find out more about the LSTF please visit My Nottingham LSTF web page

Smarter Transport Choices

To learn more about the types of services that are available to encourage more sustainable forms of travel please visit My Nottingham Smarter Transport Choices web page.

7.2 Nottingham Local Transport Plan 2011 - 2026

With plans to transform our railway station into a transport hub, an extended world class tram system, and a fantastic bus network that has two award winning bus operators, Nottingham is one of the leading cities in the UK for public transport. To deliver this vision the Council needs a strong and clear strategy. The Nottingham Local Transport Plan 2011 - 2026 aims to address transport challenges facing the city and build an exemplar sustainable transport system.

The Campaign for Better Transport ranked Nottingham as the least car dependent city in the UK in 2010 - a legacy we want to maintain going forward.

The availability of transport affects our everyday lives. Because we expect the demand for transport to keep on growing we need to plan ahead. Although funding is limited at the moment, it is essential we continue to invest in our transport system to allow the economy to grow and protect the environment.

The LTP has been developed to comprise of two component documents:

- LTP strategy 2011 - 2026 which sets out the Council's long term transport ambitions and strategy of proposals
- LTP Implementation Plan 2012 - 2015 details the funding allocations and proposed transport measures to be funded over the next three years from April 2011 to March 2014

The LTP Strategy 2011 – 2026 Chapter 1 – Introduction presents the Local Transport Plan ('the Plan') framework and gives an overview of the approach and structure of the document. The wider policy context is described which gives the Plan its strategic direction and overall focus. The current partnership working arrangements which will be necessary in successfully delivering its goals are summarised. The following is an extract from the document - subsection 1.1

Transport Strategy overview

Over the past decade Nottingham has built up a high quality integrated and efficient transport system. As individuals, the transport we use is integral in assisting a wide range of activities to take place. Transport gives people choice, flexibility and opportunities to travel to work, access education, healthcare and other services, allowing us to lead better quality lives. For local business, good transport is crucial in generating economic growth and enterprise, bringing with it job opportunities and creating access to other markets to ensure the city remains competitive. The Local Transport Plan (LTP) is the principal policy and investment tool through which the planning, management and delivery of transport improvements take place.

The LTP has been developed with a view to achieving wider health, socio-economic and environmental benefits to local citizens and businesses. Maintaining our current transport assets, the role of transport in supporting neighbourhood transformation, enabling enterprise, and providing and enhancing the sustainable transport system are core themes of this strategy.

The 2010 Comprehensive Spending Review and associated Budget announcements have confirmed the Government's commitment to reducing the national deficit. As such, public sector funding has entered a time of austerity with reduced levels of funding for local transport compared to what we have benefited from in recent years. However, not continuing to invest in our transport network would present us with major consequences where people and businesses are restricted by poor travel opportunities and lowered aspirations.

More specifically a lack of investment could lead to:

- A rise in carbon emissions which would further contribute to climate change
- Busier and more congested roads, with longer and less reliable travel times impacting on the city's business competitiveness
- Deterioration of the condition of our roads which could lead to an increased lack of safety

- People unable to access employment and learning opportunities and other essential services heavily impacting on the most vulnerable citizens
- Greater health inequalities, growing trends in obesity and lowered life expectancy
- Growing numbers of people will be affected by transport related noise and poor air quality

Whilst there are very challenging times ahead, transport will play an instrumental role in leading the city to recovery following the effects of the recession and tightening budgets. Being clearer about our priorities, maximising value for money and getting the most of our transport assets will be central to the delivery of this Plan particularly whilst the city emerges from the impacts of the economic downturn.

Box 1A on the next page outlines key achievements delivered through past LTPs.

As part of the development of the Local Transport Plan, the City Council has conducted an Integrated Impact Assessment of the Plan. The report for the Integrated Impact Assessment and Environmental Statement is also available for download from the LTP webpage.

The Nottingham Local Transport Plan can be found at the following web address which also has links to associated documents and pages and external websites

http://nottinghamcity.gov.uk/index.aspx?articleid=12631

Air quality action plans in relation to the two AQMAs for the current LTP were produced in June 2010.These are updated annually and reported via the LAQM process.

See Section 9 for information about the implementation and progress of the Air Quality Action Plans (AQAPs).

7.3 Major Transport Schemes

Nottingham Station

Nottingham Station is being transformed into a world-class interchange – a place where the city's transport connects. Nottingham City Council is working in partnership with Network Rail and East Midlands Trains on the £60m redevelopment scheme of Nottingham Station. This includes the restoration and upgrading of the Edwardian Grade II listed building at the front of the station and a new passenger concourse, which will link the Queen's Road Multi-Storey Car Park and new tram stop. Platform buildings are also being refurbished.

Tram extension

The multi-million pound project to extend Nottingham's tram service to the south and south west of the city to Chilwell via the QMC and Beeston and Clifton via Wilford, and directly link with train services at Nottingham Station, is well under way.

Track construction commenced at the start of 2013 and iconic landmark bridges, including at Nottingham Station, off Lenton Lane and over the A52, are already appearing on the city's skyline.

NET Phase Two is the region's biggest construction project and builds on the success of Nottingham Express Transit's (NET) Line One from Hucknall and Phoenix Park into the city centre. Line One is currently used by around 10 million passengers a year. The extension works will more than double the size of the tram network by the end of 2014, with 17.5km of new and 28 new stops.

Construction work is being undertaken by Taylor Woodrow Alstom, a joint venture on behalf of Tramlink Nottingham, the NET concession holder appointed by Nottingham City Council.

When complete, the extended tram network will consist of 51 tram stops, and link directly with the existing NET line at Nottingham Station. The total tram network will be 32km in length, serve seven park and ride sites and be able to provide around 23 million passenger journeys a year.

A453 Widening

Work on long awaited major improvements to widen a seven mile stretch of the A453 between M1 Junction 24 and the A52 Nottingham Ring Road started in January 2013. The A453, east of the M1, is the major route between Nottingham, the M1 and Nottingham East Midlands Airport. Carrying up to 30,000 vehicles a day, the existing single-carriageway road is one of the busiest trunk roads in the UK.

The improvement work will also include widening the 1.5 mile urban section through Clifton from a two-lane single carriageway to a four-lane single carriageway (two lanes in each direction) with signalisation of the existing Crusader Roundabout and new signalised roundabout junctions at Green Lane and Farnborough Road.

A new roundabout at Mill Hill will be sited to the west of the Nottingham City Council and Nottinghamshire County Council boundary, and will provide a connection to the

existing A453, Fox Covert Lane and Clifton Lane via a new link road. This road will provide a link to the new Nottingham Express Transit (NET) 1,000 space park and ride, transporting people directly from Clifton into the centre of Nottingham by tram. This £150 million scheme, partly funded by Nottinghamshire County Council, is expected to be completed in summer 2015 and will help to reduce congestion and make the route safer.

Ring Road Improvement Scheme

Work has started on a £16.2m improvement scheme for Nottingham's Ring Road (A6514), the busiest and most important route in the city. The Ring Road currently carries almost as much traffic as the M1 motorway, with up to 100,000 people using it each day. However the way that the road is currently laid out means it struggles to cope with the volume of traffic, leading to congestion and increased carbon emissions from vehicles.

Improvement works will include upgrading and redesign of key junctions, including Aspley Lane, Crown Island and Hucknall Road, widening of the carriageway, reconstruction of carriageway most in need of repair and better road facilities for buses, pedestrians and cyclists.

The improvements are expected to be completed by summer 2015.

8 Climate Change Strategies

8.1 Climate Change

10:10 Campaign

Nottingham City Council has signed up to the 10:10 campaign. This is encouraging all sectors in the UK to reduce their carbon emissions by 10% in 2010. We are committed to cutting our carbon by 10%.

Everyone is being encouraged to take part with initiatives on Nottingham City Council's website such as:

It's Everybody's Business - do your 10% be cleaner and greener

Maybe you want to cut your carbon emissions by 10% in 2010, to join 10:10, please click here to visit the 10:10 campaign webpage.

Carbon Footprinting

Do you know your carbon footprint? To calculate your carbon footprint please click here to visit our carbon footprinting pages.

ZERO 2100 Climate Protection Strategy

In 2006 ZER0 2100 a climate protection strategy was produced. This built on the earlier Climate Change action plan. The aims of this strategy are:

- to put the city on a path towards a low carbon future where the needs of the economy and local people are much less dependent on fossil fuels resulting in lowered carbon emissions.
- to ensure that the city is adapted to the inevitable impacts of climate change and is well placed to maximize any benefits.

The Council are now beginning to work on a new climate change plan for the city.

The Nottingham Declaration

The Nottingham Declaration on Climate Change requires councils and public authorities to acknowledge the increasing impact that climate change will have on our community during the 21st century and commits them to tackle the causes and effects of a changing climate in their area of operation. Further information including the content of the declaration can be found by clicking here to visit the Nottingham Declaration on Climate Change website.

Working in Partnership

Nottingham's local strategic partnership in 2008 adopted two National Performance indicators relating to climate change. These are called National Indicator 186 - per capita reduction in CO2 emissions in the Local Authority area and National Indicator 188 Planning to adapt to Climate Change.

The Health and Environment Partnership

The Nottingham Health and Environment Partnership was launched in March 2007. It is a multi-sector partnership that works strategically in Greater Nottingham to identify and address environmental and economic causes of ill-health, to promote good health, tackle health inequalities and encourage environmental responsibility.

Nottingham Carbon Club

Nottingham is aiming to become one of the UK's First Low-Carbon cities through reducing emissions, raising environmental standards and capturing any economic benefits. In April 2007 the Nottingham Carbon Club was launched. Its main purpose is to assist Nottingham's major businesses help meet the City's commitments to lower carbon emissions.

The Carbon Management Programme

Nottingham City Council is participating in the Carbon Trust Local Authority Carbon Management Programme and is committed to reducing its carbon footprint through this process. This targets carbon reduction in the Council's own buildings, transport, estate, schools and housing functions.

The Council's Carbon Management Plan can be downloaded from the website.

Environmental Management

The development of the Eco-Management & Audit Scheme (EMAS) throughout Nottingham City Council will strengthen action taken to reduce the City's significant environmental impacts. By ensuring that the environmental impacts of all services are audited, monitored and actions taken to ensure continual improvement in this area.

Environmental Policy

Nottingham City Council recognises the need to safeguard and enhance the local and global environment through its own activities and those of our partners. This Local Authority is committed to minimising the Council's adverse environmental impacts while enhancing the quality of life for the people of Nottingham City. An Environmental Policy was adopted in 2008 to outline how we intend to do this.

8.2 The Nottingham 2020 Sustainable Energy Strategy

The Nottingham Sustainable Energy Strategy was produced by Nottingham Energy Partnership (NEP) on behalf of Nottingham City Council.

The Strategy provides an overarching framework for the City’s plans, programmes and initiatives relating to sustainable energy supply and use to 2020: cutting emissions, maintaining energy security, maximising economic opportunities, and protecting the most vulnerable. The Strategy and the associated action plan will ensure that Nottingham accelerates the development, use and value of its energy resource and energy efficiency potential.

Targets

The Action Plan prioritises the delivery of:

- A 26% reduction of carbon dioxide emissions against 2005 levels,
- 20% of the City’s own energy generated from low or zero carbon sources by the target date of 2020, as set out in the local Sustainable Community Strategy.

At a national level the Government's Low Carbon Transition Plan and Renewable Energy Strategy in particular provide very challenging targets. The Strategy details how we will meet our proportional 'pro rata per capita' contribution to the national Renewable Energy Strategy targets, which is estimated in the City at:

- 2% (37GWh) generation from small scale sources
- 12% (342.7GWh) generation from renewable heat sources

Nottingham's Current Status

Nottingham is starting the low carbon transition from the front, with a considerable lead. Between 2003 and 2006 the City reduced domestic gas consumption by 16%; the greatest fall of all Local Authorities in the East Midlands and of all the Core Cities. In 2006 we generated 3% of our own heat and power from renewables and waste, making Nottingham the most energy self-sufficient City in the UK

We also generated 11.45% of our own heat and power from gas CHP (combined heat and power) and renewables. Nottingham is the leading City in the country in distributed energy generation. Generation of 11.45% of our own energy from low or zero carbon sources, against the 20% Sustainable Communities Strategy target is a remarkable achievement and a very strong starting point for the challenge ahead.

Key Actions

To meet the national and local targets for heat and power will be very challenging, even given Nottingham's leading position. This will require the development of all the City's major renewable and low carbon energy resources from large scale biomass to a rapid increase in the uptake of domestic renewable energy systems.

The Action Plan alongside in the Energy Strategy represents a detailed map to achieve our local and national 2020 targets. National targets for small scale electricity generation and renewable heat steer us towards biomass fuel and renewable electricity generation.

In particular, to meet national and local targets for heat and power will require;

- More than doubling the size of the City district heating network
- Development of a local biomass processing and transfer site
- Significant capacity of new biomass CHP plant with associated district heating
- Consideration of a City anaerobic digester

Alongside energy generation, Nottingham will need to make a significant cut in energy demand to provide a 26% reduction in carbon emissions to 1,329k tonnes CO_2 per annum by 2020 as stated in the Sustainable Communities Strategy, but also to enable the achievement of target energy generation (reduction in demand eases proportional generation targets).

The City Council will lead by example by targeting a 45% reduction in emissions by 2020. The majority of emission cuts will however come from the domestic sector; reducing energy consumption and reducing the impact of fuel price increases. The City will be able to achieve a 37.6% reduction in CO_2 emissions from domestic energy efficiency by 2020. This will be achieved through the work of the City Council, Nottingham Energy Partnership and local housing associations working with householders and communities. A 23.4% reduction in CO_2 emissions is expected from industrial and commercial sector energy efficiency by 2020.

Significant savings of around 20% also need to be made in transport emissions. A further saving of around 5% will be met from installing all the low or zero energy generation systems detailed in the Strategy. Over all these saving should provide a total reduction of 28.3% by 2020.

The Challenge

Funding for the major energy generation, supply chain and energy efficiency programmes will be the greatest challenge. This Strategy has identified the key strategic objective and numerical targets, the Action Plan details priorities for

investment. These priority actions provide the best carbon, energy and financial returns and will provide a focus for development over the next 10 years.

8.3 Peak Oil

Nottingham City Council was one of the first UK Local Authorities to recognise the challenge of Peak Oil.

Peak Oil is the time when maximum oil production point is reached globally. After this point the production rate will decline. After Peak Oil the production and availability of oil will decline, and oil prices will rise. The UK's oil peak was in 1999.

Oil and oil based products are widespread in modern living. Products such as crop fertilisers, detergents, solvents, adhesives and most plastics would become more expensive as these products would become scarce.

This Council acknowledges the forthcoming impact of Peak Oil. The Council therefore needs to respond, and help our citizens respond to the likelihood of the shrinking oil supply but in a way which will nevertheless maintain the City's prosperity. It acknowledges that actions taken to adapt to and mitigate against climate change also help us adapt issues around Peak Oil.

It will do this by:

- developing an understanding of the impact of Peak Oil on the local economy and the local community
- encouraging a move across the city towards sustainable transport, cycling and walking throughout the city
- pursuing a rigorous energy efficiency and conservation programme through its carbon management plan, the work towards EMAS accreditation and on leading on raising energy awareness across all sectors to reduce dependency on oil based energy in the city
- supporting research and production within the city which helps develop local effective alternative energy supplies and energy saving products in order to encourage a move away from oil based fuels and also in order to create local 'green collar jobs'

- co-ordinating policy and action on reducing our city's carbon dependency and in response to the need to mitigate and adapt to climate change and Peak Oil

In this way Nottingham City Council will not only be helping the city to rise to the challenge of Peak Oil but also encourage the city to grasp the opportunities which Peak Oil offers.

9 Implementation of Action Plans

Table 9.1 Action Plan Progress - City Centre Air Quality Management Area Action Plan Update May 2013

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
1	**Turning Point Major Integrated Transport Scheme**	Redistribution of cross-city traffic movements with restricted access to Milton Street/Lower Parliament Street Area to achieve high level pedestrian and bus priority	City Council	2002-03	2004-06	Congestion Bus use Pedestrian footfall Area wide traffic mileage	< 1µg/m^3	New traffic scheme introduced for Northern quadrant of inner ring road. Pavement widening and enhanced bus waiting facilities Enforcement of restrictions have been strengthened through introduction of bus gates.	Scheme completed November 2006. 76% reduction in traffic volumes on restricted access streets. 6% increase in pedestrian footfall, 11% increase in cyclist movements with 700,000 additional bus passengers	2006	Traffic redistribution within AQMA area. Increased priority for buses without significant traffic displacement impacts.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
2	**Parksmart**	Variable message signing and zonal car park direction signing system to direct traffic to available car park parking availability	City Council	2008	2009-10	Congestion	< 1µg/m^3	Business case prepared. Network of real time parking availability signs and VMS installed. Includes supporting marketing information.	System installed and operational.	2010	Lessening congestion by reducing circulating traffic speculatively searching for a car parking space
3	**Statutory Bus Quality Partnership Scheme**	UK's first City Centre wide statutory quality partnership scheme	City Centre	2009	2010	Bus use Bus reliability	< 1µg/m^3	Scheme implemented.	Monitoring performance.	2010	Management of all bus services operating in the City Centre including of minimum bus emission standards

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
4	**Connecting Eastside - Phase 1**	Huntingdon St/Lower Parliament St (between Mansfield Road and Southwell Road) to become strategic two-way traffic route with associated public realm improvement package	City Council	2006-08	2009-11	Traffic volume Pedestrian footfall Cycling trips	< 1μg/m^3	Funding package including EMDA and ERDF funding secured.	Highway works largely complete. Sneinton Square public realm works complete.	2011	Traffic redistribution within AQMA area. Will encourage more walking and cycling.
5	**Connecting Eastside - Phase 2**	Cranbrook St/Bellar Gate bus priority route and local access	City Council	2006-2013	2014-16	Bus use Public transport accessibility	< 1μg/m^3	Preliminary design complete. £5m City Deal funding secured.	Scheme included in LTP3. Detailed design progressing	2016	Traffic redistribution within AQMA area. Will increase public transport accessibility to Eastside of

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
											the City and thus support sustainable regeneration.
6	**Primary Pedestrian Routes**	Increased priority for pedestrians across inner ring road junctions and upgraded routes from City Centre through regeneration areas.	City Council	Annual programme	2011-16	Pedestrian footfall	< 1µg/m^3	Hockley scheme completed in October 2007. Shared surface treatment, public realm and pavement widening from Carlton Street to Cranbrook Street. Includes infilling of all pedestrian subways. Alfreton Road footway and crossing improvements linking residential areas to the city centre complete in September 2010. Routes implemented as part of Connecting Eastside Phase 1.	George Street and Broad Street commenced in Spring 2013. Detailed design progressing for Heathcoat Street and Connecting Eastside Phase 2.	2016	Will encourage more walking and modal change from car.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								City Deal funding secured for George Street, Broad Street, Heathcoat Street and Connecting Eastside Phase 2.			
7	**Commuter cycle routes**	On road cycle route improvements includes road space reallocation, cycle lanes and advanced stop lines at junctions	City Council	Annual programme	2011-15	Cycling trips	< 1μg/m^3	£250k allocated per year in LTP. Hucknall Rd scheme completed in 2009 and Strelley Route in 2010. Clifton route completed. Outstanding elements of Strelley and Hucknall Road completed. Corridors improvements planned in 2013/14 and 2014/15 as part of the Cycle Ambition Grant bid.	Other routes in development as part of LTP3 implementation plan. Cycle Ambition Grant bid submitted in Spring 2013. Decision in July 2013.	2015	Will encourage more cycling and modal change from car.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
8	**Big Track**	Off road circular cycle route via City Centre. Includes Embankment Link and upgrading of footbridge to accommodate cyclists.	British Water-ways	2006-08	2008-12	Cycling trips	< 1μg/m^3	Funding secured from GNTP/EMDA, Growth Point and LTP. Delivery managed by British Waterways. 10 mile off-road route complete.	Meadow Lane lock enhancements completed. Clifton Bridge section designed and completed.	2011	Will encourage more cycling and modal change from car.
9	**Travel Plans**	Travel plans and business support package for employers.	City Council	Annual programme	2011-14	Travel plans	1μg/m^3	Local Plan requires travel plan for all large-scale development schemes. Travel plan advice and business support package available to employers.	Business support launched linked to WPL implementation including grants for business to improve cycling facilities	Ongoing	Discourages car use for commuting journeys. Will encourage modal change to more sustainable modes and car sharing.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
									and car park management.		
10	**Smarter Choices**	Encouraging and supporting travel using sustainable modes	City Council	Annual programme	2011-2014	Congestion Public transport use Pedestrian footfall Cycling trips	1µg/m^3	Smarter travel/low carbon business support package being funded through the Local Sustainable Transport Fund until 2015.	Funding package established and schemes implemented this year include Workplace Challenge based around active travel to work and ECO Stars national fleet recognition scheme across Nottingham.	2014	Discourages car use for commuting journeys. Will encourage modal change to more sustainable modes and car sharing.
11	**Station Hub**	Rail capacity improvem	City Council /	2006-11	2010-14	Congestion Public	1µg/m^3	Business Case approved. Planning	Funding package finalised.	2014	Will reduce congestion and

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		ents and development of modern transport interchange	Network Rail/ East Midlands Trains			transport use		application approved.	Advanced highway and public realm improvements underway. Work on multi-storey car park complete. Work on station buildings underway. Station blockade in Summer 2013.		encourage modal change.
12	**NET Phase Two**	Tram network extensions to Clifton and Chilwell via Beeston	City Council	2006-11	2011-14	Tram use Congestion	1-2 $\mu g/m^3$	Programme entry approval secured October 2006. Transport and Work Act Order submitted April 2007. Public Inquiry completed January 2008.	Tramlink consortium selected to design, build, operate and maintain the expanded system.	2014	Will encourage modal change from car and thus reduce congestion as well as supporting sustainable

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
									Design work completed. Construction underway.		development.
13	**NET Future Phases**	Other tram network extensions linked to sustainable urban extensions	City Council	2011-16	Post 2019	Tram use Congestion	2 $\mu g/m^3$	Consideration of NET future phases included in LTP3. Subject to preliminary design and economic assessment.	NET future phases and infrastructure requirements being explored linked to the consideration of new developments through the development plan process.	Post 2019	Will encourage modal change from car and thus reduce congestion as well as supporting sustainable development
14	**Workplace Parking Levy**	Employers charged for commuter car parking	City Council	2006-12	2012	Congestion Public transport use	< 1-2 $\mu g/m^3$	Business case agreed by DfT. Examination in public completed. Scheme order approved.	Scheme commencement of licensing commenced October	Ongoing	Fiscal measure to discourage commuting by car coupled with

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
		provision (>10 spaces). Revenue generated to fund significant public transport improvements							2011. WPL charging commenced April 2012.		significant improvements to public transport alternatives.
15	**Park and Ride**	Expansion of Park and Ride capacity	City and County Councils	2011-14	2008-14	Public transport use	< 1µg/m^3	Queens Drive park and ride facility expansion completed - 2009. New sites and expansion of other sites linked to sustainable urban extensions.	Two large scale sites to be delivered as part of NET Phase Two.	2014	Reduces congestion through less vehicle movements to the City Centre.
16	**A52 Ring Road upgrading**	Upgrading of Ring Road Radcliffe to Clifton Bridge as recommended in the A52 MMS	Highways Agency	Post 2014	Post 2019	Congestion	< 1µg/m^3	Feasibility being considered as part of Growth Point programme. Requires prioritisation through Regional Funding Allocations	Sustainable urban extensions and infrastructure requirements identified through	Post 2019	Reduced congestion by increasing capacity of ring road around the south of the conurbation.

No	Measure	Focus	Lead authority	Planning phase	Implementation phase	Indicator	Target NO_2 annual emission reduction in the AQMA	Progress to date	Progress in last 12 months	Estimated completion date	Comments relating to emission reductions
								process.	Aligned Core Strategy process		
17	**'Centrelink' Linkbus development**	Purchase of electric vehicles to operate service	NCC	2010	2011	Public transport use	< 1µg/m^3	Green Bus Funding secured from DfT.	Service in operation.	2011	Reduce carbon emissions from public transport vehicles. Encourage public transport use
18	**Electric vehicle charging infra-structure**	Charging point at employment and interchange sites	City Council	2009-10	2011-13	Availability of charging points	< 1µg/m^3	Plugged in Places funding secured for the installation of a number of electric vehicle charging points at key employment sites.	Roll out to be complete in 2013.	2013	Will encourage modal change from car.

For the above table - under the heading '**Target NO_2 annual emission reduction in the AQMA**' a value of < 1µg/m^3 indicates that whilst the individual measure may have a negligible impact, it is likely to contribute to overall emissions reduction.

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

The 2012 monitoring results show that there were no exceedences of the Air Quality Objectives for PM_{10}, sulphur dioxide and benzene. This is consistent with findings reported in previous Review & Assessment reports.

The trend information for sulphur dioxide and benzene show that although 2012 annual mean concentrations were higher than in previous years, generally concentrations have been reducing with a significant decrease in measured levels since 2006.

Exceedences of the nitrogen dioxide annual mean AQO were measured at three automatic sites and eleven diffusion tube sites. Whilst most of these sites are within AQMAs - two of the diffusion tube sites are not. These two tubes are on or adjacent to residential properties where there is relevant public exposure.

The trend information shows that, since start up in 2005, the nitrogen dioxide annual mean AQO has been exceeded at the CG NOx within No.2 AQMA in most years and that there was a gradual increase in levels for the first 4 years.

In contrast the trend at the AURN urban background site has been decreasing concentrations that have levelled out for the last few years with no exceedences of the nitrogen dioxide annual mean AQO measured since 2004. The AURN 2012 nitrogen dioxide annual mean was on the borderline for exceedance and represents a significant increase compared with the last nine years' data.

The results show that exceedences of the annual mean nitrogen AQO continue to be measured at sites within the existing AQMAs consequently they should not be revoked.

It is apparent from the 2012 monitoring data that there were two sites outside of the AQMAs where exceedance of the annual mean nitrogen AQO occurred. There is relevant public exposure at these sites.

Therefore it is necessary to proceed to a Detailed Assessment for annual mean nitrogen dioxide.

10.2 Conclusions relating to New Local Developments

Of the new local developments outlined in Section 3 the Station Hub redevelopment, Nottingham Express Transit (NET) Phase Two, the Ring Road Major Scheme, the Broad Marsh/Turning Point South and Turning Point East schemes may require more detailed consideration in the next Updating and Screening Assessment.

As noted in the PR 2010 the use of biomass to meet the renewable energy requirements in planning applications and its increasing use in the industrial and domestic sector may have an impact on local air quality in the future. A more detailed consideration of this aspect may be needed in the next Updating and Screening Assessment.

10.3 Other Conclusions

With regard to the LTP2 Air Quality Action Plan a number of schemes such as Turning Point Major, Parksmart, Statutory Bus Quality Partnership Scheme have been fully implemented. Other measures with an estimated completion date of 2011-2013 include:

- Connecting Eastside Phase 1 – a funding package including East Midlands Development Agency (EMDA) and European Regional Development Fund (ERDF) funding has been secured and the shame is under construction. The highway works are largely complete.

- the Station Hub – the funding package has been finalised. Advanced highway and public realm improvements are underway and work on the multi-storey car park has commenced.

- ‘Centrelink’ Link Bus development – Green bus funding for electric vehicles to operate the service has been secured from the Department for Transport and the buses have been ordered.

A number of measures in the LTP2 Air Quality Action Plan have been carried through into the LTP 3 AQAP and progress with these will continue to be reported in future LAQM reports.

The NET (Nottingham Express Transit) Phase 2 – the tram network extensions have the potential to impact positively on air quality by encouraging modal change from cars and reduce congestion.

Construction work on the new lines has started and passenger services across the extended tram network should be fully operational by the end of 2014.

Together with Line One, NET will provide tram based Park & Ride sites near all three M1 junctions into Nottingham.

Twenty of the 30 largest employers in Greater Nottingham will be within 800m of a tram stop once the network is complete - with around 55,000 commuters within reach of the system. NET Phase Two will increase the number of passenger journeys across the extended tram system to an estimated 20 million a year and will take approximately three million car journeys off Nottingham's roads.

Air quality issues will be an integral part of the ongoing work being undertaken by Nottingham City Council to develop and implement the Local Development Framework for land use planning.

10.4 Proposed Actions

The 2012 monitoring data has identified the need to proceed to a Detailed Assessment for the annual mean nitrogen dioxide Air Quality Objective in 2 areas:

- around the junction of the Outer Ring Road (A6514) with Nottingham Road (B682) which is in a residential/commercial area approximately 3.5km to the north west of the City centre

  and

- in the vicinity of the roundabout where Castle Boulevard (A6005) meets Abbey Bridge (A6005) - a mainly residential area approximately 1.7km west of the City centre.

Additional diffusion tubes have been located around these junctions since January 2011. The results will assist in evaluation for the Detailed Assessment.

Exceedences of the annual mean nitrogen AQO were measured at sites within the existing AQMAs consequently the AQMAs should not be revoked and it is appropriate to maintain their current boundaries.

10.5 What Happens Next?

The next steps that Nottingham City Council will take to fulfil its LAQM duties are:

- to submit this 2012 Progress Report to Defra

- to complete a Detailed Assessment in respect of the annual mean nitrogen dioxide Air Quality Objective - i) around the junction of the Outer Ring Road (A6514) with Nottingham Road (B682) and ii) in the vicinity of the roundabout where Castle Boulevard (A6005) meets Abbey Bridge (A6005). This also requires consultation with statutory consultees, businesses and the general public.

  The Detailed Assessment, which is a statutory requirement following likely exceedance of an AQO, will be initiated following Defra's acceptance of the conclusions of this Progress Report.

- to undertake either an Updating and Screening Assessment, or submit a Progress Report by 30 April 2014 in accordance with the Review and Assessment timescales outlined in the LAQM Policy Guidance (PG09).

11 References

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Local Air Quality Management: Progress Report July 2011

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Local Air Quality Management: Further Assessment Report January 2012

Nottingham City Council Website **http://www.nottinghamcity.gov.uk**

The Air Quality (England) (Amendment) Regulations 2002 (SI 3043)

The Pollution Prevention and Control Act 1999

Appendices

Appendix A: Diffusion Tube Data Adjustment and QA/QC Information

Nottingham City Council's diffusion tubes are supplied and analysed by Gradko International, Hampshire. The tubes are prepared using a 20% solution of triethanolamine (TEA) in de-ionised water and are exposed on site for one month before being returned for laboratory analysis.

A -1 NO_2 Diffusion Tube Bias Adjustment Factor

Diffusion tubes are affected by several sources of interference which can cause substantial under or overestimation (often referred to as "bias") of NO_2 concentrations compared to the chemiluminescent analyser (defined within Europe as the reference method).

Consequently Local Authorities using diffusion tubes in their Review and Assessment work are required to quantify the "bias" of their diffusion tube measurements and apply an appropriate bias adjustment factor to the annual mean if required.

The guidance advises that Local Authorities can either:

1. Carry out their own co-location study (in which the accuracy of the diffusion tubes is quantified by exposure alongside an automatic chemiluminescence analyser), and use the results to calculate a bias adjustment factor i.e. locally-derived bias adjustment factors**.**

2. Use a combined bias adjustment factor, based on the result of many co-location studies (using the same laboratory and tube prepa
3. ration method) i.e. national bias adjustment factors.

Throughout 2012 triplicate diffusion tubes were co-located at the 3 automatic analyser roadside sites – CG NOx, LS NOx and SA NOx. Nottingham City Council's co-location data has been entered in the National Bias Adjustment Spreadsheet.

Bias adjustment factors determined from Local Authority co-location studies throughout the UK have been collated by the Local Air Quality Management Helpdesk.

The bias adjustment database is available at: http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

Table A -1 on the next page shows the national bias adjustment factors for Gradko diffusion tubes using 20% TEA in water. The overall factor for 27 studies is 0.9.

The 3 tables following Table A-1 i.e. A-1a, A-1b and A-1c – CG NOx, LS NOx and SA NOx sites respectively show the data that was entered into the National Bias Adjustment Spreadsheet (the most recent version is March 2013) and the resultant bias adjustment factors.

Table A-1 National Bias Adjustment Factor Data

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/13

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies

Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods

Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet

This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2013

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1: Select the Laboratory that Analyses Your Tubes from the Drop-Down List — If a laboratory is not shown, we have no data for this laboratory.

Step 2: Select a Preparation Method from the Drop-Down List — If a preparation method is not shown, we have no data for this method at this laboratory.

Step 3: Select a Year from the Drop-Down List — If a year is not shown, we have no data[2]

Step 4: Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.

If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

	Analysed By[1]	Method (a wrong selection, choose (All) from the pop-up list)	Year[5] (a wrong selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[6]	Bias Adjustment Factor (A) (Cm/Dm)
1434	Gradko	20% TEA in water	2012	R	Wiltshire Council	11	38	40	-4.0%	G	**1.04**
1436	Gradko	20% TEA in Water	2012	R	Dudley MBC	11	39	33	16.0%	G	**0.86**
1437	Gradko	20% TEA in Water	2012	UB	Dudley MBC	10	27	26	3.1%	G	**0.97**
1439	Gradko	20% TEA in Water	2012	R	Dudley MBC	11	43	42	2.0%	G	**0.98**
1440	Gradko	20% TEA in water	2012	R	Monmouthshire County Council	11	48	45	7.0%	G	**0.93**
1445	Gradko	20% TEA in water	2012	R	Cheshire West & Chester	11	40	45	-10.1%	G	**1.11**
1447	Gradko	20% TEA in Water	2012	UB	East Herts Council	11	21	12	71.9%	G	**0.58**
1449	Gradko	20% TEA in Water	2012	R	Gateshead Council	11	34	34	-1.4%	G	**1.01**
1450	Gradko	20% TEA in Water	2012	R	Gateshead Council	11	36	37	-3.2%	G	**1.03**
1451	Gradko	20% TEA in Water	2012	R	Gateshead Council	11	32	33	-2.6%	G	**1.03**
1455	Gradko	20% TEA in Water	2012	R	Dudley MBC	9	55	60	-7.5%	G	**1.08**
1468	Gradko	20% TEA in Water	2012	UB	Luton Borough Council	11	38	30	29.4%	G	**0.77**
1475	gradko	20% TEA in water	2012	UC	Southampton City Council	11	30	33	-8.3%	G	**1.09**
1484	Gradko	20% TEA in water	2012	R	Exeter City Council	11	34	34	-0.3%	G	**1.00**
1489	Gradko	20% TEA in water	2012	R	Scarborough B C	11	32	37	-11.3%	G	**1.13**
1501	Gradko	20% TEA in Water	2012	KS	Marylebone Road Intercomparison	11	106	94	12.1%	G	**0.89**
1518	Gradko	20% TEA in water	2012	KS	New Forest DC	10	46	40	13.4%	G	**0.88**
1522	Gradko	20% TEA in water	2012	R	New Forest DC	10	33	29	11.8%	G	**0.89**
1536	Gradko	20% TEA in water	2012	R	Brighton & Hove City Council	11	41	37	10.5%	G	**0.91**
1537	Gradko	20% TEA in water	2012	R	City of Lincoln Council	11	53	44	18.4%	G	**0.84**
1538	Gradko	20% TEA in water	2012	R	Fareham Borough Council	9	38	39	-4.1%	G	**1.04**
1539	Gradko	20% TEA in water	2012	R	NOTTINGHAM CITY COUNCIL	10	44	44	-0.2%	G	**1.00**
1540	Gradko	20% TEA in water	2012	R	NOTTINGHAM CITY COUNCIL	11	43	41	4.9%	G	**0.95**
1541	Gradko	20% TEA in water	2012	R	NOTTINGHAM CITY COUNCIL	10	46	47	-0.3%	G	**1.00**
1542	Gradko	20% TEA in water	2012	R	The Highland Council	9	24	32	-24.1%	G	**1.32**
1557	Gradko	20% TEA in water	2012	R	Wiltshire Council	10	36	35	3.9%	G	**0.96**
1563	Gradko	20% TEA in Water	2012	UB	LB Waltham Forest	11	33	38	-11.8%	S	**1.13**
1761	Gradko	20% TEA in water	2012		**Overall Factor[3] (27 studies)**				**Use**		**0.97**
1773											

Table A-1a CG NOx Bias Adjustment Data

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2012	08/02/2012	57	59	49	55	5.7	10	14.1
2	08/02/2012	29/02/2012	56		59	57	1.7	3	15.5
3	29/02/2012	28/03/2012	48	49	48	48	0.6	1	1.5
4	28/03/2012	25/04/2012	37	45	48	43	5.6	13	14.0
5	25/04/2012	30/05/2012	33	33	34	33	0.6	2	1.6
6	30/05/2012	27/06/2012	30	37		33	4.5	13	40.4
7	27/06/2012	01/08/2012	36	32	33	34	1.8	5	4.6
8	01/08/2012	29/08/2012	39	36	40	38	2.2	6	5.4
9	29/08/2012	26/09/2012	40	41	38	40	1.9	5	4.8
10	26/09/2012	30/10/2012	47	47	42	45	2.5	6	6.2
11	30/10/2012	30/11/2012	41	47	50	46	4.6	10	11.5
12	30/11/2012	02/01/2013	39	34	36	37	2.4	7	6.0
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method	
Period Mean	Data Capture (% DC)
55.0	99.7
46.5	99.6
50.8	99.6
40.9	99.4
33.6	89.1
30.4	61.7
32.4	99.3
36.0	98.9
38.3	99.9
41.5	98.7
51.8	99.9
49.1	98.1

Data Quality Check	
Tubes Precision Check	Automatic Monitor Data
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	or Data Captu
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good precision	Good Overall DC

Overall survey -->

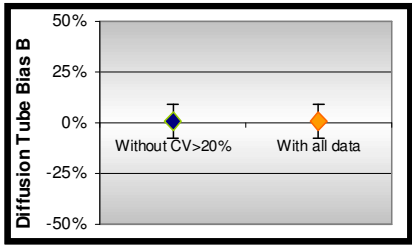
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	CARTER GATE NOX 2012

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	1 (0.92 - 1.09)
Bias B	0% (-8% - 8%)
Diffusion Tubes Mean:	43 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	43 μgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	43 (40 - 47) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	1 (0.92 - 1.09)
Bias B	0% (-8% - 8%)
Diffusion Tubes Mean:	43 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	43 μgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	43 (40 - 47) μgm^{-3}



Jaume Targa, for AEA
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Table A-1b LS NOx Bias Adjustment Data

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements										Automatic Method		Data Quality Check	
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean	Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
1	06/01/2012	08/02/2012	54	59	49	54	5.1	10	12.7	54.5	95.7	Good	Good
2	08/02/2012	29/02/2012	52	53	49	51	2.4	5	5.9	43.2	95.3	Good	Good
3	29/02/2012	28/03/2012	45	51	48	48	3.4	7	8.4	47.4	95.7	Good	Good
4	28/03/2012	25/04/2012	37	42	36	38	3.1	8	7.6	35.9	95.1	Good	Good
5	25/04/2012	30/05/2012	31	40	35	35	4.1	12	10.2	33.2	85.6	Good	Good
6	30/05/2012	27/06/2012	32	32	33	33	0.6	2	1.4	31.1	80.1	Good	Good
7	27/06/2012	01/08/2012	33	27	32	31	3.2	10	7.9	31.8	97.7	Good	Good
8	01/08/2012	29/08/2012	37	39	36	37	1.4	4	3.6	31.1	98.9	Good	Good
9	29/08/2012	26/09/2012	38	40	38	38	0.9	2	2.2	32.2	99.4	Good	Good
10	26/09/2012	30/10/2012	44	48	43	45	2.5	6	6.2	41.1	99.3	Good	Good
11	30/10/2012	30/11/2012	47	53	48	49	2.9	6	7.2	46.9	99.4	Good	Good
12	30/11/2012	02/01/2013	45	50	44	46	3.0	7	7.5	56.2	98.7	Good	Good
13													
										Overall survey -->		Good precision	Good Overall DC

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

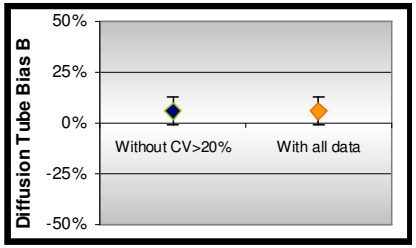
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	LACE STREET 2012

Precision 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 12 periods of data	
Bias factor A	0.96 (0.9 - 1.03)
Bias B	4% (-2% - 11%)
Diffusion Tubes Mean:	42 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	40 μgm^{-3}
Data Capture for periods used:	95%
Adjusted Tubes Mean:	40 (38 - 43) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 12 periods of data	
Bias factor A	0.96 (0.9 - 1.03)
Bias B	4% (-2% - 11%)
Diffusion Tubes Mean:	42 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	40 μgm^{-3}
Data Capture for periods used:	95%
Adjusted Tubes Mean:	40 (38 - 43) μgm^{-3}



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Table A-1c SA NOx Bias Adjustment Data

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2012	08/02/2012	47	50	49	49	1.7	3	4.2
2	08/02/2012	29/02/2012	59	59	64	61	2.6	4	6.5
3	29/02/2012	28/03/2012	44	44	50	46	3.2	7	7.9
4	28/03/2012	25/04/2012	44	40	42	42	1.7	4	4.3
5	25/04/2012	30/05/2012	31	29	27	29	1.8	6	4.4
6	30/05/2012	27/06/2012	32	29	33	31	2.2	7	5.3
7	27/06/2012	01/08/2012	35	30	39	35	4.1	12	10.3
8	01/08/2012	29/08/2012	40	43	40	41	2.0	5	4.9
9	29/08/2012	26/09/2012	39	47	46	44	4.2	10	10.5
10	26/09/2012	30/10/2012	43	46	41	44	2.8	7	7.1
11	30/10/2012	30/11/2012	55	59	51	55	3.8	7	9.4
12	30/11/2012	02/01/2013	47	66	49	54	10.3	19	25.6
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method	
Period Mean	Data Capture (% DC)
51.5	99.9
51.0	99.1
46.9	99.7
42.8	99.9
30.4	82.0
31.2	52.5
32.0	96.9
35.8	99.1
43.9	96.3
45.0	98.3
57.2	99.9
60.6	96.5

Data Quality Check	
Tubes Precision Check	Automatic Monitor Data
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	or Data Captu
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good	Good
Good precision	Good Overall DC

Overall survey -->

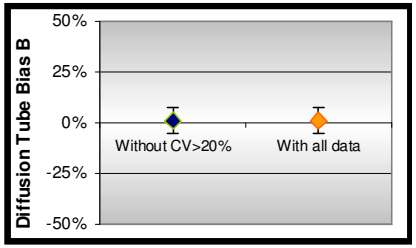
(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	ST.ANDREWS ROAD NOX

Precision: 12 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%	
Bias calculated using 11 periods of data	
Bias factor A	1 (0.94 - 1.06)
Bias B	0% (-6% - 7%)
Diffusion Tubes Mean:	45 μgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	45 μgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	45 (43 - 48) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	1 (0.94 - 1.06)
Bias B	0% (-6% - 7%)
Diffusion Tubes Mean:	45 μgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	45 μgm^{-3}
Data Capture for periods used:	97%
Adjusted Tubes Mean:	45 (43 - 48) μgm^{-3}



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Table A1-d Factors from Local Co-location Studies

Site	Site Type	Bias Adjustment Factor, A (from Tables A -1a,1 b & 1c)
CG NOx, Carter Gate	Roadside	1.00
LS NOx, Lace Street	Roadside	0.96
SA NOx, Carter Gate	Roadside	1.00
	Average	0.98

Discussion of Choice of Factor to Use

The national 2012 bias adjustment factor for Gradko tubes 20% TEA in water = 0.97 (based on 27 sites – 20 of which are roadside).

The locally derived factor = 0.98 (based on 3 roadside sites).

In deciding which factor to use, note has been taken of the TG(09) guidance. This advises that the most important aspects to be considered when deciding which bias-adjustment factor to use are:

- Tube exposure time (1 week, 2 weeks, 1 month)
- Length of the monitoring study
- QA/QC of the chemiluminescence analyser
- QA/QC of diffusion tubes
- Siting of the co-location study
- Siting of other tubes in the survey

Taking these into consideration then either the local or national factor could be used.

However because generally the inclusion of a greater number of studies means the resultant factor is a more reliable figure, the decision was made to use the national factor.

Use of the local factor to adjust the diffusion tube data would lead to slightly higher nitrogen dioxide values.

The 2012 diffusion tube unadjusted monthly nitrogen dioxide concentrations are given in Table A–2 after subsection A-2 diffusion tube QA/QC information.

A-2 QA/QC for Diffusion Tube Monitoring

Gradko International supply and analyse Nottingham City Council's diffusion tubes. The organisation is UKAS accredited and is assessed annually for compliance to ISO 17025 and participates in other proficiency schemes.

Gradko have confirmed that their procedures follow the guidance issued on behalf of Defra (AEA Energy & Environment, Feb 2008) relating to the preparation, extraction, analysis and calculation procedures for passive NO_2 diffusion tubes

Gradko participate in a number of QA/QC monitoring systems to demonstrate satisfactory performance including the Workplace Analysis Scheme for Proficiency (WASP) programme to ensure uniformity in data throughout the year.

The Workplace Analysis Scheme for Proficiency (WASP)

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical proficiency-testing (PT) scheme, operated by the Health and Safety Laboratory (HSL). WASP offers a number of test samples designed to test the proficiency of laboratories undertaking analysis of chemical pollutants in workplace and ambient air. One such sample is the WASP NO2 test sample type that is distributed to participants in a quarterly basis.

WASP NO2 PT forms an integral part of the UK NO2 Network's QA/QC, and is a useful tool in assessing the analytical performance of laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). With consent from the participating laboratories, HSL provides summary

proficiency testing data to the LAQM Helpdesk for hosting on the web-pages at http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html.

Information about the WASP scheme, how the testing is carried out along with the calculation of results and final scores can be found in the **Summary of Laboratory Performance in WASP NO2 Proficiency Testing Scheme for Rounds 113-120**. **LAQM Helpdesk – March 2013** (http://laqm.defra.gov.uk/documents/LAQM-WASP-Rounds-113-120-(April-2011--March-2013)-NO2-report.pdf).

Defra and the Devolved Administrations advise that diffusion tubes used for Local Air Quality Management should be obtained from laboratories that have demonstrated satisfactory performance in the WASP scheme.

Gradko International's WASP performance for the 2012 rounds (rounds 116 – 119) was 100% (results shown below in an extract from the Summary).

Extract taken from **Table 1: Laboratory summary performance for WASP NO2 PT rounds 113 - 120**

"The following table lists those UK laboratories undertaking LAQM activities that have participated in recent HSL WASP NO2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of $\leq \pm 2$ as defined above (see the full summary referenced above for detailed information)."

WASP Round	WASP R116	WASP R117	WASP R118	WASP R119
Round conducted in the period	January – March 2012	April – June 2012	July – September 2012	October – December 2012
Gradko International [2]	100 %	100 %	100 %	100 %

Precision vs Accuracy (Bias)

A further aspect of QA/QC for a laboratory is the reproducibility of results i.e. precision. Precision should not be confused with accuracy. Diffusion tube precision can be

described as the ability of a measurement to be consistently reproduced, i.e. how similar the results of duplicate or triplicate tubes are to each other.

Accuracy represents the ability of the measurement to represent the 'true' value, which for the monitoring results, is defined as the results from the automatic analysers. When averaged over a number of sets of results bias can be evident. This represents the overall tendency of the diffusion tubes to depart from the 'true' value, i.e. to systematically over-or under-read when compared against the reference method.

Once identified, bias can be adjusted for to improve the accuracy of diffusion tube results. This is done using bias adjustment factors which have been found to be specific to a laboratory and tube preparation method. See Appendix A subsection A-1 above.

Unlike bias, poor precision cannot be adjusted for. It can only be improved by careful handling of the tubes in both the laboratory and the field.

The LAQM website provides a link to the summary of precision results for individual laboratories - **Summary of Diffusion Tube Precision 2008-2012**. It can be downloaded as a PDF from http://laqm.defra.gov.uk/diffusion-tubes/precision.html.

The precision rating for Gradko for 2012 was 'good'. This precision reflects the laboratory's performance/consistency in preparing and analysing the tubes, as well as the subsequent handling of the tubes in the field.

Table A-2 2012 Diffusion Tube Monthly Unadjusted Nitrogen Dioxide Concentrations (μg/m^3)

Site Id	Location	Site Type	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Raw Mean μg/m^3
G	Beeston Road	R	57	53	50	38	40	23	34	34	40	46	50	36	41.7
I	Derby Road	R	45	43	36	36	32	14	27	30	28	36	35	32	32.7
X	Western Boulevard	R	39	41	39	33	25	25	23	33	33	36	44	41	34.4
X2	Wilkinson Street	R	50	48	40	38	25	27	26	33	36	37	45	34	36.6
X3	Nottingham Road (1)	R	61	48	46	41	37	35	34	39	40	44	53	39	43.0
X3-2	Nottingham Road (2)	R	51	39	41	40	30	33	32	37	27	32	27	47	36.4
X3-3	Highland Court	R	45	41	37	30	23	15	26	31	16	37	43	42	32.1
X4	Danethorpe Vale	R	41	46	38	24	17	13	27	32	30	34	40	38	31.7
AA	Ilkeston Road	R	50	50	50	48	39	35	35	37	42	50	54	44	44.4
AA-2	6 Rayner Court	R	43	43	34	34	27	24	26	28	28	35	39	44	33.7
V	Bentinck Road	R	50	50	45	40	32	29	32	36	38	41	44	46	40.3
V2	Gregory Boulevard	R	47	45	36	38	26	26	27	34	33	37	40	24	34.4
K4	Castle Gardens	R	-	-	-	61	44	45	50	54	52	58	61	46	52.3
K3-2	Castle Boulevard (2)	R	45	38	36	25	25	24	26	30	26	34	37	25	31.1
K3-3	Sherwin Road	R	40	27	34	30	23	23	25	27	28	34	37	34	30.1
K	Castle Boulevard	R	54	50	51	37	41	37	45	39	41	48	47	64	46.3
M	Canning Terrace	R	62	64	57	62	56	49	48	49	50	69	62	72	58.4
N	Upper Parliament St	R	60	66	56	56	49	51	49	50	52	66	53	51	54.7
O	Shakespeare St	R	58	57	49	50	43	38	42	46	45	54	55	60	49.7
P	Mansfield Road	R	65	54	48	50	47	41	41	46	47	54	54	44	49.2
Y	Bloomsbury Court	R	49	64	54	55	43	38	39	46	44	57	53	53	49.5
U	Trent Bridge PH	R	49	52	48	46	35	36	38	43	40	47	50	39	43.5
T	Queens Rd	R	59	65	59	54	37	47	43	51	47	53	67	50	52.7

Appendix B: QA/QC Information for Automatic Monitoring

Quality Control, Maintenance, Calibration

AURN Site

The analysers at the AURN site are subject to a four weekly calibration regime. The calibrations are undertaken by a trained local site operator (LSO) and conducted in accordance with the Local Site Operators' Manual. Nottingham City has 3 trained LSOs who are audited as to their performance on an on-going basis.

The LSO changes the filters for the TEOMs and FDMSs and cleans the TEOM heads approximately every 12 weeks when requested by the Central Management and Co-ordination Unit (CMCU). All work undertaken is done in accordance with the Local Site Operator's Manual,

The equipment is fully serviced every six months. In 2012 this was undertaken by EnviroTechnology Services plc, Gloucester.

The site is audited on a six monthly basis by AEA Energy & Environment.

CG NOx, LS NOx and SA NOx Sites

At Nottingham City Council's CG NOx, LS NOx and SA NOx sites calibrations are carried out fortnightly. The calibrations, using zero air and span gases, are undertaken by the same LSOs as those for the AURN site and are conducted using the same principles and procedures as given in the AURN LSO Manual.

The equipment is fully serviced every six months EnviroTechnology Services plc, Gloucester.

Calibration Gas Traceability

AURN Site

Calibration gases used in the AURN are supplied by AIR Liquide who have demonstrated compliance with relevant quality control procedures in the preparation of gas mixtures. The gas mixtures are certified by AEA Energy & Environment.

CG NOx, LS NOx and SA NOx Sites

Calibration gases used in the CG NOx, LS NOx and SA NOx monitoring sites are supplied by AIR Liquide who have demonstrated compliance with relevant quality control procedures in the preparation of gas mixtures. The gases are supplied with a certificate of analysis.

Data Collection and Processing

AURN Site

The AURN station's data is continuously interrogated by Bureau Veritas the Central Management and Co-ordination Unit (CMCU). The data obtained is validated by CMCU and passed to the Data Dissemination Unit (DDU).

Information about the AURN station and available data can be found on the internet at http://uk-air.defra.gov.uk.

CG NOx, LS NOx and SA NOx Sites

For Nottingham City Council's sites all data collection, validation and ratification is carried out by the Council's Pollution Control team.

Throughout 2012, data from the CG NOx, LS NOx and SA NOx sites was polled remotely directly from the analysers and collected as 15 minute averages using Envista ARM data collection software. The data have been scaled and converted into hourly (or other values) using the Envista ARM data management system

The software allows users to remotely view, analyse, report and distribute environmental quality data. Manipulation of raw data to verified data can be conducted in a structured approach.

Data validation is carried out and involves screening the scaled values to identify unusual measurements, errors due to equipment failure etc. and flagging them for further investigation.

Data ratification is carried at approximately 2 monthly intervals. This involves looking at the data more closely and includes:

- examination of calibration records to ensure correct application of calibration factors;
- examination of data for other pollutants and monitoring sites to highlight any anomalies;
- deletion of data shown from chart or other records to be spurious, for example, spikes generated by the analyser;
- correction of any baseline drift as indicated by examination of daily automatic calibration records.

Once this process has been carried out and data has been verified, amended or rejected as appropriate, the data is ratified. This final data set is used for the R & A process.