



DISTRICT COUNCIL  
NORTH OXFORDSHIRE

Air Quality Updating and Screening  
Assessment and Progress Report  
2013 for  
Cherwell District Council

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

February 2014

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## Executive Summary

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

Monitoring and further assessment during 2011 and 2012 confirm that the annual and hourly mean objective for nitrogen dioxide is being exceeded within the existing Hennef Way air quality management area. This supports the retention of the existing air quality management area boundary and the findings of the previous Detailed Assessment and Further Assessment reports for this area.

Monitoring and assessment in Banbury for 2011 and 2012 confirm the annual mean objective for nitrogen dioxide is being exceeded. This supports the findings of the Detailed Assessment and an AQMA should be declared which includes properties in Bloxham Road, Oxford Road and North Bar, Banbury.

Monitoring and assessment in Bicester for 2011 and 2012 confirm the annual mean objective for nitrogen dioxide is being exceeded. This supports the findings of the Detailed Assessment and an AQMA should be declared which includes properties in Field Street and Kings End, Bicester.

Monitoring and assessment in Kidlington for 2011 and 2012 confirm the annual mean objective for nitrogen dioxide is being exceeded. This supports the findings of the Detailed Assessment and an AQMA should be declared encompassing properties within Bicester Road, Kidlington.

A review of matters that may have changed and resulted in an exceedance of a national air quality objective has not identified areas which require a detailed assessment to be undertaken to determine if a national air quality objective is likely to be exceeded.

A planning application identified potential existing exceedances of the annual mean air quality objective for nitrogen dioxide in Ermont Way, Banbury. Short term monitoring indicates the objective isn't likely to be exceeded but monitoring will be continued and considered in the 2014 Progress report as to whether a detailed assessment is required.

Based on a review of monitoring locations, a relocation of monitoring tubes to reflect concentrations at appropriate receptors have also been proposed at Market Square, Bicester.

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# **1 Introduction**

## **1.1 Description of Local Authority Area**

Cherwell covers an area of 590 square kilometres (228 square miles) in north Oxfordshire. The district is located between London and Birmingham, at the most northern point of the South East region, where it meets the West Midlands and East Midlands. The M40 passes through the district and there are good rail connections to London and Birmingham.

138,500 people live in Cherwell, over 60% of the population live in the principal centres of Banbury (approx 43,800), Bicester (approx 32,000) and Kidlington (approx 13,100); the rest in more than 70 smaller settlements of between 50 and 3500 people. 85% of the district is farmland.

Between 1991 and 2001 Cherwell's population increased by almost 12% and by a further 4.5% since 2001. Growth predictions of a further 8% by 2016 and a cumulative 15.6% by 2026 are significantly higher than regional and national rates. Most of the recent growth has been in Banbury and Bicester and this will continue. Bicester's population is projected to grow by 13.8% between 2001 and 2016.

Cherwell residents travel further to work than people in the rest of the South East and nationally. Car ownership overall is high and residents in our rural areas are particularly dependent on their cars. The dependence on cars has produced a number of congestion hotspots in the district including in the centres of Banbury, Bicester and Kidlington at times (Cherwell Strategic Local Partnership, 2010).

## **1.2 Purpose of Report**

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where exceedences are



considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

### **1.3 Air Quality Objectives**

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre  $\mu\text{g}/\text{m}^3$  (milligrammes per cubic metre,  $\text{mg}/\text{m}^3$  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**

<b>Pollutant</b>	<b>Air Quality Objective</b>		<b>Date to be achieved by</b>
	<b>Concentration</b>	<b>Measured as</b>	
<b>Benzene</b>	16.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
	5.00 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2010
<b>1,3-Butadiene</b>	2.25 $\mu\text{g}/\text{m}^3$	Running annual mean	31.12.2003
<b>Carbon monoxide</b>	10.0 $\text{mg}/\text{m}^3$	Running 8-hour mean	31.12.2003
<b>Lead</b>	0.5 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
	0.25 $\mu\text{g}/\text{m}^3$	Annual mean	31.12.2008
<b>Nitrogen dioxide</b>	200 $\mu\text{g}/\text{m}^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005

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	$40 \mu\text{g}/\text{m}^3$	Annual mean	31.12.2005
<b>Particles (PM<sub>10</sub>) (gravimetric)</b>	$50 \mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	$40 \mu\text{g}/\text{m}^3$	Annual mean	31.12.2004
<b>Sulphur dioxide</b>	$350 \mu\text{g}/\text{m}^3$ , not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	$125 \mu\text{g}/\text{m}^3$ , not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	$266 \mu\text{g}/\text{m}^3$ , not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

## 1.4 Summary of Previous Review and Assessments

Cherwell District Council has undertaken and completed the following rounds of LAQM review and assessment as summarised in Table 1.2 and discussed below:

**Table 1.2 Summary of previous review and assessments**

Round	Report	Date	Outcome
2	Updating and Screening Assessment	2004	No likely exceedences of objectives at any point with a relevant exposure. No need for detailed assessment and no AQMA's.
	Progress report	2005	No likely exceedences of objectives at any point with a relevant exposure. No need for detailed assessment and no AQMA's.
3	Updating and Screening Assessment	2006/2007	PM <sub>10</sub> and NO <sub>2</sub> modelled using DMRB at 7 junctions. No likely exceedences at relevant public exposure relating to roads and traffic.
	Progress Report	2007	Exceedence of the annual mean NO <sub>2</sub> objective level was identified in Horsefair. No public exposure is present and the report recommended moving tube to relevant public exposure. Oxford Road monitoring identified NO <sub>2</sub> close to this objective but with no relevant public exposure. Establishing a continuous monitoring station for future diffusion tube bias adjustment is recommended.
	Progress report	2008	Locations of tubes had been reassessed and repositioned to more appropriate points of relevant public exposure. A co-location study was in preparation. No exceedences of the air quality objectives identified.
4	Updating and Screening Assessment	2009	Detailed assessments for NO <sub>2</sub> required at the following locations where the annual mean objective concentration was exceeded in 2008: <ul style="list-style-type: none"> <li>- Horsefair, Banbury</li> <li>- Hennef Way, Banbury</li> <li>- Queens Avenue / Kings End, Bicester</li> </ul>
	Detailed Assessment – Hennef Way	2010	Monitored NO <sub>2</sub> concentrations at Hennef Way were used to model emissions and the potential area of exceedence of NO <sub>2</sub> annual mean and hourly mean

			objective were estimated. Additional monitoring in this area was recommended and declaration of AQMA.
	AQMA Order	2011	Hennef Way AQMA declared for exceedence of the annual mean and hourly mean Air Quality Objectives
	Progress reports	2010 and 2011	Finalised in 2012. Monitoring data supports retaining the existing AQMA at Hennef Way. The identified requirement for detailed assessments at Queens Avenue, Bicester and Horsefair, Banbury is also supported and Bicester Road, Kidlington has been identified as requiring a detailed assessment.
	Further Assessment – Hennef Way	2012	Finalised in 2013. Supports existing AQMA boundaries but identifies uncertainties in exposure concentrations. Additional monitoring at relevant exposure is recommended by Defra before the action plan is completed.
	Detailed Assessment – Horsefair / North Bar, Banbury	2012	Finalised in 2013. Recommends declaration of AQMA due to NO <sub>2</sub> concentrations above the annual mean objective. To include Bloxham Road and Horsefair / North Bar providing this is supported by most recent data.
	Detailed Assessment – Kings End / Queens Avenue, Bicester	2012	Finalised in 2013. Recommends declaration of AQMA due to NO <sub>2</sub> concentrations above the annual mean objective. To include Kings End / Queens Avenue and Field Street providing this is supported by most recent data.
	Detailed Assessment – Bicester Road, Kidlington	2012	Finalised in 2013. Recommends declaration of AQMA due to NO <sub>2</sub> concentrations above the annual mean objective. To include Bicester Road, Kidlington providing this is supported by most recent data.

Cherwell District Council completed the first round of Review and Assessments and concluded that no exceedences of the objectives for any pollutants were likely at relevant receptor locations. No AQMAs were declared in the Cherwell District Council area.

The 2004 Updating and Screening Assessment and 2005 progress report indicated that no exceedences of the air quality objectives for carbon monoxide, benzene, 1-3-butadiene, lead, NO<sub>2</sub>, PM<sub>10</sub> and sulphur dioxide are likely. Therefore no detailed assessments were required to be undertaken.

The 2006 Updating and Screening Assessment modelled NO<sub>2</sub> and PM<sub>10</sub> concentrations (using the DMRB screening model) at seven junctions in the District Council area, which were identified as being particularly busy. The model indicated that there were no likely exceedences of the AQS objectives for NO<sub>2</sub> or PM<sub>10</sub> at any point of relevant public exposure close to roads and junctions during 2006. The report also concluded that there were no likely exceedences of the AQS objectives for any of the other AQS pollutants at points of relevant public exposure within the District Council area.

The 2007 Progress Report identified an exceedence of the annual mean objective for NO<sub>2</sub> at the Horsefair diffusion tube site and annual mean NO<sub>2</sub> concentrations close to the objective at the Oxford Road diffusion tube site. However, these diffusion tubes were not located at points of relevant public exposure, hence the report concluded that there was no need for Cherwell District Council to proceed to a Detailed Assessment for NO<sub>2</sub>. The report recommended that the Horsefair and Oxford Road diffusion tube sites be re-located to the nearest point of relevant public exposure to ensure that representative data is collected. The report also recommended that a continuous air quality monitoring station be established in the District Council area for the purpose of gathering inter-comparison data to inform future diffusion tube bias adjustment.

The 2008 Progress Report indicated that locations of diffusion tube sites within the District area had been reassessed and repositioned where required to suitable points of relevant public exposure. Also, a co-location study was in preparation, which was estimated to be operational by the end of 2008. The report concluded that there were no exceedences of the NO<sub>2</sub> annual mean objective within the District Council area during 2007.

The Updating and Screening Assessment (2009) concluded that a Detailed Assessment for NO<sub>2</sub> was required at the following locations where annual mean concentrations in excess of the objective were measured during 2008:

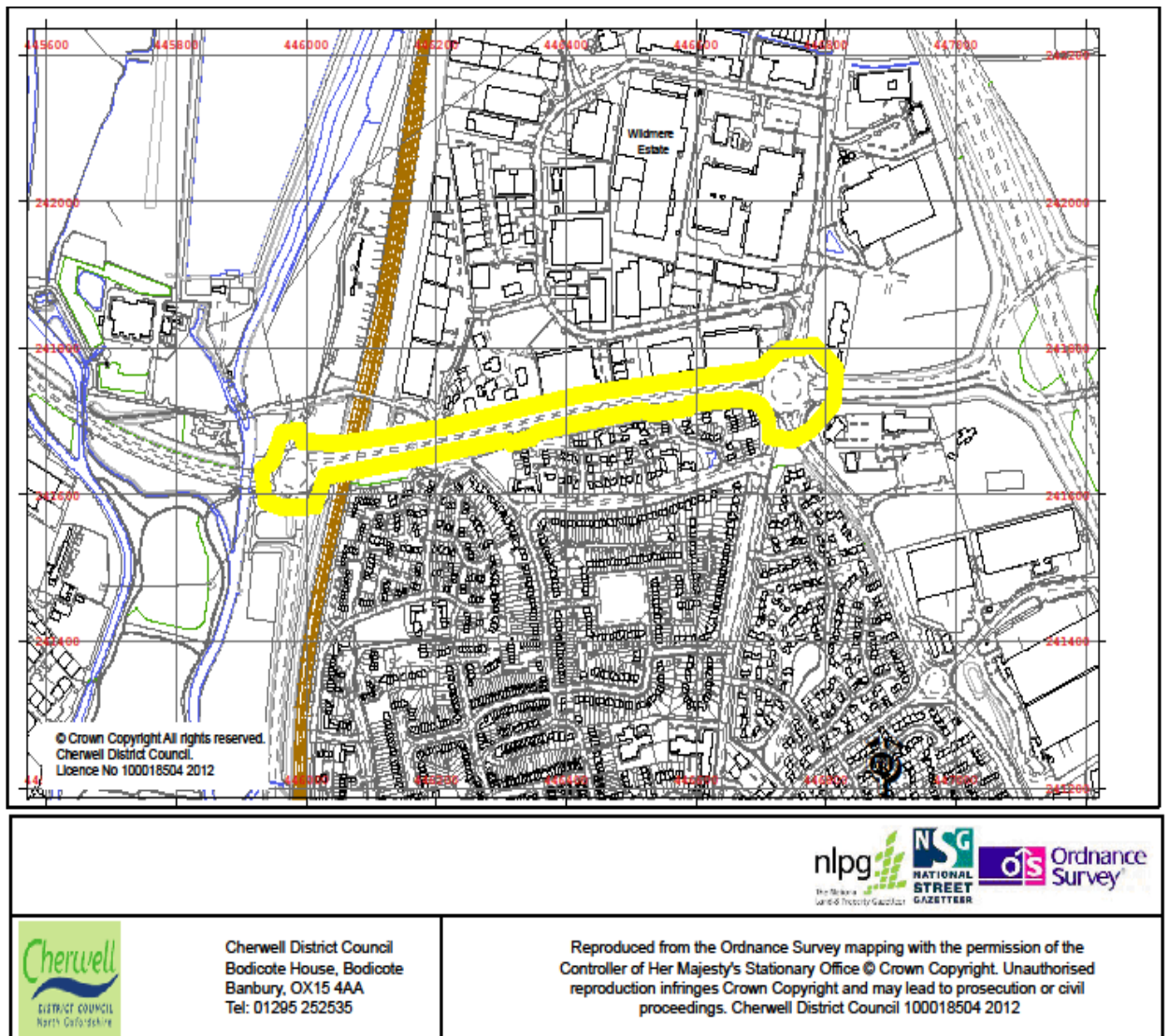
- Horsefair, Banbury;
- Hennef Way, Banbury
- Queens Avenue, Bicester

A 2010 Detailed Assessment of NO<sub>2</sub> concentrations at Hennef Way, Banbury was undertaken. Using ADMS-roads dispersion modelling and recent automatic and diffusion tube data, the results suggested that the NO<sub>2</sub> annual mean and 1-hour AQS objectives were being exceeded in and around Hennef Way, Banbury.

The report recommended that Cherwell District Council increase monitoring within the study area to assist with any future modelling studies and improve the definition of any future AQMA declaration at this location. The report also recommended that an AQMA should be declared in the vicinity of the A422 Hennef Way, Banbury.

An AQMA Order was drafted in 2011 and an AQMA was declared in Hennef Way, Banbury. The boundary of the AQMA is shown in figure 1.1 and includes three properties.

Figure 1.1 Map of Hennef Way AQMA Boundary



A further assessment of the Hennef Way AQMA has been undertaken. The reported proportion of vehicles within the Hennef Way AQMA contributing to these exceedences for 2011 are shown in Table 1.3.

Table 1.3 Hennef Way Annual Average Daily Traffic Flows - 2011

Hennef Way Carriageway through AQMA	%Cars	%LGV	%HGV	%Bus	%2WM	Annual Average Daily Traffic Flows
Eastbound	82.0%	12.9%	4.3%	0.4%	0.5%	18205
Westbound	82.0%	12.9%	4.3%	0.4%	0.5%	18002

LGV – Light Goods Vehicles  
 HGV – Heavy Goods Vehicles (Articulate and Rigid)  
 2WM – Motorcycles

Additional monitoring sites were created to inform this further assessment. These sites reduced the uncertainty of the modelling data in the detailed assessment and supports the existing boundary of the AQMA. Differences between monitored concentrations at the road-side and those facing away from the road highlighted additional uncertainty of actual concentrations at the receptors. Defra has recommended that additional monitoring as close as possible to the receptor should be undertaken before completing the action plan. An air quality action plan is being drafted for this AQMA.

The 2010 and 2011 Progress report concluded that the existing AQMA at Hennef Way be retained. The identified requirement for detailed assessments at Queens Avenue, Bicester and Horsefair, Banbury is also supported. Bicester Road, Kidlington has identified elevated concentrations of nitrogen dioxide in excess of the annual mean objective and there is a requirement to proceed to a detailed assessment at this location.

Detailed assessments have been undertaken for the areas around Horsefair / North Bar (Banbury), Queens Avenue / Kings End area (Bicester) and Bicester Road (Kidlington) using 2010 monitoring information. These assessments concluded that Air Quality Management Areas should be declared as soon as possible to include the properties where the nitrogen dioxide air quality management area is likely to be exceeded, as a minimum.



## **2 New Monitoring Data**

### **2.1 Summary of Monitoring Undertaken**

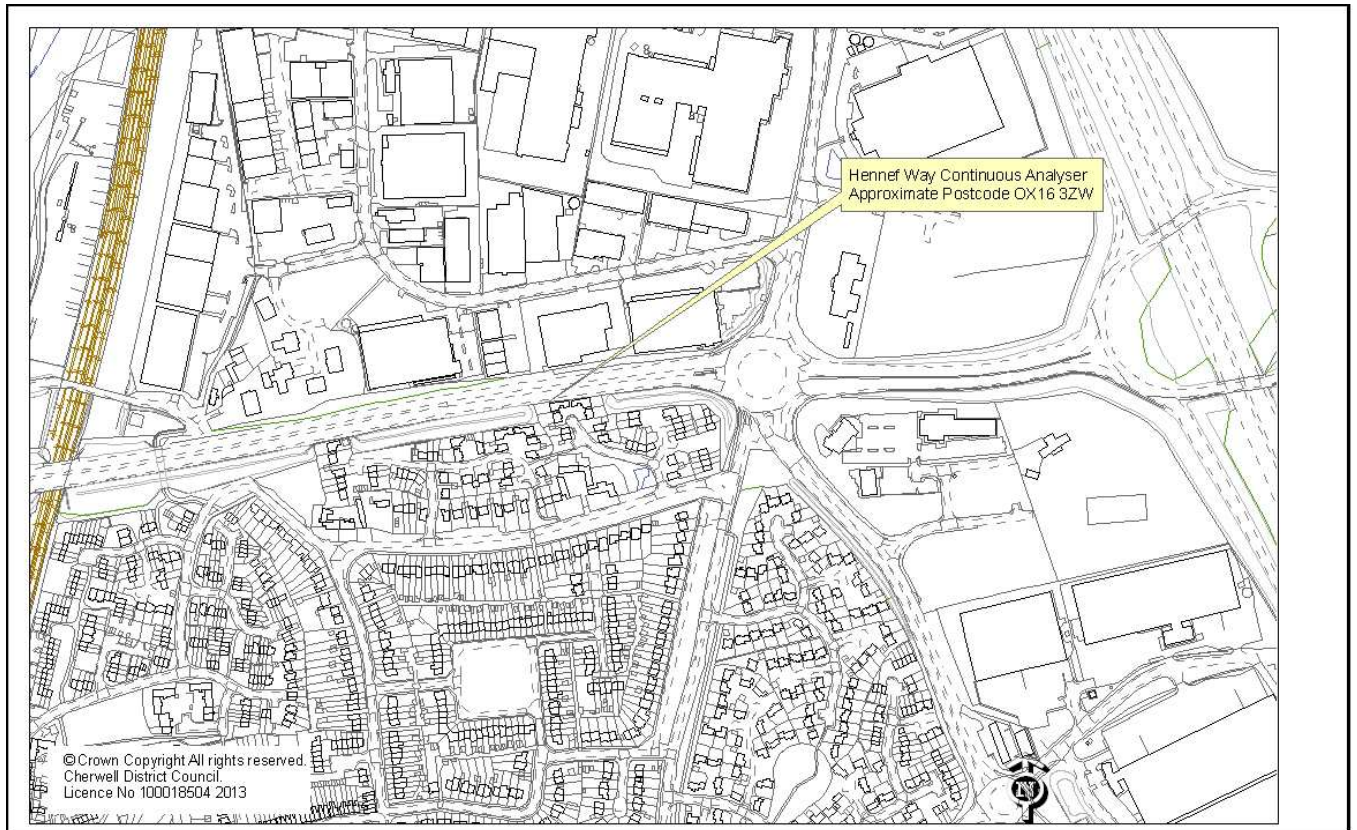
Cherwell District Council undertakes ambient monitoring of Nitrogen Dioxide using both passive and active monitoring methods.

#### **2.1.1 Automatic Monitoring Sites**

An automatic monitoring station has been monitoring NO<sub>2</sub> at Hennef Way between May 2009 and April 2012. A map showing this monitoring location is shown in Figure 2.1 and details of the monitoring site are given in Table 2.1. This monitoring station was not operational between April 2012 and December 2012. The QA/QC information and procedures for this automatic site is contained in Appendix A.

It is proposed to relocate this monitoring station to one of the other sites where the national air quality objective is likely to be exceeded to support passive tube data, increasing accuracy of monitoring data and reducing uncertainty. This will also determine whether the hourly mean objective for NO<sub>2</sub> is likely to be exceeded elsewhere.

Figure 2.1 Map of Automatic Monitoring Sites at Hennef Way



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Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road	Does this location represent worst-case exposure?
Hennef Way	Roadside	446,535	241,721	NO <sub>2</sub>	Y	Chemiluminescence	Y (3m)	3m	Yes

### 2.1.2 Non-Automatic Monitoring Sites

In 2011, Cherwell District Council operated a network of 38 diffusion tube sites throughout the district measuring ambient NO<sub>2</sub>. These are in Banbury, Bicester, Kidlington, Ardley and Adderbury. In 2012, an additional 2 monitoring sites were created. Triplicate tubes are located at Hennef Way (Banbury), Kings End / Queens Avenue (Bicester) and Horsefair / North Bar (Banbury). The QA/QC information and procedures for non-automatic sites are contained in Appendix B.

In areas where elevated concentrations were identified in the USA 2009 and detailed assessments have been undertaken, additional monitoring has been added to around the individual worst case monitoring point identified as close to the air quality objective. These are at the following areas:

- 9 additional tubes around Hennef Way AQMA, Banbury since May 2010
- 7 additional tubes around Horsefair / North Bar, Banbury since December 2009
- 6 additional tubes around Queens Avenue / Kings End, Bicester since December 2009

These are a mix of intermediate, roadside and urban background monitoring locations.

Triplicate tubes have been placed at each of the worst case monitoring points in the areas above to determine precision and further reduce uncertainty in the results.

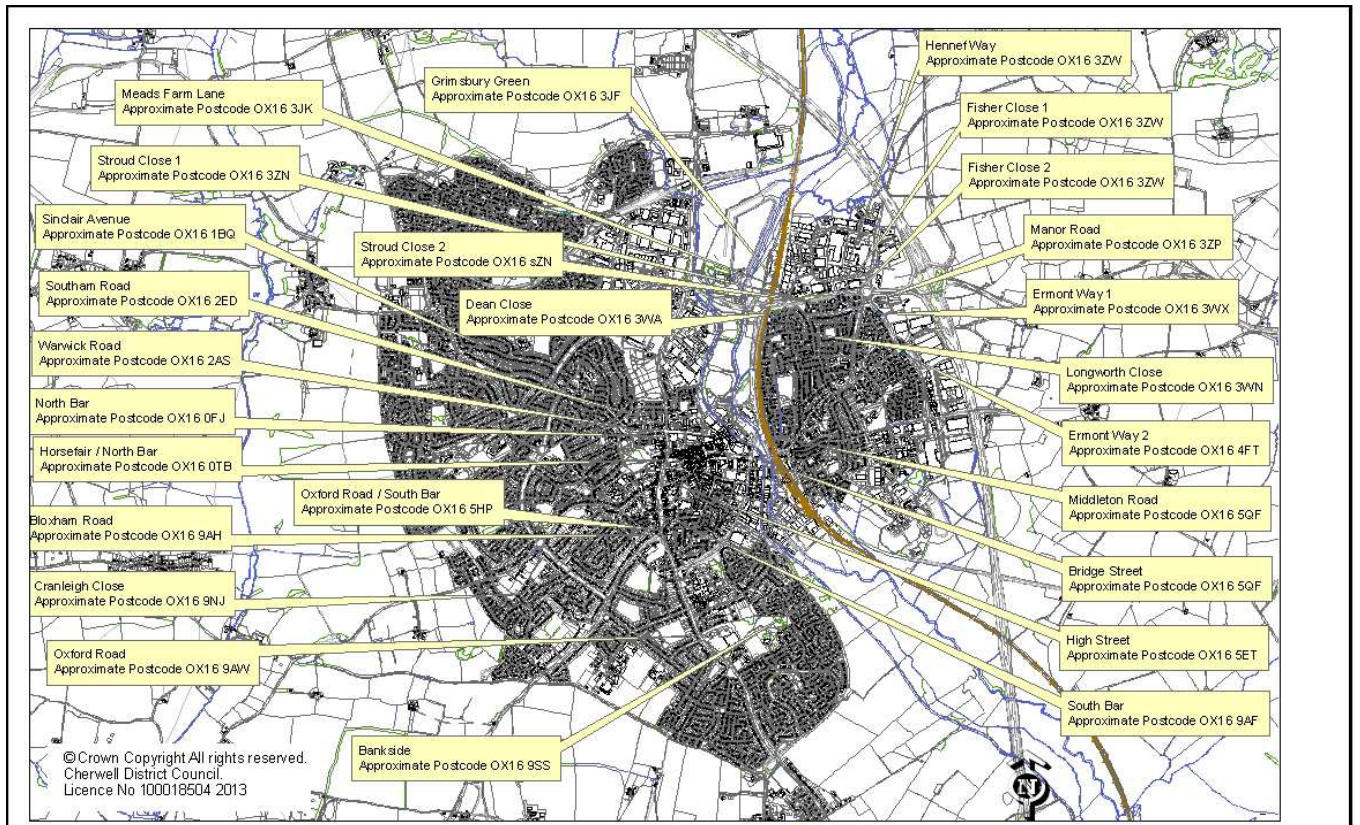
The triplicate tube monitoring location at Hennef Way, Banbury is co-located with the automatic analyser.

In 2012, an air quality assessment received by the Local Planning Authority indicated the air quality objective may be exceeded at several locations on Ermont Way in Banbury. Two additional diffusion tube monitoring sites along this road were created to measure nitrogen dioxide concentrations at these locations.

Figure 2.2a – 2.2 e below are maps of the locations of the non-automatic monitoring sites in 2011 and 2012 (including the additional Ermont Way sites).

Tables 2.2a – 2.2e below show the non-automatic monitoring site details for 2011 and 2012.

Figure 2.2a Map of NO<sub>2</sub> Diffusion Tube Monitoring Sites – Banbury



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Figure 2.2b Map of NO<sub>2</sub> Diffusion Tube Monitoring Sites – Bicester

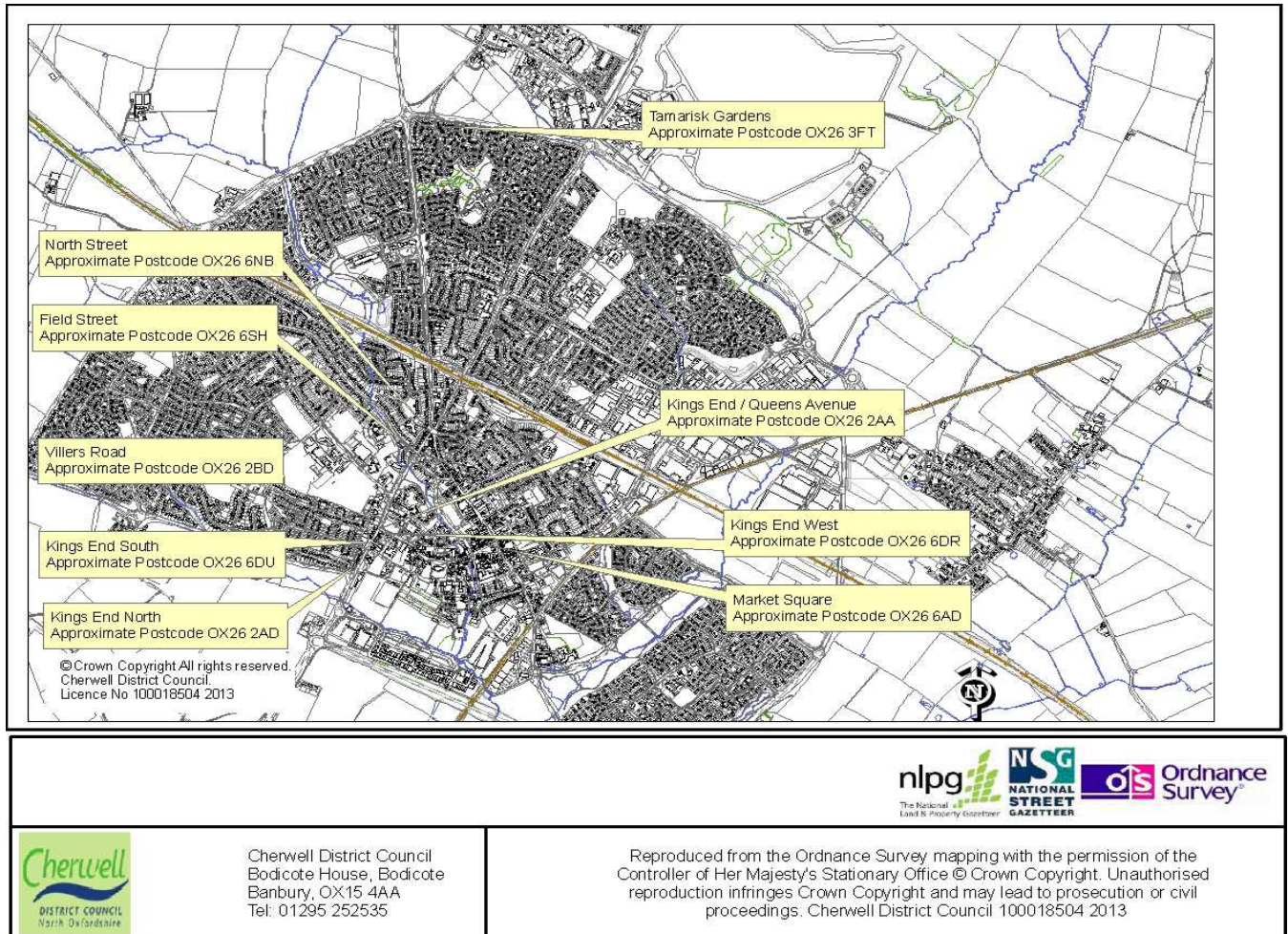


Figure 2.2c Map of NO<sub>2</sub> Diffusion Tube Monitoring Sites – Kidlington

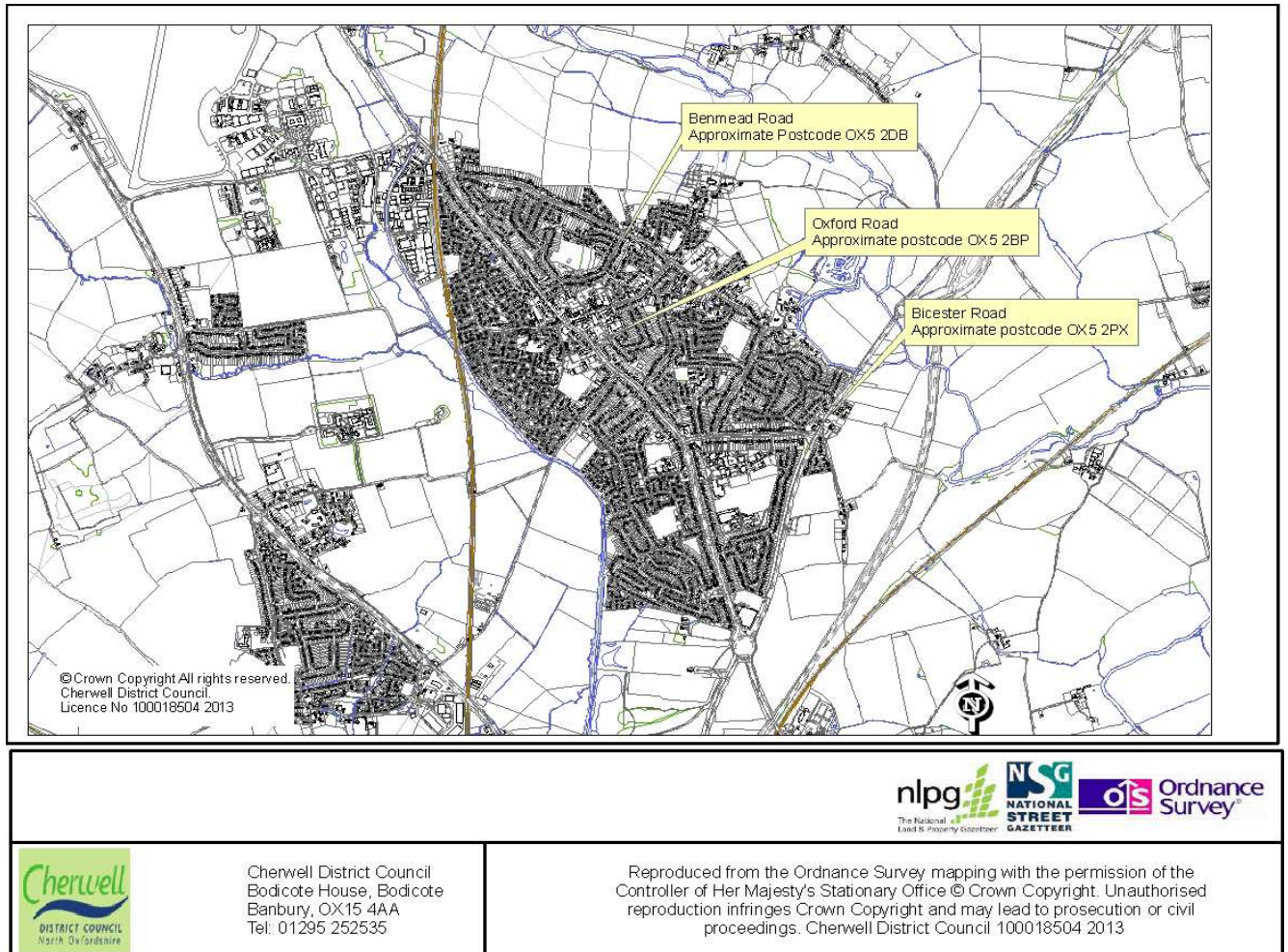




Figure 2.2d Map of NO<sub>2</sub> Diffusion Tube Monitoring Site – Adderbury

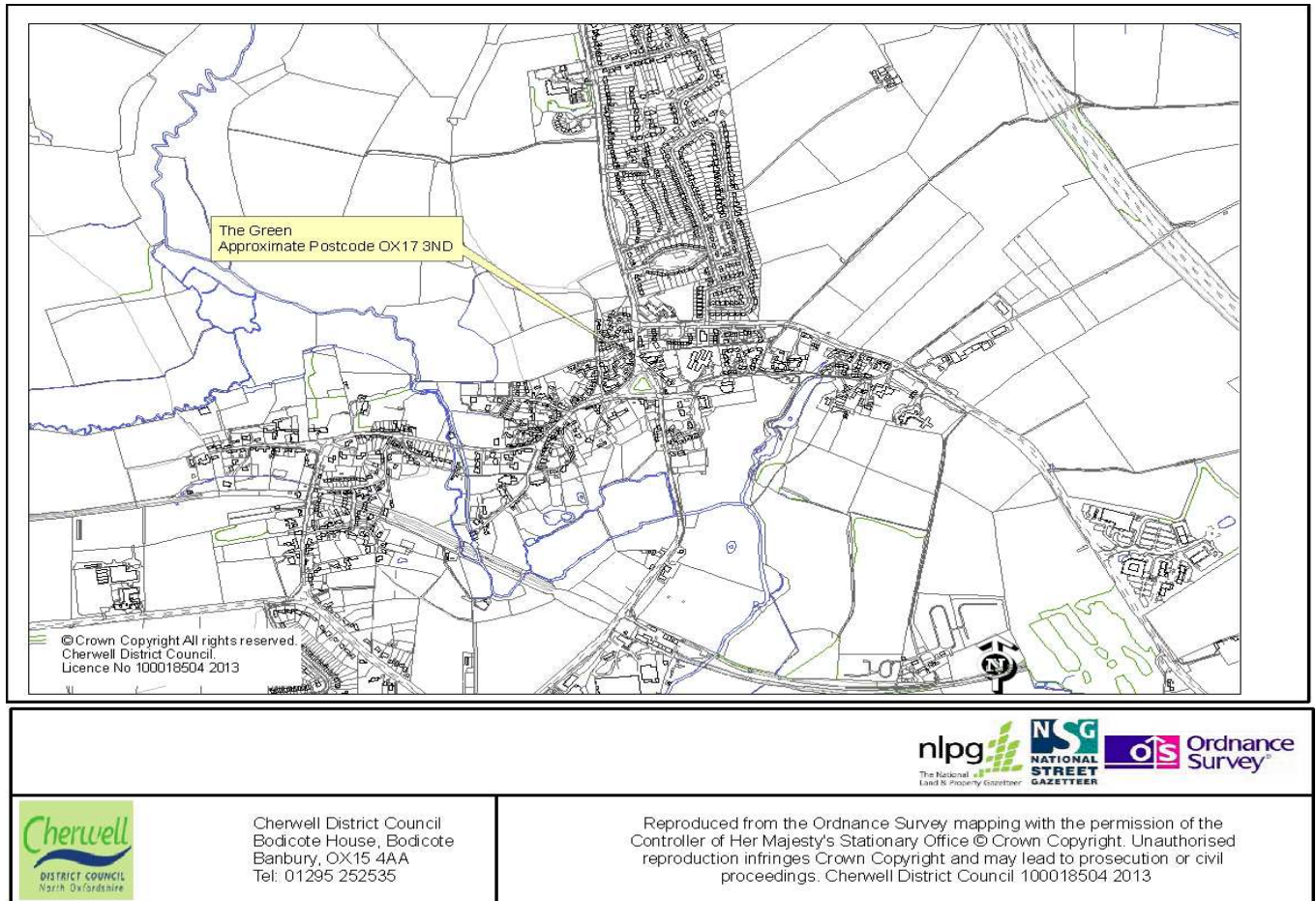


Figure 2.2e Map of NO<sub>2</sub> Diffusion Tube Monitoring Site – Ardley

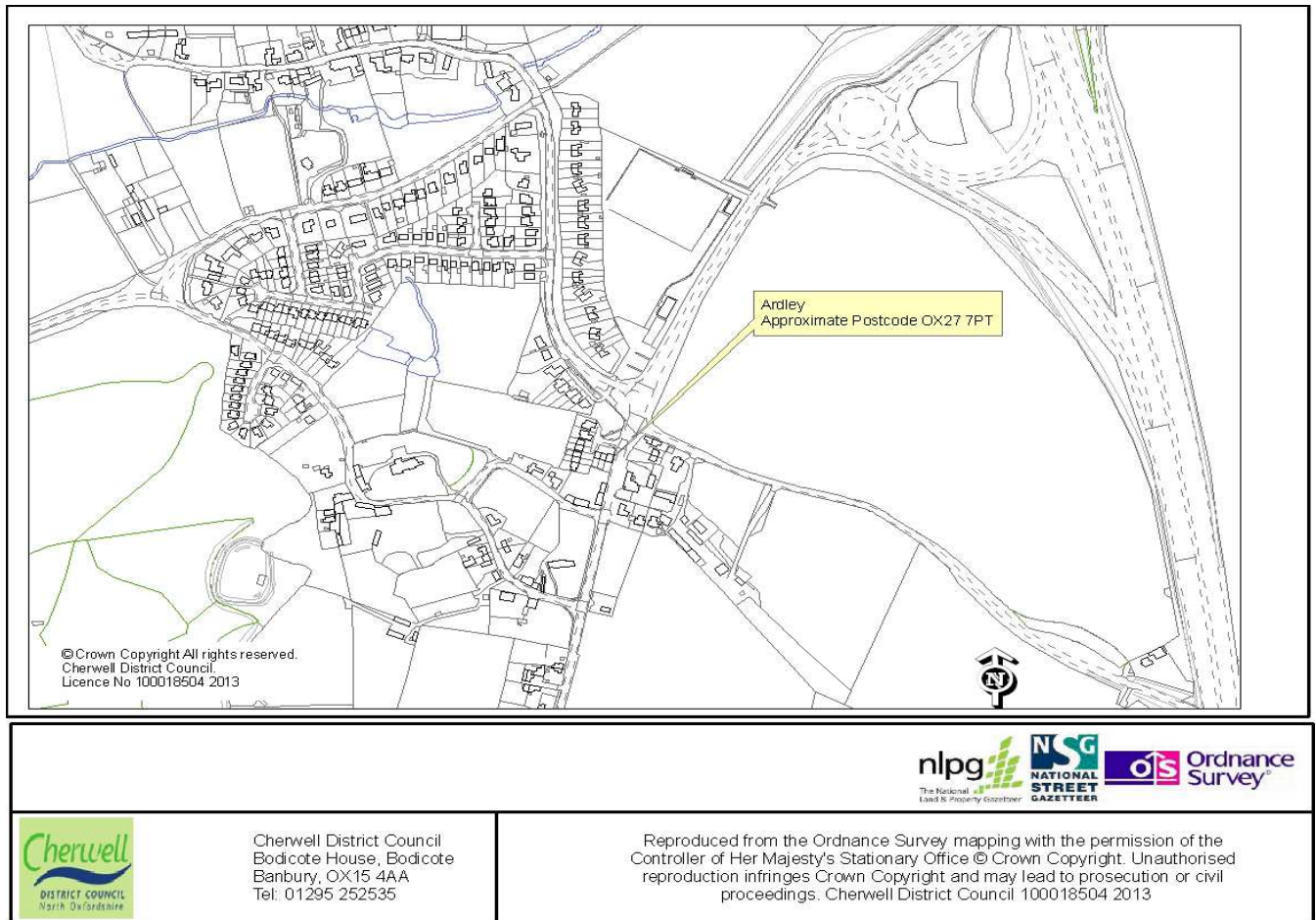


Table 2.2a Details of Banbury NO<sub>2</sub> Diffusion Tube Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Oxford Road	Kerbside	445581	239365	NO <sub>2</sub>	N/A	Y (11 m)	1 m	Y
Middleton Road	Kerbside	446248	240714	NO <sub>2</sub>	N/A	Y (5 m)	1 m	Y
Bridge Street	Kerbside	445961	240595	NO <sub>2</sub>	N/A	Y ( 1 m)	1 m	Y
Bankside	Roadside	446377	239620	NO <sub>2</sub>	N/A	Y (8 m)	1 m	N/A
High Street	Kerbside	445407	240421	NO <sub>2</sub>	N/A	Y (1 m)	1 m	Y
Northbar	Kerbside	445352	240744	NO <sub>2</sub>	N/A	Y (1.5 m)	1 m	Y
Warwick Road	Roadside	445290	240775	NO <sub>2</sub>	N/A	Y (2.5 m)	2 m	Y
Southam Road	Kerbside	445368	240826	NO <sub>2</sub>	N/A	Y (1.0 m)	1 m	Y
South Bar	Roadside	445345	240201	NO <sub>2</sub>	N/A	Y (12 m )	12 m	Y
Oxford Rd/South Bar	Kerbside	445335	240094	NO <sub>2</sub>	N/A	Y (1 m)	1 m	Y
Bloxham Road	Kerbside	445316	240069	NO <sub>2</sub>	N/A	Y (2 m)	1 m	Y
Horsefair (x3)	Roadside	445351	240578	NO <sub>2</sub>	N/A	Y (2 m)	3 m	Y
Sinclair Avenue	Roadside	444274	241289	NO <sub>2</sub>	N/A	Y (9 m)	1 m	N
Cranleigh Close	Urban background	444367	239654	NO <sub>2</sub>	N/A	Y (8 m)	1 m	N
Hennef Way (x3)	Roadside	446535	241721	NO <sub>2</sub>	Yes	Y (2 m)	3 m	Y
Meads Farm lane	Roadside	446213	241741	NO <sub>2</sub>	N/A	N	2 m	Y
Dean Close	Urban background	446165	241598	NO <sub>2</sub>	N/A	N	N/A	Y
Longworth Close	Urban background	446195	241472	NO <sub>2</sub>	N/A	N	N/A	Y
Grimsbury Green	Intermediate	446266	241625	NO <sub>2</sub>	N/A	N	N/A	Y
Stroud Close 1	Intermediate	446334	241676	NO <sub>2</sub>	N/A	N	N	N
Stroud Close 2	Intermediate	446425	241664	NO <sub>2</sub>	N/A	N	N/A	Y
Fisher Close 1	Roadside	446546	241713	NO <sub>2</sub>	N/A	N	N/A	Y
Fisher Close 2	Intermediate	446638	241699	NO <sub>2</sub>	N/A	N	N/A	Y
Manor Road	Intermediate	446700	241654	NO <sub>2</sub>	N/A	N/A	N	N
Ermont Way 1	Roadside	446828	241591	NO <sub>2</sub>	N/A	Y (20 m)	2 m	Y
Ermont Way 2	Roadside	446997	241314	NO <sub>2</sub>	N/A	Y (12 m)	2.5 m	Y

Table 2.2b Details of Bicester NO<sub>2</sub> Diffusion Tube Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Villiers Road	Urban background	457619	222535	NO <sub>2</sub>	N/A	N	N/A	Y
Kings End West	Kerbside	458071	222450	NO <sub>2</sub>	N/A	Y (0.5 m)	4 m	Y
Kings End South	Roadside	458007	222404	NO <sub>2</sub>	N/A	Y (1.5 m)	1.5 m	Y
Kings End North	Roadside	457944	222305	NO <sub>2</sub>	N/A	Y (3.0 m)	8 m	Y
Field Street	Kerbside	458214	222836	NO <sub>2</sub>	N/A	Y (1 m)	1.5 m	Y
North Street	Kerbside	458275	222935	NO <sub>2</sub>	N/A	Y (1 m)	1.5 m	Y
Queens Avenue (x3)	Kerbside	458028	222471	NO <sub>2</sub>	N/A	Y (1 m)	1.5 m	Y
Market Square	Kerbside	458528	222392	NO <sub>2</sub>	N/A	N	1 m	N
Tamarisk Gardens	Urban background	458332	224433	NO <sub>2</sub>	N/A	Y (5 m)	0.5 m	N

Table 2.2c Details of Kidlington NO<sub>2</sub> Diffusion Tube Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Bicester Road	Roadside	450267	213511	NO <sub>2</sub>	N/A	Y (1 m)	1.5 m	Y
Oxford Road	Roadside	449122	213947	NO <sub>2</sub>	N/A	Y (8 m)	3 m	Y
Benmead Road	Urban background	449172	214325	NO <sub>2</sub>	N/A	Y (7 m)	1.5 m	N

Table 2.2d Details of Adderbury NO<sub>2</sub> Diffusion Tube Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
The Green	Kerbside	447403	235723	NO <sub>2</sub>	N/A	Y (1 m)	1 m	Y

Table 2.2e Details of Ardley NO<sub>2</sub> Diffusion Tube Sites

Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
Ardley (B430)	Roadside	454301	227498	NO <sub>2</sub>	N/A	Y (1.5 m)	1.5 m	Y

## 2.2 Comparison of Monitoring Results with AQ Objectives

The following section compares NO<sub>2</sub> diffusion tube and automatic analyser monitoring results with relevant air quality objectives. Only NO<sub>2</sub> data are presented as no other parameters have been monitored in Cherwell District Council.

### 2.2.1 Nitrogen Dioxide

Automatic NO<sub>2</sub> monitoring has been undertaken for assessment against the annual mean and hourly mean NO<sub>2</sub> objectives. Diffusion tube monitoring has been undertaken elsewhere for assessment against the annual mean objective.

#### Automatic Monitoring Data

The annual mean NO<sub>2</sub> concentration measured at the Hennef Way, Banbury automatic monitor during 2011 is presented in Table 2.3a alongside the previous two years results. The annual mean concentration was 78 µg/m<sup>3</sup> which is significantly greater than the 40 µg/m<sup>3</sup> objective. The monitoring location is at a roadside site and is approximately 1 meter closer to the road than the facade of the nearest residential property. The monitoring location is at the top of a 3 metres high close boarded acoustic fence. Hagler *et al.* (2011) indicates that vertical barriers increase the concentrations at the top of the barriers and increase vertical lofting pollutants. The fencing may result in artificially elevated pollutant concentrations at the monitoring point i.e. top of fencing. Vertical lofting of these elevated concentrations is also likely to occur before reaching the housing facades. As it is impractical to monitor at the first floor façade of the property, monitoring the worst case scenario is appropriate with distance corrections using the “predicting nitrogen dioxide concentrations at different distances from roads” calculation in LAQM.TG(09).

Using the NO<sub>2</sub> distance from road calculator an annual mean NO<sub>2</sub> concentration of 71.9 µg.m-3 is predicted at the facade of this nearest residential property.

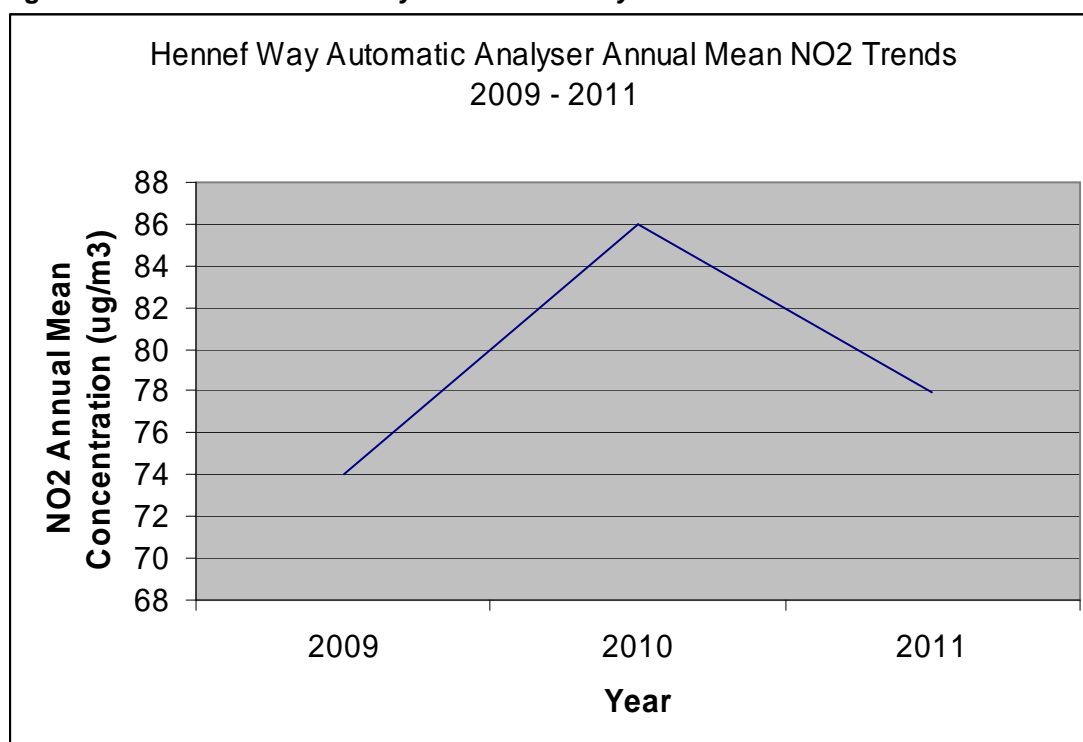
The results in the last 3 years of monitoring are shown in table 2.3a below.

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

Site ID	Site Type	Within AQMA?	Valid Data Capture 2011 % <sup>b</sup>	NO <sub>2</sub> Annual Mean Concentration µg/m <sup>3</sup>		
				2009	2010	2011
Hennef Way, Banbury	Roadside	Y	93.8	74	86	78

A chart showing the historic trends in automatic NO<sub>2</sub> monitoring data for Hennef Way, Banbury between 2009 and 2011 is shown in Figure 2.3 below.

**Figure 2.3 Trends in Hennef Way Automatic Analyser Annual Mean Concentrations**



The trend graph shows a higher annual mean concentration in 2010, above the 2009 and 2011 annual means. This was generally seen across the district and nationally. Seasonal variations affect nitrogen dioxide concentrations. The elevated concentrations during 2010 have been linked to the weather conditions during this year.

**Table 2.3b Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour mean Objective**

Site ID	Valid Data Capture for period of monitoring %	Valid Data Capture 2011 %	Number of Exceedences of Hourly Mean (200 µg/m <sup>3</sup> )		
			2009 (8 months)	2010	2011
Hennef Way, Banbury	93.8	93.8	48	145	151

Measured 1-hour mean concentrations in excess of the 200 µg.m<sup>-3</sup> short-term objective were recorded 151 times at the Hennef Way monitoring site during 2011. This is in excess of the 18 permitted exceedences of 200 µg.m<sup>-3</sup> specified in the 1-hour mean NO<sub>2</sub> objective.

A further assessment of NO<sub>2</sub> at Hennef way was undertaken during 2011 and 2012. This report is being used to assist in the creation of an action plan aiming to achieve the air quality objective at this location.

Diffusion tube data taken from the façade of one of the house receptors within the AQMA (Fisher Close 1) facing away from Hennef Way indicate concentrations below the annual mean objective. The continuous analyser inlet is at the top of a fence line which is approximately the same height as first floor windows and approximately 2 metres closer to the Hennef Way carriageway. This site was chosen to monitor the worst case location.

Defra have recommended that additional monitoring is undertaken at the receptor to reduce the uncertainty of what levels of exposure are present at the façade of the building.



## Diffusion Tube Monitoring Data

Measured NO<sub>2</sub> concentrations across the diffusion tube network in 2012 and 2011 are presented in Table 2.4a. Measured concentrations in excess of the NAQS objective of 40 µg.m<sup>-3</sup> are highlighted in bold.

Bias adjustment factors of 0.79 for 2012, and 0.83 for 2011 which are taken from the national diffusion tube bias adjustment factor database. This has been applied to all of the reported diffusion tube results for each specific year, as specified on the summary spread sheet of co-location studies version 03/13 (National Physical Laboratory, 2013).

Cherwell District Council operated a NO<sub>2</sub> diffusion tube co-location study at Hennef Way, Banbury until March 2012. This site is at a roadside location where measured annual mean NO<sub>2</sub> concentrations have been significantly greater than the annual mean objective in recent years. The locally derived adjustment factor for 2011 was 0.75. Due to the operational period of the automatic monitoring station during 2012, a local derived adjustment factor is not available.

The bias adjustment factor derived from the national data base (0.83 for 2011 and 0.79 for 2012) was chosen for all tube locations (except for the co-located Hennef Way location in 2011) in preference to the locally derived factor (0.75) as there are a large number of diffusion tube sites across the Cherwell DC network that are exposed over a range of settings which all differ significantly from the co-location site.

No data capture rates were below 75% for 2011. The two additional Ermont Way, Banbury monitoring sites were operational from September to December in 2012, giving a data capture period of 33%. All other 2012 monitoring locations had data capture rates above 75%. Period mean adjustments have been made to the two Ermont Way sites monitoring between September and December 2012 to give annual mean concentrations. These calculations are shown in Appendix C.

Trends in annual mean NO<sub>2</sub> concentrations where three years of consecutive data is available are graphically shown in Figures 2.4a – 2.4d. Although there is insufficient

data available with which to consider a long-term trend, examination of these chart indicates that in general, annual mean NO<sub>2</sub> concentrations have increased since monitoring started.

Table 2.4a Results of NO<sub>2</sub> Diffusion Tubes in 2011 and 2012 - Banbury

Site ID	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture (%)		Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (µg/m <sup>3</sup> )	
				2011	2012			2011 (BAF = 0.83)	2012 (BAF = 0.79)
Hennef Way (x3)	Roadside	Y	Triplicate and colocated	97	92	N	N	86.4 [ 78* ]	85.3
Oxford Road	Kerbside	N	n/a	100	100	N	N	40.4	40.9
Middleton Road	Kerbside	N	n/a	92	100	N	N	36.3	30.3
Bridge Street	Kerbside	N	n/a	100	100	N	N	35.4	34
Bankside	Roadside	N	n/a	100	100	N	N	20.2	20.2
High Street	Kerbside	N	n/a	100	100	N	N	42.0	39.6**
North Bar	Kerbside	N	n/a	100	100	N	N	43.8	40.3**
Warwick Road	Roadside	N	n/a	92	100	N	N	29.6	26.4**
Southam Road	Kerbside	N	n/a	92	100	N	N	36.0	37.4**
South Bar	Roadside	N	n/a	100	100	N	N	24.1	23.4**
Oxford Rd/South Bar	Kerbside	N	n/a	100	100	N	N	39.7	38.3**

Site ID	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture (%)		Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration ( $\mu\text{g}/\text{m}^3$ )	
				2011	2012			2011 (BAF = 0.83)	2012 (BAF = 0.79)
Bloxham Road	Kerbside	N	n/a	100	100	N	N	46.2	44.2**
Horsefair/North Bar (x3)	Roadside	N	Triplicate	97	100	N	N	47.3	45.4**
Sinclair Avenue	Roadside	N	n/a	100	100	N	N	17.2	16.8
Cranleigh Close	Urban background	N	n/a	92	100	N	N	13.9	12.9
Meads Farm lane	Roadside	N	n/a	100	100	N	N	25.5	22.5
Dean Close	Roadside	N	n/a	100	100	N	N	24.5	21.2
Longworth Close	Urban background	N	n/a	100	100	N	N	20.4	21.3
Grimsbury Green	Urban background	N	n/a	100	100	N	N	26.9	26.4
Stroud Close 1	Intermediate	Y	n/a	100	100	N	N	27.1	27.3
Stroud Close 2	Intermediate	N	n/a	100	100	N	N	23.8	25.0
Fisher Close 1	Intermediate	Y	n/a	100	100	N	N	26.8	28.2
Fisher Close 2	Roadside	N	n/a	92	100	N	N	27.4	27.3
Manor Farm	Intermediate	N	n/a	75	92	N	N	27.2	25.7
Ermont Way 1	Roadside	N	n/a	0	33	Y	N	n/a	31.0
Ermont Way 2	Roadside	N	n/a	0	33	Y	N	n/a	35.7

\* Automatic analyser annual mean concentration

\*\* Area covered within Detailed Assessment for Banbury 2012

Table 2.4b Results of NO<sub>2</sub> Diffusion Tubes in 2011 and 2012 - Bicester

Site ID	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (µg/m <sup>3</sup> )	
							2011 (BAF = 0.83)	2012 (BAF = 0.79)
Villiers Road	Urban background	N	n/a	92	N	N	19.0	20.5
Kings End West	Kerbside	N	n/a	100	N	N	30.1	31.1*
<b>Kings End South</b>	<b>Roadside</b>	<b>N</b>	<b>n/a</b>	<b>100</b>	<b>N</b>	<b>N</b>	<b>49.5</b>	<b>49.0*</b>
<b>Kings End North</b>	<b>Roadside</b>	<b>N</b>	<b>n/a</b>	<b>92</b>	<b>N</b>	<b>N</b>	<b>43.9</b>	<b>46.0*</b>
Field Street	Kerbside	N	n/a	100	N	N	42.9	41.6*
North Street	Kerbside	N	n/a	100	N	N	46.1	45.6*
Queens Avenue (x3)	Kerbside	N	Triplicate	97	N	N	42.9	45.0*
Market Square	Kerbside	N	n/a	100	N	N	35.7	45.6
Tamarisk Gardens	Urban background	N	n/a	100	N	N	22.3	17.6

\* Area covered within Detailed Assessment for Queens Avenue, Bicester 2012

Table 2.4c Results of NO<sub>2</sub> Diffusion Tubes in 2011 and 2012 – Kidlington

Site ID	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011	Data with less than 9 months has been	Confirm if data has been distance	Annual mean concentration (µg/m <sup>3</sup> )
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				(%)	annualised (Y/N)	corrected (Y/N)	2011 (BAF = 0.83)	2012 (BAF = 0.79)
<b>Bicester Road</b>	<b>Roadside</b>	<b>N</b>	<b>n/a</b>	<b>100</b>	<b>N</b>	<b>N</b>	<b>45.7</b>	<b>44.9*</b>
Oxford Road	Roadside	N	n/a	100	N	N	34.1	32.4
Benmead Road	Urban background	N	n/a	100	N	N	17.5	17.2

\* Area covered within Detailed Assessment for Bicester Road, Kidlington 2012

**Table 2.4d Results of NO<sub>2</sub> Diffusion Tubes in 2011 and 2012 – Adderbury**

Site ID	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (µg/m <sup>3</sup> )	
							2011 (BAF = 0.83)	2012 (BAF = 0.79)
The Green	Kerbside	N	n/a	100	N	N	34.8	34.1

**Table 2.4e Results of NO<sub>2</sub> Diffusion Tubes in 2011 and 2012 – Ardley**

Site ID	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (µg/m <sup>3</sup> )	
							2011 (BAF = 0.83)	2012 (BAF = 0.79)
Ardley (B430)	Roadside	N	n/a	83	N	N	31.2	30.9

Table 2.5a Results of Nitrogen Dioxide Diffusion Tubes (2008 to 2012) - Banbury

Site ID	Site Type	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
		2008	2009	2010	2011	2012
<b>Hennef Way</b>	<b>Roadside</b>	<b>99.6<sup>a</sup></b>	<b>90.6</b>	<b>94.1</b>	<b>86.4</b>	<b>85.3</b>
<b>Oxford Road</b>	<b>Kerbside</b>	<b>43.2</b>	39.6	<b>46.1</b>	<b>40.4</b>	<b>40.9</b>
Middleton Road	Kerbside	39.4	35.4	<b>41.7</b>	36.3	30.3
Bridge Street	Kerbside	37.5	31.8	38.7	35.4	34
Bankside	Roadside	22.2	21.6	26.8	20.2	20.2
<b>High Street</b>	<b>Kerbside</b>	-	-	<b>43.5</b>	<b>42.0</b>	39.6
<b>North Bar</b>	<b>Kerbside</b>	-	-	<b>42.5</b>	<b>43.8</b>	<b>40.3</b>
Warwick Road	Roadside	-	-	31.5	29.6	26.4
Southam Road	Kerbside	-	-	39.5	36.0	37.4
South Bar	Roadside	-	-	32.1	24.1	23.4
Oxford Rd/South Bar	Kerbside	-	-	<b>44.3</b>	39.7	38.3
<b>Bloxham Road</b>	<b>Kerbside</b>	-	-	<b>45.4</b>	<b>46.2</b>	<b>44.2</b>
<b>Horsefair/North Bar</b>	<b>Roadside</b>	-	-	<b>48.4</b>	<b>47.3</b>	<b>45.4</b>
Sinclair Avenue	Roadside	19.9	18	21.9	17.2	16.8
Cranleigh Close	Urban background	15.4	14.2	17.1	13.9	12.9
Meads Farm lane	Roadside	-	-	25.1	25.5	22.5
Dean Close	Roadside	-	-	24.2	24.5	21.2
Longworth Close	Urban background	-	-	21.9	20.4	21.3
Grimsbury Green	Urban background	-	-	27.3	26.9	26.4
Stroud Close 1	Intermediate	-	-	29.8	27.1	27.3
Stroud Close 2	Intermediate	-	-	28.7	23.8	25.0
Fisher Close 1	Intermediate	-	-	29.8	26.8	28.2

Site ID	Site Type	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
		2008	2009	2010	2011	2012
Fisher Close 2	Roadside	-	-	29.8	27.4	27.3
Manor Farm	Intermediate	-	-	26.8	27.2	25.7
Ermont Way 1	Roadside	-	-	-	-	31.0
Ermont Way 2	Roadside	-	-	-	-	35.7

a – tube relocated in 2009 to better represent appropriate receptor worst case scenario

Table 2.5b Results of Nitrogen Dioxide Diffusion Tubes (2008 to 2012) - Bicester

Site ID	Site Type	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
		2008	2009	2010	2011	2012
Villiers Road	Urban background	-	-	26.8	19.0	20.5
Kings End West	Kerbside	-	-	36.5	30.1	31.1
<b>Kings End South</b>	<b>Roadside</b>	-	-	<b>51.3</b>	<b>49.5</b>	<b>49.0</b>
<b>Kings End North</b>	<b>Roadside</b>	-	-	<b>46.2</b>	<b>43.9</b>	<b>46.0</b>
<b>Field Street</b>	<b>Kerbside</b>	-	-	<b>46.2</b>	<b>42.9</b>	<b>41.6</b>
<b>North Street</b>	<b>Kerbside</b>	-	-	<b>44.1</b>	<b>46.1</b>	<b>45.6</b>
<b>Queens Avenue</b>	<b>Kerbside</b>	<b>43.6<sup>a</sup></b>	<b>44.1</b>	<b>46</b>	<b>42.9</b>	<b>45.0</b>
Market Square	Kerbside	35.4	31.7	37.2	35.7	<b>45.6</b>
Tamarisk Gardens	Urban background	22.3	19.7	22.3	22.3	17.6

a – tube relocated in 2009 to better represent appropriate receptor worst case scenario

Table 2.5c Results of Nitrogen Dioxide Diffusion Tubes (2008 to 2012) – Kidlington, Adderbury and Ardley Monitoring Sites

Site ID	Site Type	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
		2008	2009	2010	2011	2012
<b>Bicester Road</b>	<b>Roadside</b>	<b>42.2</b>	<b>45.0</b>	<b>47.5</b>	<b>45.7</b>	<b>44.9</b>



Site ID	Site Type	Annual mean concentration (adjusted for bias) $\mu\text{g}/\text{m}^3$				
		2008	2009	2010	2011	2012
Oxford Road	Roadside	37.3	33.8	<b>42.1</b>	34.1	32.4
Benmead Road	Urban background	21.4	19.3	20.3	17.5	17.2
The Green	Kerbside	34.3	32.2	38.4	34.8	34.1
Ardley (B430)	Roadside	-	31.3	35.8	31.2	30.9

Figure 2.4a – 2.4c show the potential trends in air quality where there is at least four years of monitoring location data. These results have not been corrected for distance to the appropriate receptor and are an indication of urban background concentrations and roadside NO<sub>2</sub> concentrations in these locations from 2008 to 2012.

The following monitoring sites where elevated concentrations were identified are included within the three detailed assessment reports submitted in 2013:

Banbury	High Street
	North Bar
	Bloxham Road
	Horsefair / North Bar
Bicester	Kings End South
	Kings End North
	Field Street
	North Street
	Queens Avenue / Kings End
Kidlington	Bicester Road

These elevated concentrations support the conclusions of the detailed assessments for inclusion within the boundary of an air quality management area.

The Oxford Road, Banbury monitoring site recorded elevated concentrations. Trend data in Figure 2.4a shows this is consistent with historical data. This monitoring station is a kerbside site and the distance to the nearest façade is 11 metres. The result has been distance corrected and the resulting concentration at this façade is 27.4 and 27.6 µg/m<sup>3</sup> in 2012 and 2011 respectively. This calculation has been undertaken as per Box 2.3 of TG(09) when taking locally measured background concentrations at Cranleigh Close, Banbury.

The Market Square, Bicester monitoring site recorded elevated concentrations in 2012. Trend data in Figure 2.4b shows this is not consistent with historical data. The closest appropriate receptor to this monitoring location is 12 metres away.

Flats are present around the market square where exposure is closer to the carriageway than this. Additional monitoring is recommended to better represent the NO<sub>2</sub> concentrations where there is relevant exposure.

Figure 2.4a Trends in Annual Mean Nitrogen Dioxide Concentrations for Banbury Monitoring Sites

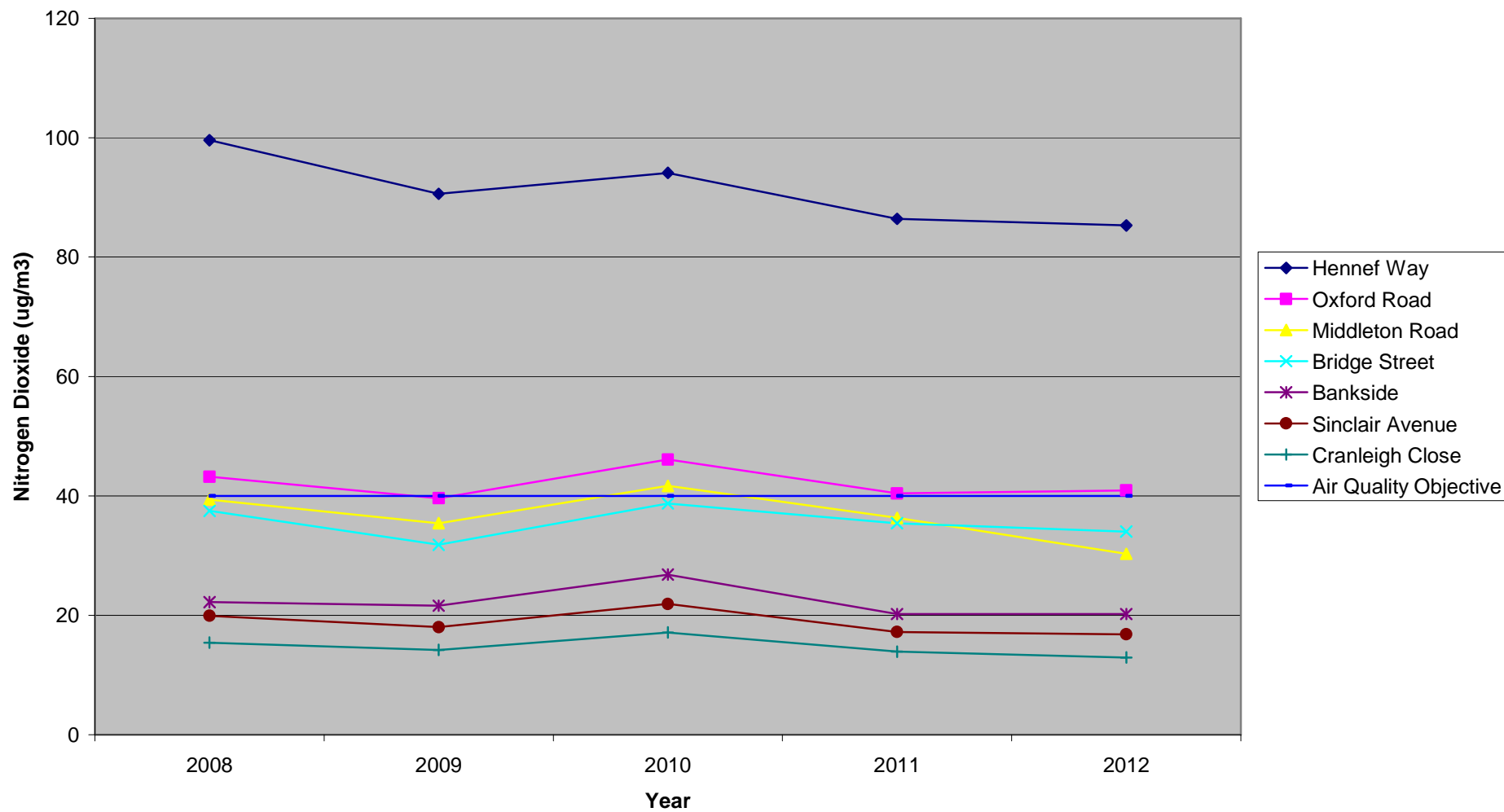


Figure 2.4b Trends in Annual Mean Nitrogen Dioxide Concentrations for Bicester Monitoring Sites

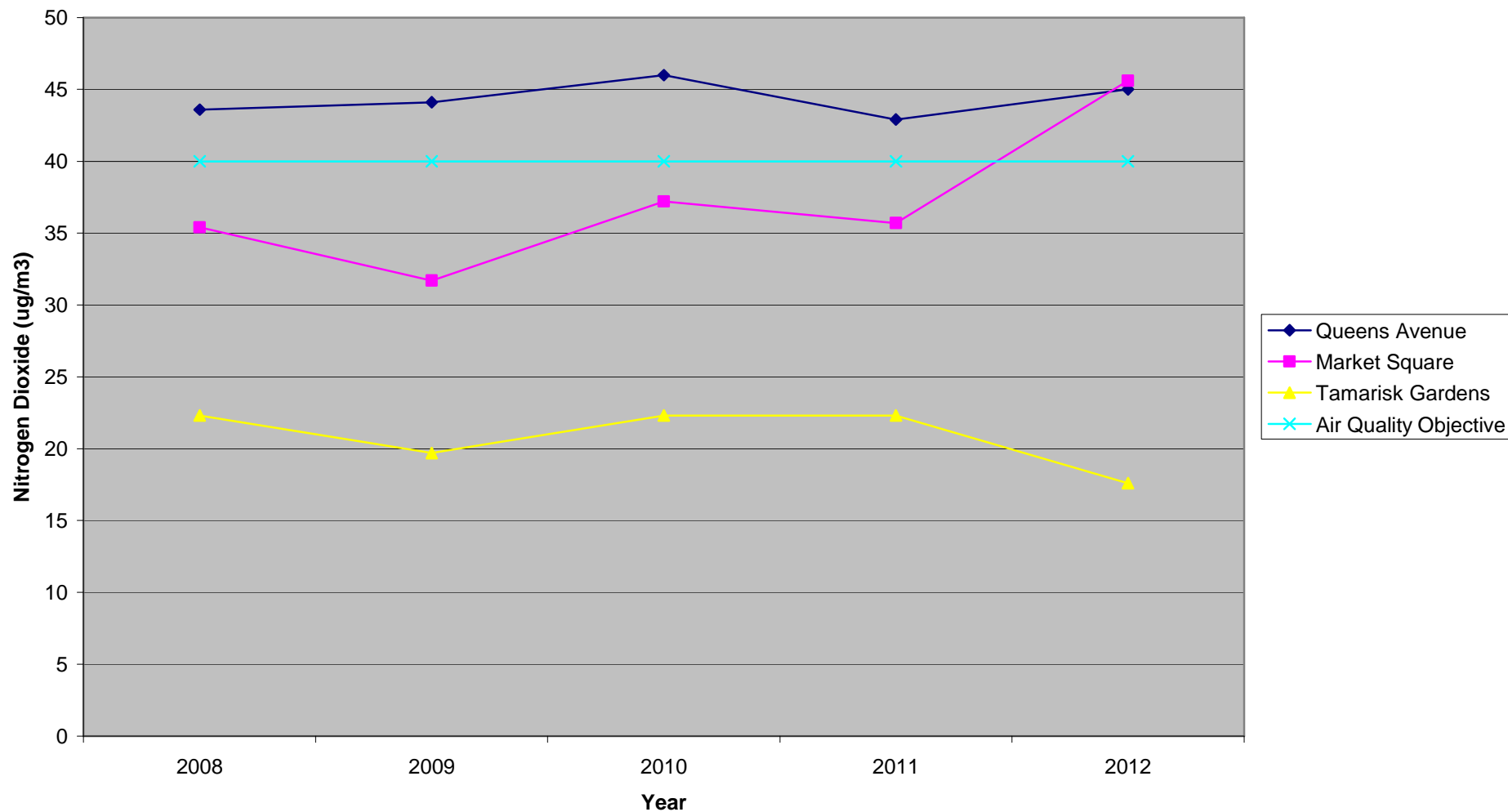
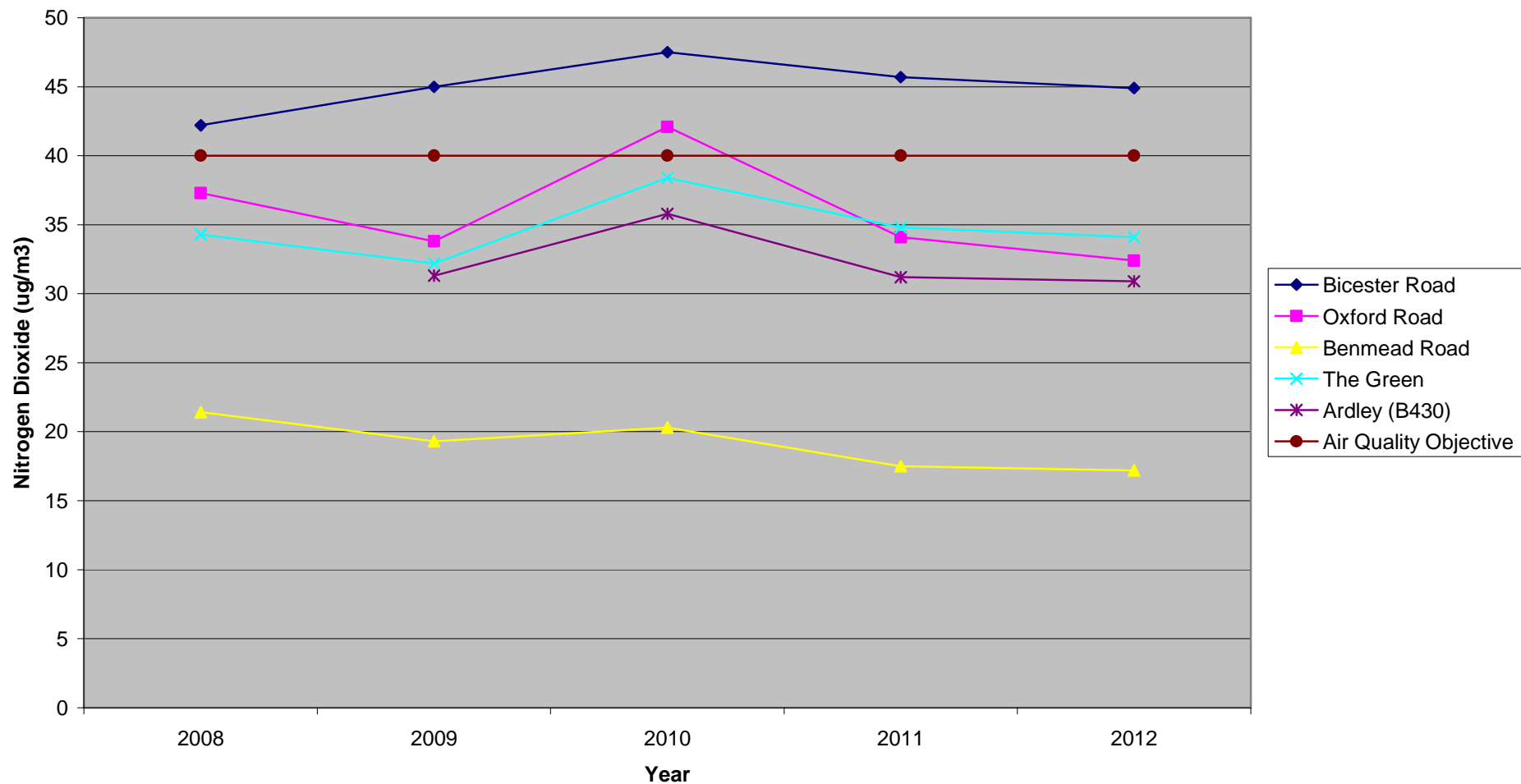


Figure 2.4c Trends in Annual Mean Nitrogen Dioxide Concentrations for Kidlington, Adderbury and Ardley Monitoring Sites



### **2.2.2 PM<sub>10</sub>**

Cherwell District Council does not currently undertake monitoring for PM<sub>10</sub>.

### **2.2.3 Sulphur Dioxide**

Cherwell District Council does not currently undertake monitoring for Sulphur Dioxide.

### **2.2.4 Benzene**

Cherwell District Council does not currently undertake monitoring for Benzene.

### **2.2.5 Other pollutants monitored**

Cherwell District Council does not currently undertake routine monitoring for any other pollutants.

### **2.2.6 Summary of Compliance with AQS Objectives**

Cherwell District Council has examined the results from monitoring in the district. Concentrations within the existing AQMA and those areas which have been focussed on in the three recent detailed assessments indicate the objectives are being exceeded and support the conclusions of earlier reports.

Concentrations outside of the areas above and at locations where the objectives would apply are below the objectives. There is no need to proceed to a Detailed Assessment for any other area.

Market Square, Bicester identified kerbside concentrations in excess of the air quality objective. Monitoring closer to appropriate receptors is recommended in this area.

The 2011 and 2012 data supports the findings of the recent detailed assessments. Concentrations of nitrogen dioxide are likely to exceed the annual mean air quality objective at the following locations:

- Bicester Road, Kidlington
- Queens Avenue / Kings End, Bicester
- Horsefair / North Bar, Banbury

It is proposed that AQMA's are declared which as a minimum include the monitoring locations above.

Concentrations at the existing AQMA in Hennef Way, Banbury are shown to be

above the annual mean and hourly mean air quality objectives for nitrogen dioxide. This supports leaving the AQMA at Hennef Way, Banbury in place.

## 3 Road Traffic Sources

### 3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

A local councillor had expressed concern that traffic on the western branch of Kings End, Bicester, beyond our monitoring locations for the detailed assessment, may be a narrow congested with appropriate receptors. Residential properties are present close to the kerb on this road and would be narrow streets as defined by the screening criteria in TG(09).

Oxfordshire County Council data records the daily traffic flow (AADT) was 4700 in 2011 and 5300 in 2012 at the closest monitoring location "Kings End, West of Coker Close, Bicester" which would be indicative of traffic on the Causeway. Traffic was observed queuing at the western end of this road (Causeway) at peak times. The entire stretch of road was not noted to be congested throughout "much of the day" as detailed in TG(09) and it is not recommended to proceed to a detailed assessment of this area. To confirm the above findings, a diffusion tube monitoring location is proposed to be sited in this area for the period of one year.

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

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

Cherwell District Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

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

No additional roads have been identified where heavy duty vehicles are more than 20% of the proportion of traffic and there is relevant exposure within 10 metres of the carriageway.

Cherwell District Council confirms that there are no new/newly identified roads with



high flows of buses/HGVs.

### **3.4 Junctions**

Cherwell District Council confirms that there are no new/newly identified busy junctions/busy roads.

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

Cherwell District Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

### **3.6 Roads with Significantly Changed Traffic Flows**

No roads have been identified with greater than 10000 AADT where a greater than 25% increase in traffic has been experienced.

Cherwell District Council has not identified roads with significantly changed traffic flows.

### **3.7 Bus and Coach Stations**

No bus or coach station has been identified with more than 2500 movements per day.

Cherwell District Council confirms that there are no relevant bus stations in the Local Authority area.

## 4 Other Transport Sources

### 4.1 Airports

The London Oxford Airport has a total equivalent passenger throughput of less than 10 million passengers per annum and the existing background NO<sub>x</sub> concentration is below 25 µg/m<sup>3</sup> according to the “2010-based background maps” available online through the LAQM helpdesk.

Cherwell District Council confirms that there are no airports in the Local Authority area which require a detailed assessment to be undertaken.

### 4.2 Railways (Diesel and Steam Trains)

#### 4.2.1 Stationary Trains

There are railway sidings in both Bicester and Banbury where locomotives stop. These trains are not frequent visitors to either site and do not idle at these sites for 15 minutes at a time where there is relevant exposure within 15 metres.

Cherwell District Council confirms that there are no locations where diesel or steam trains are regularly stationary for periods of 15 minutes or more, with potential for relevant exposure within 15m.

#### 4.2.2 Moving Trains

Cherwell District Council confirms that there are no locations with a large number of movements of diesel locomotives, and potential long-term relevant exposure within 30m.

### 4.3 Ports (Shipping)

There are no ports or local sources of shipping within the local authority area. There is therefore no need to proceed to a detailed assessment for SO<sub>2</sub>.

Cherwell District Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

## 5 Industrial Sources

### 5.1 Industrial Installations

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

Table 5.1 lists new Part B installations permitted since the 2009 Updating and Screening Assessment. No new Part A(1) or A(2) installations have been permitted within the district, which have not been included in previous review and assessment reports.

**Table 5.1 New Part B Installations**

Type	Operator	Site	Ref No.	Issue Date
Dry Cleaning	Andrew's of Oxford Ltd, Unit 1, Kidlington Centre, High Street, Kidlington, OX5 2DL	Andrew's of Oxford Ltd, Unit 1, Kidlington Centre, High Street, Kidlington, OX5 2DL	CDC P 01/10	22/03/2009
Dry Cleaning	Johnson Cleaners UK Ltd 47c Castle Street Banbury OX16 5NU	Johnson Cleaners UK Ltd 47c Castle Street Banbury OX16 5NU	CDC P 02/10	22/03/2009
Quarry	Smith and Sons (Bletchington) Ltd Enslow Kidlington Oxon OX5 3AY	Smith and Sons (Bletchington) Ltd Dewars Farm Quarry Ardley Road Middleton Stoney Bicester Oxon OX6 0PH	CDC P 03/10	01/12/2010

Cherwell District Council has assessed new/proposed industrial installations, and concluded that it will not be necessary to proceed to a Detailed Assessment.

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

Cherwell District Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

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

Cherwell District Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

**5.2 Major Fuel (Petrol) Storage Depots**

There are no major fuel (petrol) storage depots within the Local Authority area.

**5.3 Petrol Stations**

Cherwell District Council confirms that there are no petrol stations meeting the specified criteria.

**5.4 Poultry Farms**

Cherwell District Council confirms that there are no poultry farms meeting the specified criteria.

## **6 Commercial and Domestic Sources**

### **6.1 Biomass Combustion – Individual Installations**

Cherwell District Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

### **6.2 Biomass Combustion – Combined Impacts**

Cherwell District Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

### **6.3 Domestic Solid-Fuel Burning**

Cherwell District Council confirms that there are no areas of significant domestic fuel use in the Local Authority area.

## 7 Fugitive or Uncontrolled Sources

Cherwell District Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area which would require progressing to detailed assessment.

## **8 Conclusions and Proposed Actions**

### **8.1 Conclusions from New Monitoring Data**

Within the existing AQMA, monitoring during 2011 and 2012 confirms that the annual and hourly mean objectives for nitrogen dioxide is being exceeded within the existing Hennef Way air quality management area. This supports the retention of the existing air quality management area boundary and the findings of the previous Detailed Assessment and Further Assessment reports for this area.

Monitoring in Banbury for 2011 and 2012 confirm the annual mean objective for nitrogen dioxide is being exceeded. This supports the findings of the Detailed Assessment and an AQMA should be declared which includes properties in Bloxham Road, Oxford Road and North Bar, Banbury. Monitoring in the area of detailed assessment support the findings of the detailed assessment that other locations are close to the annual mean objective in North Bar and Bloxham Road.

5 year trends in diffusion tube monitoring data indicate there is a slight downward trend nitrogen dioxide concentration if 2010 is removed from the data. The elevated concentrations in 2010, which are contrary to this trend, have been recognised in monitoring nationally.

Monitoring in Bicester for 2011 and 2012 confirm the annual mean objective for nitrogen dioxide is being exceeded. This supports the findings of the Detailed Assessment and an AQMA should be declared which includes properties in Field Street and Kings End, Bicester.

A significant increase in nitrogen dioxide concentrations in Market Square, Bicester in 2012 has been identified. It is noted there is some distance to the nearest receptor from this roadside monitoring location.

No significant general trends at monitoring locations were seen in the Bicester area at sites where 5 years of monitoring data is available when the 2010 elevated concentration is removed.



Monitoring and assessment in Kidlington for 2011 and 2012 confirm the annual mean objective for nitrogen dioxide is being exceeded at Bicester Road, Kidlington. This supports the findings of the Detailed Assessment and an AQMA should be declared encompassing properties within Bicester Road, Kidlington.

A review of matters that may have changed and resulted in an exceedence of a national air quality objective has not identified areas which require a detailed assessment to be undertaken to determine if a national air quality objective is likely to be exceeded.

## **8.2 Conclusions from Assessment of Sources**

The assessment of new and significantly changed sources has not identified any potential exceedences outside existing and proposed AQMAs.

## **8.3 Proposed Actions**

This assessment has not identified the requirement to proceed to a detailed assessment for any pollutant.

Short duration monitoring at the end of 2012 indicates an exceedence of the objective is not likely and progressing to a detailed assessment is not required. Monitoring in Ermont Way, Banbury will continue for 2013. Should additional monitoring in 2013 indicate an exceedence of the objective, progression to a detailed assessment will be undertaken. This will be reported on during the 2014 Progress Report.

It is proposed to move the monitoring location for 2014 to better reflect concentrations at appropriate receptors in Market Square, Bicester.

The assessment has not identified any need for additional monitoring, or changes to the existing monitoring programme further to those referred to above in Ermont Way, Banbury and Market Square, Bicester.

No changes to the existing AQMA are proposed.

The proposed AQMA boundaries within the three detailed assessments completed in 2013 are supported by this information.

The 2014 Progress Report should be submitted in 2014 to reflect the review and assessment of air quality in Cherwell for 2013.

## 9 References

Cherwell District Council (2013) Further Air Quality Assessment, Hennef Way, Banbury

Cherwell District Council (2013) Detailed Air Quality Assessment, Banbury

Cherwell District Council (2013) Detailed Air Quality Assessment, Queens Avenue, Bicester

Cherwell District Council (2013) Detailed Air Quality Assessment, Bicester Road, Kidlington

Cherwell District Council (2012) 2010 and 2011 Progress Reports

Cherwell District Council (2010) Detailed Air Quality Assessment, Hennef Way, Banbury

Cherwell District Council (2009) Air Quality Update and Screening Assessment

Cherwell District Council (2008) Air Quality Review and Assessment Progress Report

Cherwell District Council (2007) Air Quality Review and Assessment Progress Report

Cherwell District Council (2006) Air Quality Updating and Screening Assessment

Cherwell Strategic Local Partnership (2010) Cherwell Sustainable Community Strategy. Our District, Our Future.

Department for Environment, Food and Rural Affairs (2009) Local Air Quality Management Technical Guidance LAQM.TG (09).

Department for Environment, Food and Rural Affairs (2007) Air Quality Strategy for England, Scotland Wales and Northern Ireland, 2007.

Hagler, G.S.W., Tang, W., Freeman, M.J., Heist, D.K., Perry, S.G. and Vette, A.F.(2011) 'Model Evaluation of Roadside Barrier Impact on Near-Road Air Pollution'. *Atmospheric Environment*. vol. 45, pp. 2522-2530.

National Physical Laboratory (2013) Spreadsheet of Bias Adjustment Factors available at <http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html>

# **Appendices**

Appendix A: QA/QC Data – Automatic Monitoring Station

Appendix B: QA/QC Data – Diffusion Tubes

Appendix C: Short to long term monitoring period adjustments

## Appendix A: QA:QC Data – Automatic Monitoring Station

AEA Technology and Ricardo-AEA conducted all data ratification for Cherwell District Council at Hennef Way, Banbury during 2011 and 2012.

This consisted of:

- Polling the data on a daily basis
- 6 month site audit

Cherwell District Council does not conduct manual calibrations on the NO<sub>x</sub> analyser; the analyser carries out an automatic calibration overnight on daily basis. The automatic calibrations are used by Ricardo-AEA to scale and ratify the data. AEA Technology (2011) and SupportingU (2011 and 2012) conducted filter changes and servicing of the analyser.

The analyser was operational at the Hennef Way monitoring location between January 2011 and April 2012. The continuous analyser monitoring site was closed in April 2012 pending relocation. It was not operational between April 2012 and December 2012.

Cherwell District Council operates an NO<sub>2</sub> diffusion tube co-location study at Hennef Way, Banbury. This site is at a roadside location where measured annual mean NO<sub>2</sub> concentrations have been significantly greater than the annual mean objective in recent years. The locally derived adjustment factor for 2011 was 0.77; details of the data used to derive this are presented in Table A1.1 below.

Discussion on the choice of correction factor is contained in section 2.2.1 of the report.

Checking Precision and Accuracy of Triplicate Tubes



Diffusion Tubes Measurements									
Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 µgm <sup>-3</sup>	Tube 2 µgm <sup>-3</sup>	Tube 3 µgm <sup>-3</sup>	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	06/01/2011	02/02/2011	125.5	134.9	121.7	127	6.8	5	16.9
2	02/02/2011	03/03/2011	114.2	116.5	103.4	111	7.0	6	17.4
3	03/03/2011	30/03/2011	124.2	143.6	102.8	124	20.4	17	50.7
4	30/03/2011	27/04/2011	91.9	98.4	74.3	88	12.5	14	31.0
5	27/04/2011	01/06/2011	79.6	83.5	85.1	83	2.8	3	7.0
6	01/06/2011	29/06/2011		98.3	91.2	95	5.0	5	45.1
7	29/06/2011	03/08/2011	99.9	92.8	94.0	96	3.8	4	9.4
8	03/08/2011	31/08/2011	86.1	101.5	91.2	93	7.8	8	19.5
9	31/08/2011	28/09/2011	98.3	94.9	97.0	97	1.7	2	4.3
10	28/09/2011	02/11/2011	125.3	127.1	107.3	120	10.9	9	27.2
11	02/11/2011	01/12/2011	120.5	151.5	97.9	123	26.9	22	66.8
12	01/12/2011	05/01/2011	90.4	94.6	83.8	90	5.4	6	13.5
13									

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
92.4	100	Good	Good
76.6	100	Good	Good
101.2	100	Good	Good
98.3	100	Good	Good
69.2	100	Good	Good
73	100	Good	Good
85	100	Good	Good
63	42	Good	for Data Capture
61	80	Good	Good
73	100	Good	Good
80.4	100	Poor Precision	Good
58.6	100	Good	Good

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

Overall survey -->

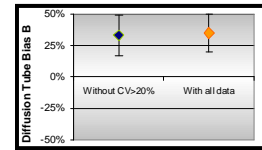
Good precision Good Overall DC  
(Check average CV & DC from Accuracy calculations)

Site Name/ ID: Hennef Way, Banbury

Precision 11 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 10 periods of data	
Bias factor A	0.77 (0.68 - 0.88)
Bias B	31% (14% - 47%)
Diffusion Tubes Mean:	103 µgm <sup>-3</sup>
Mean CV (Precision):	7
Automatic Mean:	79 µgm <sup>-3</sup>
Data Capture for periods used:	98%
Adjusted Tubes Mean:	79 (70 - 91) µgm <sup>-3</sup>

Accuracy (with 95% confidence interval)	
WITH ALL DATA	
Bias calculated using 11 periods of data	
Bias factor A	0.75 (0.68 - 0.85)
Bias B	33% (17% - 48%)
Diffusion Tubes Mean:	105 µgm <sup>-3</sup>
Mean CV (Precision):	9
Automatic Mean:	79 µgm <sup>-3</sup>
Data Capture for periods used:	98%
Adjusted Tubes Mean:	79 (71 - 89) µgm <sup>-3</sup>



Jaume Targa, for AEA  
Version 04 - February 2011

Table A1.1 Hennef Way diffusion tube co-location adjustment factor 2011

## Appendix B: QA:QC Data – Diffusion Tubes

Cherwell District Council's diffusion tubes are prepared and analysed by Environmental Scientifics Group, Unit 12 Moorbrook, Southmead Industrial Estate, Didcot, Oxfordshire, OX11 7HP

The tubes are prepared by spiking acetone:triethanolamine (50:50) onto the grids prior to the tubes being assembled. The tubes were desorbed with distilled water and the extract analysed using a segmented flow autoanalyser with ultraviolet detection.

The Workplace Analysis Scheme for Proficiency (WASP) is an independent analytical performance-testing scheme, operated by the Health and Safety Laboratory (HSL). WASP formed a key part of the former UK NO<sub>2</sub> Network's QA/QC, and remains an important QA/QC exercise for laboratories supplying diffusion tubes to Local Authorities for use in the context of Local Air Quality Management (LAQM). The laboratory participants analyse four spiked tubes, and report the results to HSL. HSL assign a performance score to each laboratory's result, based on their deviation from the known mass of nitrite in the analyte. The performance criteria are based upon the Rolling Performance Index (RPI) statistic.

Environmental Services Group (ESG) participates in the Workplace Analysis Scheme for Proficiency (WASP) for nitrogen dioxide. According to the Annual Performance Criteria for NO<sub>2</sub> Diffusion Tubes used in the Local Air Quality Management (LAQM), during 2011 and 2012, Environmental Scientifics Group is ranked as a **Category Good** laboratory.

The bias adjustment factor used within this Updating and Screening Assessment was derived from the national database of co-location studies (National Physical Laboratory, 2013). The results from this spreadsheet provided a national bias adjustment factor of 0.83 for 2011 and 0.79 for 2012.

The locally derived adjustment factor at the Hennef Way monitoring location for Hennef Way in 2011 has only been used for the Hennef Way location. This is due to the physical characteristics at this monitoring location and monitoring uncertainties identified in the Detailed Assessment and Further Assessment reports at this location i.e. the fenceline may be affecting the contaminant concentrations and monitored NO<sub>2</sub> is greater than expected from modelling vehicle movements and is not atypical of other monitoring locations.

## Appendix C: Short-term to Long-term Data Adjustment

Four months of monitoring data is available for the two Ermont Way tubes which were in position from September 2012 to December 2012. These have therefore been period mean adjusted using the procedure detailed in Box 3.2 of TG(09).

Three long term continuous monitoring sites have been used to adjust the short-term data to long-term. The sites chosen were nearby background stations within the Automatic Urban and Rural monitoring network, with greater than 90% data capture rates. These are shown below in table C1.1.

Site	Site Type	Annual Mean	Period Mean	Ratio
Leamington Spa	Urban Background	20.1	22.8	0.906
Reading New Town	Urban Background	25.5	28.0	0.994
Harwell	Rural Background	10.1	10.2	0.986
Birmingham Acocks Green	Urban Background	31.7	32.2	0.910
			Average	0.962

Table C1.1 AURN monitoring stations used to correct for short term monitoring