

DETAILED ASSESSMENT FOR NEW
CHELTENHAM AIR QUALITY MANAGEMENT AREA 2011

1. INTRODUCTION

An Air Quality Management Area was declared on lower Bath Road and part of the High Street in Cheltenham on 23rd December 2008. However following further detailed monitoring, there is now a requirement to revoke this air quality management area and declare a much larger part of Cheltenham to incorporate several other locations that have also been identified as exceeding national limits for nitrogen dioxide in Cheltenham where there is potential public exposure.

A detailed assessment for nitrogen dioxide forms part of the local air quality management (LAQM) system introduced by the Environment Act 1995. It is a requirement as part of the Act, and follows on from Cheltenham Borough Council's progress reports of 2010 and 2011. These reports conclude that a detailed assessment is required at locations where exceedance of the annual mean for nitrogen dioxide has occurred. This is that assessment document.

1.1 Aims of the detailed assessment

This detailed assessment has two aims:

- To report on monitoring of nitrogen dioxide levels at the locations that are exceeding National Objective limits.
- To recommend establishment of an air quality management area to cover those areas that are in exceedance.

2. BACKGROUND

2.1 Description of the identified sites

Cheltenham is a town of 112,000 residents in an urban area of 40 km². There are no substantial industrial sources of nitrogen dioxide (NO₂) in the area. There is a road circuit around the pedestrianised centre of town that carries the bulk of the city-centre traffic. There are also main roads (A40) leading into the town from the east (London Road) and south (Gloucester Road) both of which suffer from vehicle congestion during peak travel times. The locations where there has been an exceedance of the annual mean objective for nitrogen dioxide and where there is potential human exposure are described as follows and are indicated in Appendix A with location photographs included in Appendix B;

1. The current AQMA area (AQMA to be revoked) – of the lower part of Bath Road and High Street. This canyon is 56 metres long with buildings averaging nine metres high along each side. The road sector of concern ends with a four way junction, where minor roads join Bath Road from west and east; this is also controlled by traffic lights. The road of concern is one way with two lanes of traffic going southwards, is eight metres wide and has pavements either side two metres wide (site pictures at annex B). There are residential premises at 2A, 2B and 8A Bath Road. These are all flats of first and higher floors above shops to the east side. The site's circumstances of two traffic lights, a tight bend, tall buildings and a narrow street all contribute to causing the high nitrogen dioxide levels observed here.

2. Swindon Road. A section of the southern side of Swindon Road from the junction of St Georges Street to Henrietta Street. This road sector of concern comprises a three way junction controlled with two sets of traffic lights and a section of road with two lanes of traffic. The sites circumstances of two traffic lights, high traffic flow and traffic congestion all contribute to the high nitrogen dioxide levels experienced here. There are three and four storey residential premises on the south side of Swindon Road located within 3m of the roadside.

3. High Street. This section of road at the western end of the High Street bounded by Poole Lane and Tewkesbury Road. This road sector of concern is also a canyon with two and three storey buildings on both sides of the High Street enclosing a road with two-way traffic of ten metres width. It has pavements of two to three metres width on both sides of the road. Residential premises are present at several locations including the flats at 343 High Street.

4. London Road. The road section of concern is the junction of London Road with Hales Road comprising the A435, B4075 and A40 junction. It is a four way junction controlled with traffic lights. Stationary and slow-moving traffic is common as a result of the volume of traffic coming into Cheltenham. There is potential exposure to elevated nitrogen dioxide levels to residential premises on the southern side of London Road between 81 and 107. The buildings here are three storey of approximately 9 metres height separated from the road by a 3m wide pavement.

5. Fairview Road. The road section of concern is the section of Fairview Road from Portland Street (A46) junction to Fishers Lane including the junction with Winchcombe Street. Although the road is relatively wide at over 30m, there are four lanes of traffic at the junction with Portland Street, controlled by several traffic lights. The junction at Winchcombe Street 80m further east is very similar. The traffic count is high and there is routine congestion. Although there is a limited canyon effect, residential properties are located close to the roadside with several multi-storey blocks of flats.

6. Suffolk Road. The road section from Bath Road to Suffolk Parade is of concern due to high traffic counts and regular vehicle congestion. There is a potential canyon effect of two and three storey buildings located close to the road with relatively narrow pavement areas of 2m. There are several residential premises along this section of Suffolk Road including at nos; 7, 9, 8, 12, 16 and 24.

7. 338 – 346 Gloucester Road. The road section from the Gloucester Road junction with Lansdown Road near to the traffic lights. Here there is a two storey row of terraced properties located on the eastern side of Gloucester Road that are within 3m of a congested road with vehicles routinely queuing at the traffic lights heading southbound.

2.2 Source apportionment

The sources of nitrogen dioxide at all these sites were assessed to be substantially traffic-based. Cheltenham has no significant industrial nitrogen dioxide sources. The annual mean ratified nitrogen dioxide level for 2008 at the Council's urban background real-time air quality unit was only 21.6ug/m³. This Unit has now been removed and background air quality is no longer measured at this location. Measured levels at the kerbside locations exceeding national objectives identified in section 2.1 are over twice the historical urban background level, therefore with no other significant local sources, road traffic was determined to be the sole substantial source of concern.

3. POLLUTANT MONITORING

3.1 Monitoring method

Cheltenham Borough Council currently measures nitrogen dioxide at 40 sites across the town with diffusion tubes of 20% TEA in water supplied by Bristol Scientific Services. There is also a real-time air quality unit at a roadside location at the junction of St Georges Street and Swindon Road which commenced operation in August 2011. The diffusion tubes results are ratified annually with a national bias adjustment factor obtained for triplicate studies by several other authorities using Bristol Scientific Services. Once results have been validated, they are displayed on the Council's website in an interactive map.

3.2 Monitoring locations

Nitrogen dioxide has been measured at a façade location of 6 Bath Road since 2000. This monitoring location has been measuring nitrogen dioxide for a significant length of time and results from this location were instrumental in the declaration of the first Air Quality Management Area (AQMA) in December 2008 which resulted in more detailed monitoring of this area. Following a review of all Cheltenham air monitoring locations in 2009, several new

monitoring locations were identified where potential exposure to traffic derived pollution could be occurring as a result of high vehicle flow and traffic congestion. Annually adjusted results demonstrated that there are several new areas where annual mean nitrogen dioxide levels are being exceeded. These locations are now subject to more detailed assessment and it has become clear that there is a need to declare a much larger area of Cheltenham as an AQMA rather than just the original location on Bath Road. Table 2 below contains results obtained since monitoring commenced at these new sites. Further information is provided in the 2011 Progress Report as submitted by Cheltenham Borough Council.

3.3 Monitoring results

6 Bath Road monitoring site

The bias-adjusted nitrogen dioxide annual mean levels for the period 2000 to 2010 are as follows:

Table 1: Nitrogen dioxide annual means for lower Bath Road AQMA monitoring point

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
NO2 annual mean (ug/m3)	38.3	37.5	33.6	43.3	42.8	42.0	46.2	44.6	44.0	45.4	46.3

The graph in Appendix C illustrates historically declining levels at the Bath Road location during the period 2000 to 2002, but then a marked rise in 2003 to a level that exceeded the objective. This elevated level has since been sustained and continues to breach the annual objective. This site therefore exceeded the 2005 nitrogen dioxide annual mean objective of 40ug/m3 in the Air Quality Regulations (England)(Wales) 2000 (as amended). This site was included in the declared Air Quality Management Area in 2008. This site is expected to continue exceeding the nitrogen dioxide annual mean objective and therefore appropriate actions are required to reduce levels to below the national objective limit of 40ug/m3.

Other locations where exceedance has been identified have only been monitored since 2010. Additional monitoring tubes have been added at these locations since the beginning of 2011 to obtain more detailed information on the extent of NO2 exceedance.

Table 2: Nitrogen dioxide annual mean results for new monitoring locations in Cheltenham that exceed the national objective limit of 40ug/m3

Location	2010 NO2 levels ug/m3
Portland Street – Fairview Road junction	41.8

Swindon Road – Henrietta Street	45.7
443 High Street	41.4
81 London Road	45.5
340 Gloucester Road	44.5
7 Suffolk Road	40.1
1 Hewlett Road (no exposure nearby)	47.9

4. POLLUTANT MODELLING

No pollutant modeling has been carried out with the 2010 data although as with previous modelling it is considered that the presence of traffic lights, other road obstacles and peak traffic flow provide significant impediment to the smooth flow of traffic at those locations which elevated NO₂ levels have been recorded. This means that vehicles are usually accelerating and decelerating which can lead to greater pollution emissions. These emissions are then contained within the relevant confines of the narrow roads or canyons or, where these are not present, the proximity of kerbside residential properties means there is direct exposure to elevated nitrogen dioxide levels.

5. CONCLUSION

The monitoring evidence was that the existing AQMA at lower Bath Rd/High Street site was continuing to breach the annual mean objective. However as a result of further monitoring conducted since 2010, it is clear that there are several other locations that are also breaching the annual objective for NO₂. Therefore a new much wider AQMA should be declared to cover all areas that are breaching National Limits for NO₂. In order to ensure that all locations in exceedance are included within a new AQMA and to ensure that any future measures contained within an Action Plan do not simply move the problem elsewhere, it is proposed to declare the whole of Cheltenham Borough as an AQMA. This is considered necessary to reinforce the message that poor air quality in Cheltenham must be tackled and to ensure that the problem is not simply shifted around inside the Borough.

6. RECOMMENDATION

In light of the above findings, an air quality management area (AQMA) should be declared to cover all the locations where exceedance of NO₂ annual mean limits has been measured. Guidance states that AQMA's must encompass all known and predicted areas of exceedance where there is relevant exposure. In addition, wherever the boundary of the

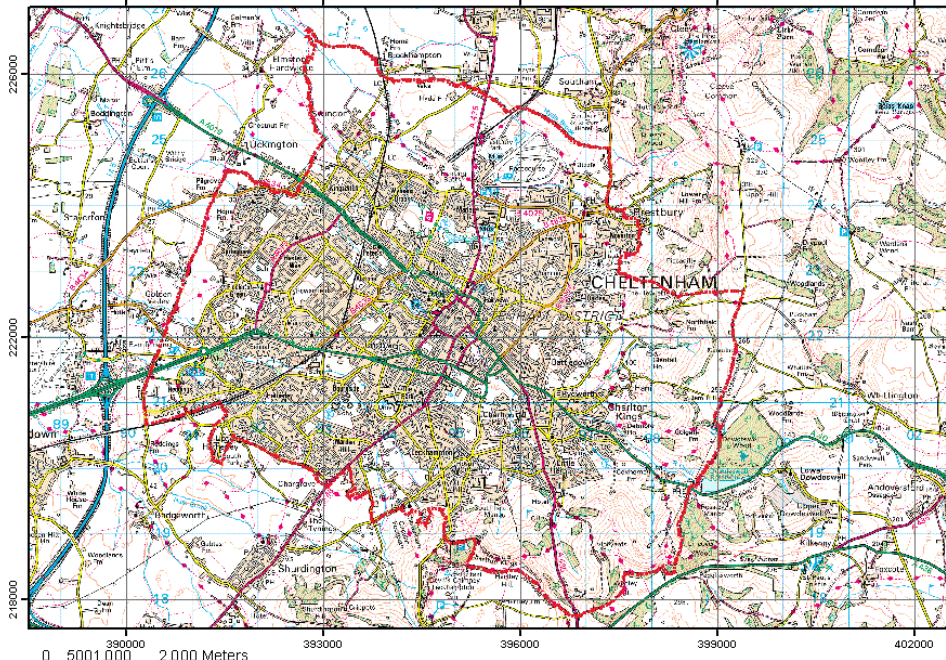
AQMA is drawn, the Action Plan developed to deal with the problem is likely to cover an even wider area. Therefore it is recommended that an AQMA is declared to cover the entire Borough of Cheltenham. This will ensure that any future solutions delivered through implementation of a future Action Plan will not simply push the problem elsewhere within the Borough. A plan of the Borough boundary is included in Appendix A.

LIST OF APPENDICES

Appendix	Content
A	Plan of proposed new AQMA for Cheltenham and locations where exceedance of the NO2 annual mean has been identified
B	Photographs of various locations where exceedance has occurred
C	Graph of nitrogen dioxide annual mean readings at 6 Bath Road

Appendix A – Plan of proposed new Air Quality Management Area for Cheltenham (following the Borough Boundary)

Proposed new Air Quality Management Area for Cheltenham - 2011



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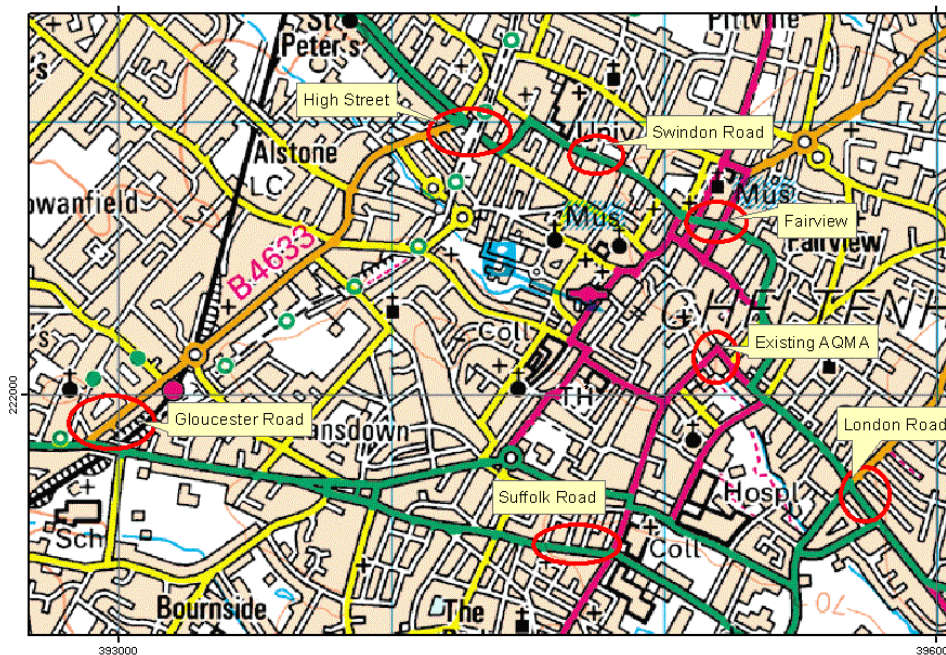


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Contaminated Land Officer 2011

Areas of Nitrogen Dioxide exceedance in Cheltenham identified in 2010



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Appendix B - Photographs of six locations within the Borough where Nitrogen Dioxide exceedance has been measured and there is relevant exposure

Site 1. Current AQMA area on Bath Road & High Street



Site 2. Swindon Road near St Georges Street/Henrietta St



Site 3. High Street towards Tewkesbury Road junction (view east)



High Street towards Tewkesbury Road junction (view west)



Site 4. London Road – junction with Hales Road (view west)



London Road – junction with Hales Road (view east)



Site 5. Fairview Road – Winchcombe Street junction (view east)



Fairview Road towards Portland Street junction (view west)



Fairview Road – Winchcombe Street junction (view west)



Site 6. Suffolk Road



Site 7. Gloucester Road



Appendix C – Graph of annual mean Nitrogen Dioxide levels at 6 Bath Road

