LAQM DETAILED ASSESSMENT FOR

Shrewsbury No 2 AQMA

Centred around Heathgates Roundabout

Local Authority Officer	Matthew Clark
Department	Public Protection
Address	Shropshire Council Shirehall Abbey Foregate Shrewsbury Shropshire SY2 6ND
Telephone	03456 789000
e-mail	public.protection@shropshire.gov.uk
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Executive Summary

In 2003 Shrewsbury and Atchem Borough Council declared an Air Quality Management Area covering the area known as Heathgates roundabout, the junction between Whitchurch Road, Sundorne Road, Telford Way and Ditherington Road using powers under the Environment Act 1995 section 83(2)(b) 2003. The Air Quality Management Area (AQMA) was declared due to a likely breach of the annual mean nitrogen dioxide national air quality objective of 40 $\mu g/m^3$. It is known as Shrewsbury No 2 AQMA.

Shrewsbury and Atchem Borough Council became part of Shropshire Council when Oswestry Borough Council, Bridgnorth District Council, Shrewsbury and Atcham Borough Council, South Shropshire District Council, North Shropshire District Council and Shropshire County Council formed the unitary authority.

The report below provides monitoring data from diffusion tubes at locations representative of the AQMA and residential properties affected. Monitoring demonstrates that there has been no exceedance of national objective levels at any monitoring location in the past 6 years.

It is concluded that it is not likely that the annual mean NO_2 concentration will exceed the national air quality objective in this location.

As a result it is proposed that the Shrewsbury No 2 AQMA is revoked by Order under section 83(2)(b) of the Environment Act 1995.

1. Introduction

1.1 Project Background

Shrewsbury and Atcham Borough Council completed its First Round of Review and Assessment between 1998 and 2000. It concluded that exceedances of the nitrogen dioxide (NO_2) annual mean were expected at Heathgates Roundabout which sees the junction of Whitchurch Road, Sundorne Road, Telford Way and Ditherington Road. As a result an AQMA was declared in 2003.using powers under the Environment Act 1995 section 83(2)(b) 2003. The Air Quality Management Area was declared due to a likely breach of the annual mean nitrogen dioxide national air quality objective of 40 $\mu g/m^3$.

Shropshire Council is a Unitary Authority and as such has a duty to comply with air quality legislation and the Local Air Quality Management regime. An Updating and Screening Assessment was carried out as part of the fifth round of reporting covering data from 2009-2015 inclusively. Monitoring results from a locations within the Shrewsbury No 2 AQMA were reviewed. The results indicated no likely breech of the national air quality objective level. As a result a detailed assessment taking into consideration all of the past monitoring undertaken was proposed.

1.2 Legislative Background

The latest Air Quality Strategy (AQS) released in July 2007 provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the Government to protect human health. The objectives for ten pollutants (benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide particulates - PM10 and PM2.5- and ozone) have been prescribed within the Air Quality Strategy based on The Air Quality Standards (England) Regulations 2007. The Objectives set out in the AQS for the protection of human health are presented in Table 1.1.

The Air Quality Standards (England) Regulations 2007 came into force on 15th February 2007 and brings together the Government's requirements to fulfil each EU Daughter Directive through a single statutory instrument.

The Environment Act 1995 gives local authorities duties and responsibilities to review and assess air quality in its area and secure improvements in air quality where required. The locations where the AQS objectives apply are defined in the AQS as locations outside buildings or other natural or manufactured structures above or below ground where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period of the AQS objective.

1.3 Air Quality Strategy Objectives

This study is interested in the annual mean nitrogen dioxide concentration as this is the objective that was thought would be likely to be breached and hence an AQMA declared. This level is 40 $\mu g/m^3$.

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928) and The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1. This table shows the objectives in units of micrograms per cubic metre $\mu g/m^3$ (milligrammes per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedances in each year that are permitted (where applicable).

Table 1: Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Scope and Methodology of the Detailed Assessment

The Shrewsbury No 2 AQMA was declared in 2003 as it was thought that the annual mean nitrogen dioxide objective was likely to be breached. This was due to their being residential receptor presenting relevant exposure in relatively close proximity to the busy Heathgates roundabout junction where standing traffic was often common. A location map delimiting the AQMA area can be found in Appendix 1.

Review of monitoring data in the recently completed Updating and Screening assessment in 2016 highlighted the fact that the concentration of nitrogen dioxide has not exceeded the objective level for some time. As a result it was recommended that a detailed assessment should be undertaken to establish if there is any likelihood of any national objective level being breached.

In order to answer the above question a review of all monitoring data at the location representative of the Shrewsbury No 2 AQMA has been undertaken.

2. Data Collection

Monitoring Data

Monitoring has taken place in and around the Shrewsbury No 2 AQMA with nitrogen dioxide diffusion tubes. These tubes are placed every month and provide a monthly average. The monthly data is summed and averaged to give an annual average of nitrogen dioxide for that monitoring location.

Trend data is available for three monitoring locations as follows, reference 433, 412 and 406 shown in Appendix 1. Location 433 is within the AQMA and found on the Heathgates public house. Location 412 is on Whitchurch Road close to the Morrisons supermarket junction to the north of the AQMA. Location 406 is on Ditherington Road to the south of the AQMA.

Additional location were installed in 2015 to capture data in the AQMA which is more representative of relevant exposures (residential properties). These locations are shown in Appendix 1 and have location references 465, 466, 467 and 468.

Diffusion tube analysis and QA/QC data is found in Appendix 2.

3. Results and discussion

Monitoring results

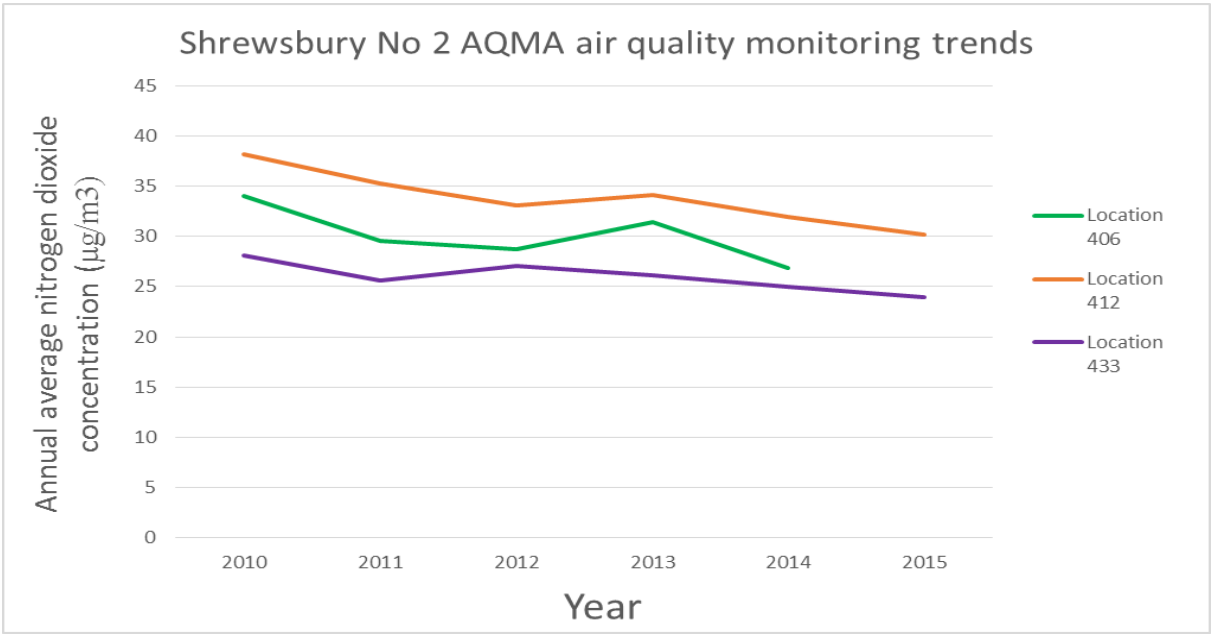
Table 2 below shows results in µg/m^3 for all monitoring location from 2010 to 2015. Data capture is shown in brackets below each result.

Location	2010	2011	2012	2013	2014	2015
406	34.0 (100%)	29.6 (100%)	28.70 (92%)	31.4 (100%)	26.9 (82%)	-
412	38.2 (100%)	35.3 (100%)	33.1 (100%)	34.1 (100%)	32.0 (100%)	30.2 (100%)
433	28.1 (100%)	25.6 (92%)	27.1 (100%)	26.1 (83%)	25.0 (100%)	24.0 (67%)
465	-	-	-	-	-	33.5 (100%)
466	-	-	-	-	-	34.3 (100%)
467	-	-	-	-	-	29.5 (100%)
468	-	-	-	-	-	22.0 (100%)

NB: data for location 465, 466 and 467 is from monitoring locations on street furniture and is therefore closer to pollutant sources than the curtilage of residential properties.

Figure 1 below shows trend data for the three long term monitoring locations found in Table 2 graphed. The national objective level for reference is 40µg/m^3.

Figure 1: trend data for Shrewsbury No 2 AQMA.



NB: No data point is available for location 406 in 2015 due to missing data points in 8 of the 12 monthly results. It can however be reported that no single monthly result for this location in 2015 was above the objective level.

4. Discussion

Data clearly shows no likely breach of the national air quality objective for nitrogen dioxide both within the existing AQMA and in markers to the north and south in any year since 2010. Figure 1 demonstrates a downward trend in nitrogen dioxide levels in this area.

Additional monitoring locations put in place within the AQMA in 2015 at relevant receptor location, representative of residential curtilage closest to the road network, shows no residential receptor was found to have levels of nitrogen dioxide within 10% of the national objective level. In particular location 468, placed directly on the residential property, finds pollutant concentrations more than 10% below the national objective level.

Residential properties represented by monitoring locations 465, 466 and 467 are set back considerably from the road. As a result, pollutant levels at residential buildings will be significantly lower than reported however the front gardens will have a similar level to that recorded at the boundary of the site with the pavement and will improve as you move towards the residential properties.

4. Conclusion and Recommendations

Having considered trend data and carried out additional monitoring within the AQMA in 2015 the following conclusions and recommendations are made:

- **Trend data indicates a reduction in nitrogen dioxide levels in and around the AQMA**

- Pollutant concentration within and flanking the AQMA **have not shown likely exceedance of the National Objective Levels in the last six years**.

- No annual average results for any location in or around the AQMA have been within 10% of the national objective level in the last 6 years.

- Considering future predicted trends in traffic flows, emission outputs from road vehicles and potential development NO_2 concentration **is not likely to exceed the National Objective Level** of 40µg/m^3 as an annual average.

- It is therefore **recommended that the Shrewsbury No 2 AQMA is revoked** by Order under section 83(2)(b) of the Environment Act 1995.

Appendix 1: Location of Shrewsbury No 2 AQMA and monitoring locations.

Appendix 2: diffusion tube analysis data

Diffusion Tube Bias Adjustment Factors

Diffusion tubes were analysed by Gradko International Ltd. within the scope of laboratory quality procedures. The tube preparation method was a 20% TEA/water preparation. Bias correction was carried out by applying the factors specified in the National Diffusion Tube Bias Adjustment Factor Spreadsheet version number 09/13 for years 2009, 2010, 2011 and 2012 and version number 03/16 for years 2013, 2014 and 2015. NB The use of the latest bias adjustment factors (09/16) for 2015 has significantly altered the data reported in the 2015 USA as the factor has altered from 0.92 in the USA to 0.87 in the latest version and as a result all 2015 results are overestimates.

The bias adjustment factors used were:

2010: 0.92, 2011: 0.90, 2012: 0.96, 2013: 0.95, 2014: 0.92, 2015: 0.92.

WASP/AIR-PT results

WASP results have been viewed via the DEFRA LAQM webpage links found at: http://laqm.defra.gov.uk/diffusion-tubes/qa-qc-framework.html

Gradko International were found to have 100% of samples provide satisfactory results when tested by Health and Safety Labs in the time covered by this report on all but two occasions. When tested between April – June 2010 one result out of eight was not satisfactory. In October – December 2011 five of eight samples were not found to be satisfactory. On the whole it is recognised that the vast majority of WASP testing has shown that results obtained have all been satisfactory. As a result it is concluded that the quality control and quality assurance of diffusion tube data collected, after adjustment for bias, is satisfactory. Information obtained from WASP Summary rounds 104 to 124. AIR-PT rounds from April 2013 to present day were checked.