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Lichfield District Council
LAQM Progress Report 2014

Bureau Veritas

June 2014

Move Forward with Confidence

Document Control Sheet

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Executive Summary

Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area and take account of Government Guidance when undertaking such work. This Annual Progress Report is a requirement of the Fifth Round of Review and Assessment and is a requirement for all local authorities. The Report has been prepared in accordance with Technical Guidance LAQM.TG (09) and associated tools (2010 based).

This Annual Progress Report considers all new monitoring data and assesses the data against the Air Quality Strategy (AQS) objectives. It also considers any changes that may have an impact on air quality.

Outside of the AQMA, the review of new diffusion tube monitoring data has identified one location where the AQS annual NO_2 objective was exceeded in 2013 at the façade of a relevant receptor: A38-2A/B – Fradley. As exceedences at this site were also recorded for 2012 and 2011, it is recommended that the four properties in the vicinity of this tube on the A38 (Rykneld Street) are declared as an AQMA as a result of exceedences of the annual mean objective.

Concentrations within the AQMA still exceed the annual mean objective for NO_2 at four diffusion tube monitoring locations (MUC-1A/B/C, MUC-3, MUC-4 and MUC-5); as such the AQMA should remain.

There has been one planning application for redevelopment of land in Fradley, which may impact upon air quality at the location of the diffusion tube monitoring site A38-2A/B. It is therefore important that monitoring continues at this location.

The joint 2010 Further Assessment and Action Plan for Muckley Corner AQMA was prepared in 2010. The assessment included the findings of the Council's air quality action planning appraisal and an impact assessment of the committed works being undertaken as part of the A5 Muckley Corner improvement schemes. A final Action Plan detailing the ongoing and future air quality work in Lichfield will be completed in 2014.

Proposed actions arising from the Progress Report are as follows:

- Continue NO_2 diffusion tube monitoring in the district to identify future changes in pollutant concentrations;
- Declare the four properties close to monitoring site A38-2A/B on the A38 (Rykneld Street) as an AQMA for the annual mean nitrogen dioxide objective;
- Finalise the Lichfield Air Quality Action Plan;
- Proceed to the 2015 Updating and Screening Assessment.

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1 Introduction

1.1 Description of Local Authority Area

Lichfield District Council (LDC) is situated in the north of the West Midlands, close to some highly industrialised parts of the UK. To the south west lie Walsall and Birmingham. LDC is only moderately industrialized, but there are a number of major roads in the region, including the M6 Toll, A38 and A5. Consequently, road traffic is the main source of air pollution in the area. Burntwood and Lichfield are the two largest urban areas in the District.

1.2 Purpose of Progress 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 (AQS) for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The Local Air Quality Management (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 AQMA and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

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

1.3 Air Quality Objectives

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

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

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 µg/m^3	Running annual mean	31.12.2003
	5.00 µg/m^3	Annual mean	31.12.2010
1,3-Butadiene	2.25 µg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.50 µg/m^3	Annual mean	31.12.2004
	0.25 µg/m^3	Annual mean	31.12.2008
Nitrogen dioxide	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µg/m^3	Annual mean	31.12.2005
Particulate Matter (PM_{10}) (gravimetric)	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

LDC completed the first Updating and Screening Assessment in 2003 (Faber Maunsell, 2003) and concluded that a Detailed Assessment was required for nitrogen dioxide (NO_2), due to the likelihood of exceedences of the objectives at locations near to the A5 and A38.

The Detailed Assessment (Casella Stranger, 2004) predicted that the annual mean NO_2 objective was likely to be exceeded at several properties near to the A5 and at one residence alongside the A38. However, model verification (and hence the conclusions of the study) were based on a short period of continuous monitoring data in the identified areas, prior to the opening of the M6 Toll road. It was recommended that further monitoring should be carried out before making a decision on whether to declare any AQMAs.

Following the collection of further monitoring data another Detailed Assessment (Casella Stranger, 2005) was produced. This assessment predicted exceedences of the annual mean NO_2 objective at the ground floor of the Muckley Corner Hotel, but future projections indicated that the objective would be met by 2010. As a result it was concluded that LDC should not declare an AQMA for NO_2. However, it was decided that further diffusion tube monitoring should be carried out in the area.

In 2006 the Council entered the Third Round of Review and Assessment and produced the 2006 Updating and Screening Assessment (Faber Maunsell, 2006). This included the results of additional monitoring undertaken by the Council. Further exceedences of the annual mean NO_2 objective were recorded at Muckley Corner, indicating the need for a further Detailed Assessment for NO_2 in this area.

The Detailed Assessment (AEA Technology, 2007) concluded that the annual mean NO_2 objective was likely to be exceeded at several properties surrounding the Muckley Corner roundabout and that an AQMA should be declared covering this area (Figure 1.1). Modelling results for PM_{10} indicated that the air quality objectives were likely to be achieved for this pollutant and no further action was necessary.

Updated diffusion tube monitoring data presented in the 2009 Updating and Screening Assessment (Faber Maunsell, 2009) indicated that the annual mean NO_2 objective continued to be exceeded at Muckley Corner. The report also indicated the potential for exceedences at residential properties alongside the A38 at Canwell and therefore recommended a Detailed Assessment for NO_2 should be carried out.

In the 2010 Detailed Assessment (AECOM, 2010) one exceedence of the annual mean NO_2 objective was predicted at a residential receptor near to the A38 at Canwell (2 Weeford Park Cottages, $\mu g/m^3$) in 2009. The modelled results for 2010 predicted that the objective would be met at all receptors. Additionally, the report highlighted that this section of the A38 would be subject to road works over the summer of 2010, which would include a 30 mph speed limit. Staffordshire County Council's plan was to introduce a number of safety measures for the A38 between Weeford Island and Bassett's Pole, including a reduced 60 mph speed limit which would be enforced by average speed cameras.

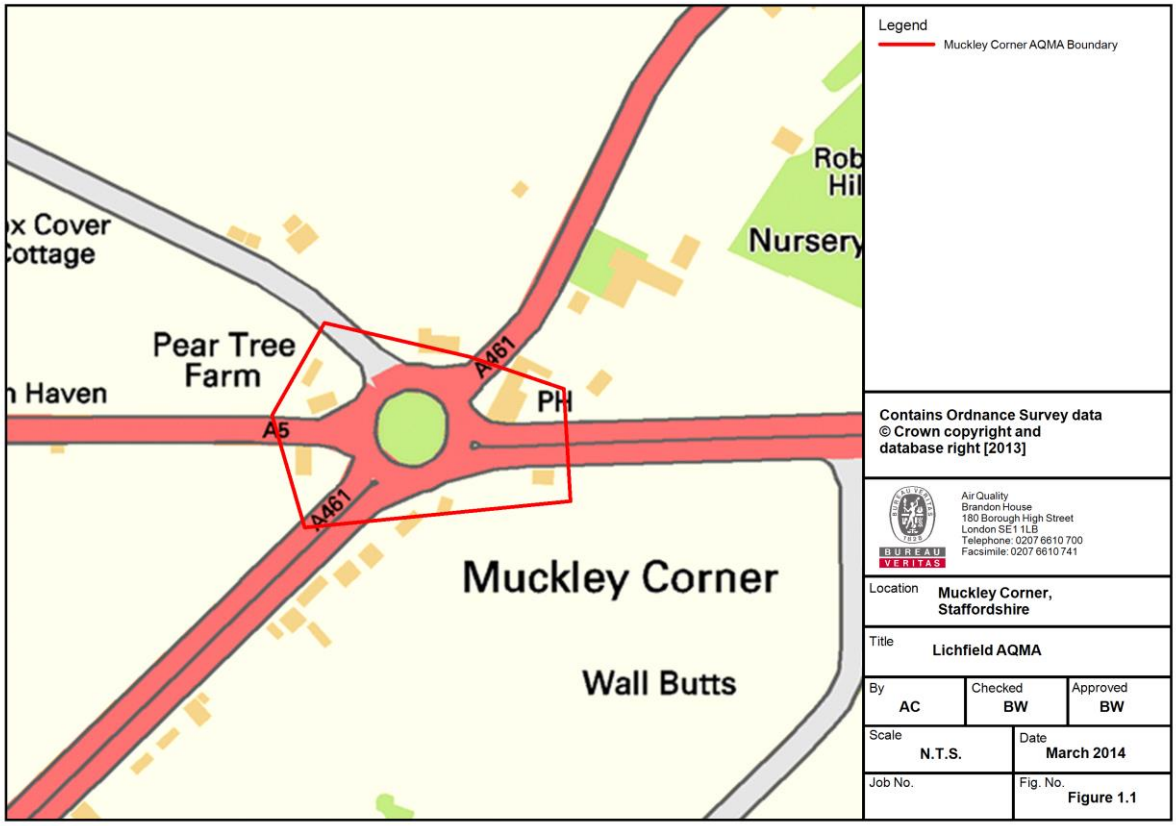
The 2010 diffusion tube dataset, reported in the 2011 Progress Report (AECOM, 2011) showed that 14 diffusion tube sites exceeded the NO_2 annual mean objective. Of these exceedences, four were shown to meet the NO_2 annual mean objective once a facade adjustment was calculated and six were within the boundary of the existing AQMA. Of the remaining exceedences, three are just outside the existing Muckley Corner AQMA. The final exceedence at Fradley on the A38 was confirmed as exceeding the annual mean objective at relevant

exposure. A Detailed Assessment was not proposed at this time. However, to support future decision making, additional diffusion tube monitoring sites were set up.

The 2012 Updating and Screening Assessment (AECOM, 2012) identified possible exceedences of the annual mean nitrogen dioxide objective near to the A38 at Weeford and Fradley. These were based on adjusted data and therefore further monitoring was proposed in these locations in order to collect further data. The results from this monitoring can then be used to ascertain the need for a Detailed Assessment.

The 2013 Progress Report confirmed the exceedence of annual mean NO_2 objective at Fradley and recommended that the Council proceed to a Detailed Assessment for this area.

Figure 1.1 Map of Muckley Corner AQMA



2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

There are no permanent continuous monitoring locations in operation in the District and no automatic monitoring was carried out by LDC in 2013.

2.1.2 Non-Automatic Monitoring Sites

Lichfield District Council undertook monitoring at 22 nitrogen dioxide diffusion tube sites in 2013. This includes six duplicate sites and one triplicate site as follows.

Duplicate sites:

- A38–2 and A38-2(1);
- A38-2A and A38-2B;
- A38-4A and A38-4B;
- A38-5A and A38-5B;
- A38-6A and A38-6B; and
- A38-4(X) and A38-4(Y).

Triplicate site:

- MUC-1A, MUC-1B and MUC-1C.

Details of the monitoring sites are shown in Table 2.1, whilst their location is provided in Figure 2.1 through to Figure 2.6. There have not been any changes to the sites number or location since the completion of the 2013 Progress Report.

The diffusion tubes are supplied and analysed by Staffordshire Scientific Services utilising the 20% triethanolamine (TEA) in water preparation method. Quality control procedures, including bias adjustment, are discussed in Appendix A.

Figure 2.1 Map of Non-Automatic Monitoring Sites. Lichfield

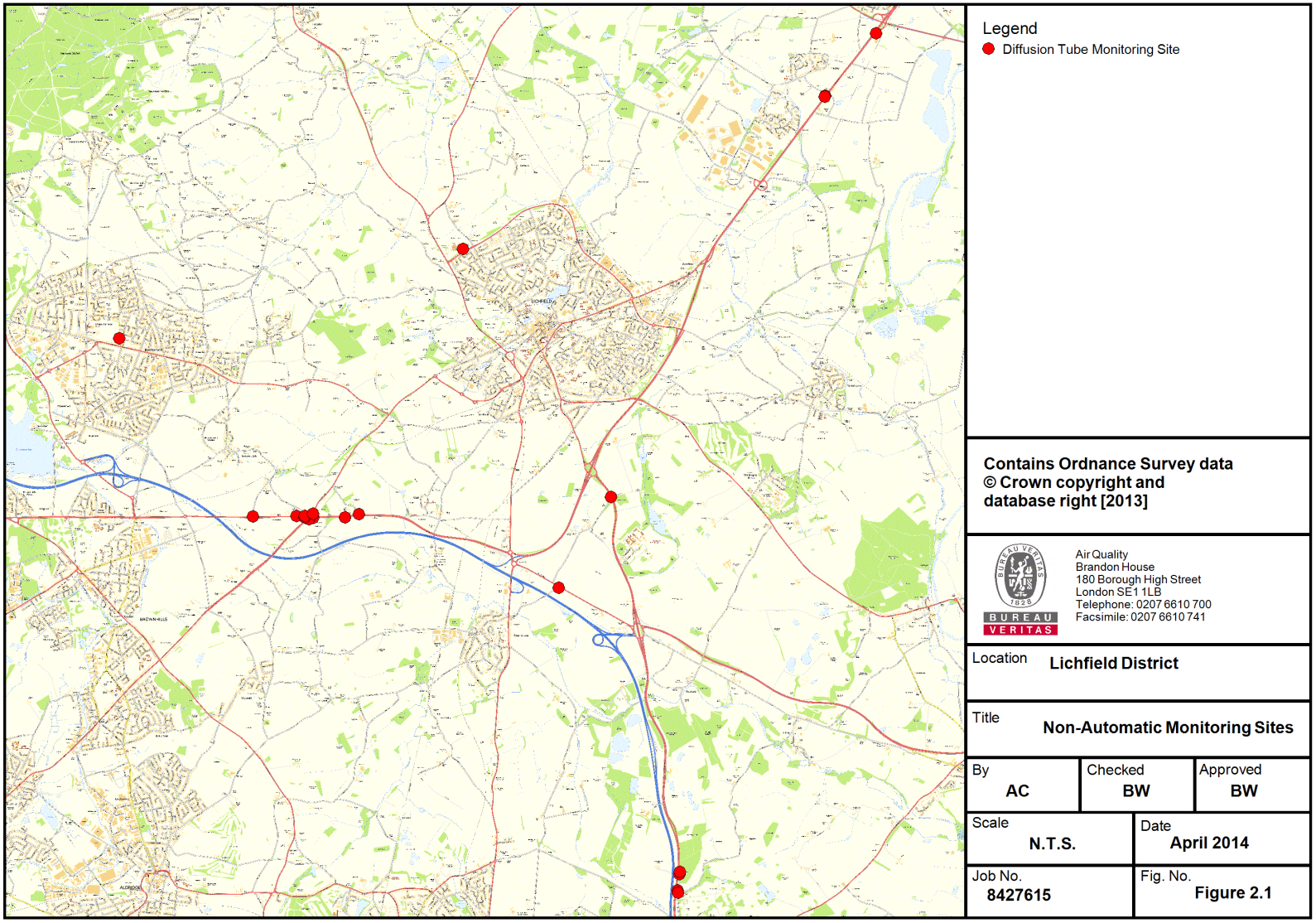


Figure 2.2 Map of Non-Automatic Monitoring Sites. Muckley Corner

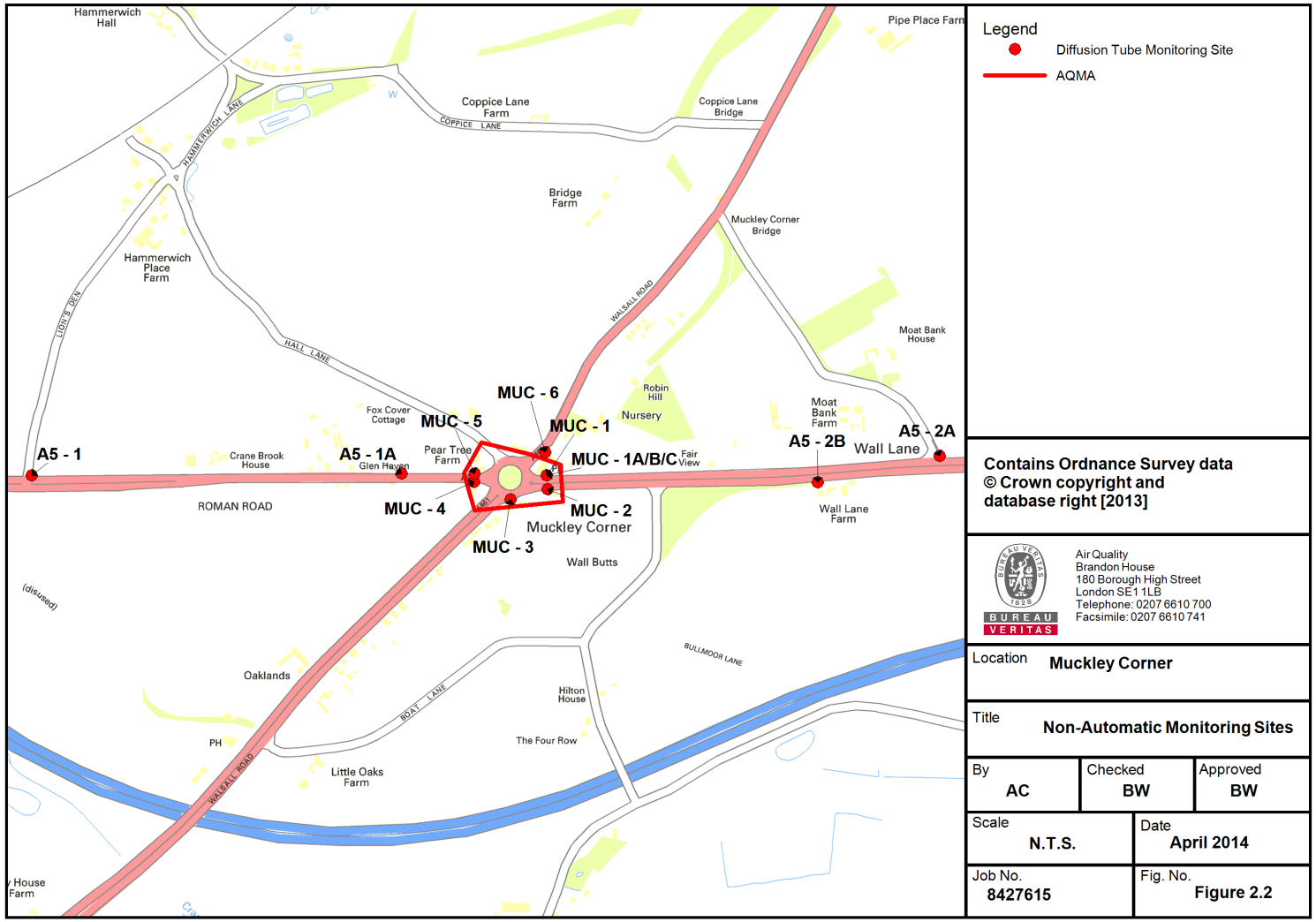
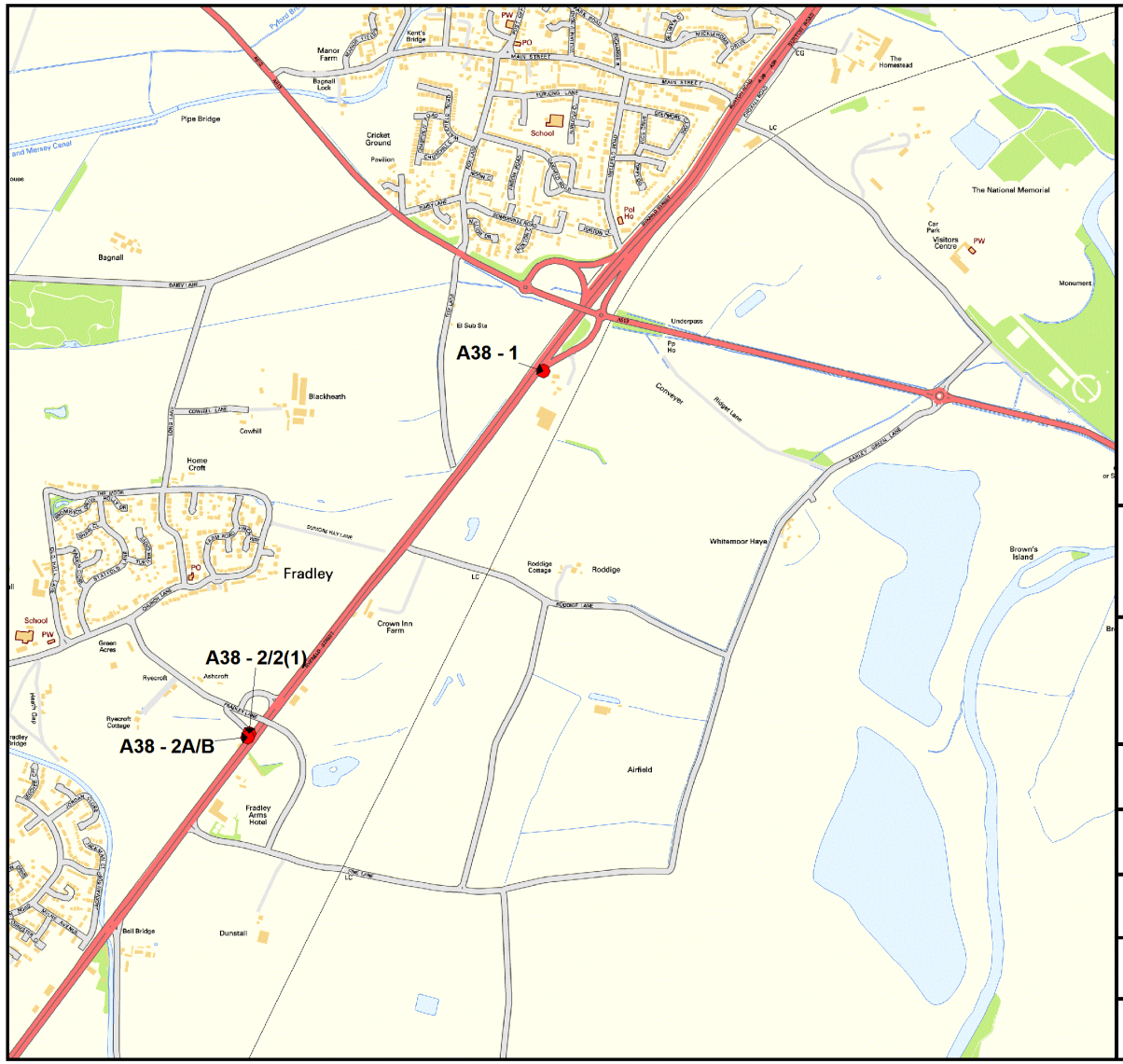


Figure 2.3 Map of Non-Automatic Monitoring Sites. Alrewas and Fradley



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Location	**Alrewas & Fradley**
Title	**Non-Automatic Monitoring Sites**

By	Checked	Approved
AC	**BW**	**BW**

Scale	Date
N.T.S.	**April 2014**

Job No.	Fig. No.
8427615	**Figure 2.3**

Figure 2.4 Map of Non-Automatic Monitoring Sites. Canwell

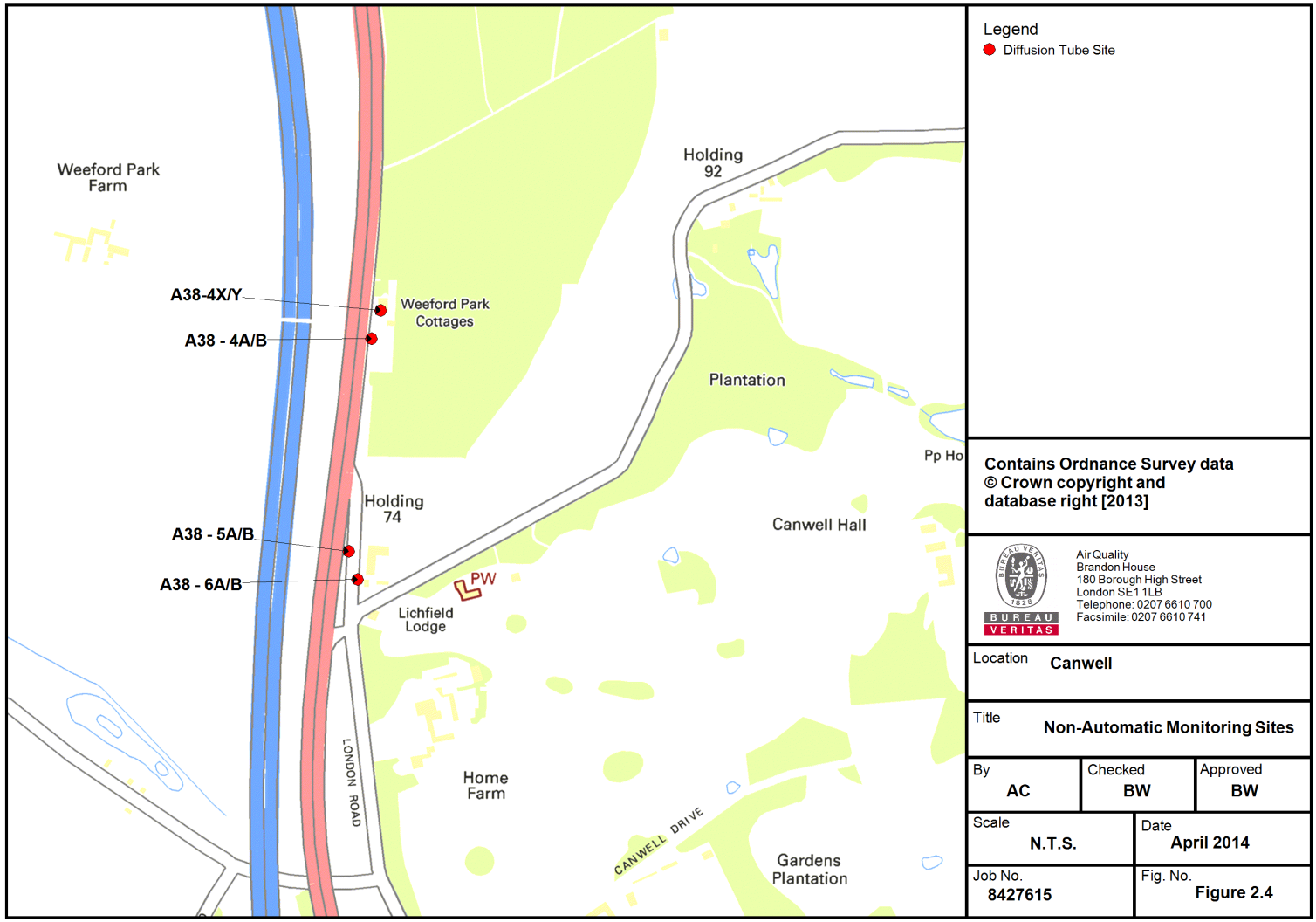

Figure 2.5 Map of Non-Automatic Monitoring Sites. Lichfield

Legend
- Diffusion Tube Site

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Location	**Lichfield**	
Title	**Non-Automatic Monitoring Sites**	
By **AC**	Checked **BW**	Approved **BW**
Scale **N.T.S.**	Date **April 2014**	
Job No. **8427615**	Fig. No. **Figure 2.5**	

Figure 2.6 Map of Non-Automatic Monitoring Sites. Burntwood

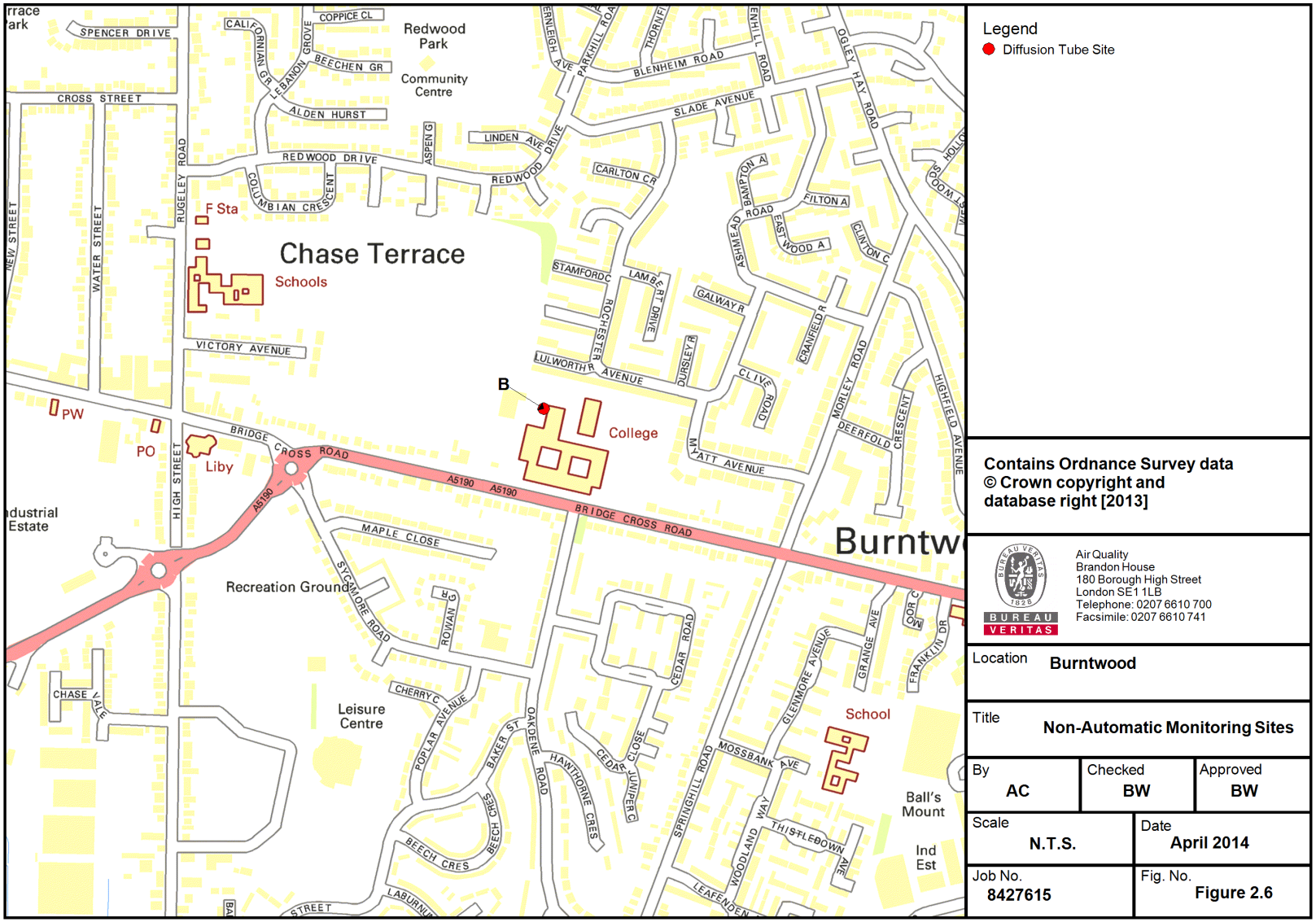


Table 2.1 Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
A38 - 1	Alrewas	Roadside	417101	314180	NO_2	N	N (9 m)[a]	1 m	Y
A38 - 2/2(1)	Fradley	Roadside	416295	313186	NO_2	N	N (10 m)	5 m	Y
A38 - 2A/B	Fradley	Roadside	416290	313175	NO_2	N	Y	6 m	Y
A38 - 3	Lichfield	Roadside	412891	306817	NO_2	N	N (6 m)	2 m	Y
A38 - 4A/B	Canwell	Roadside	413978	300834	NO_2	N	N (10 m)	6.85 m	Y
A38 - 5A/B	Canwell	Roadside	413950	300574	NO_2	N	N (35 m)	10 m	Y
A38 - 6A/B	Canwell	Roadside	413961	300539	NO_2	N	N (10 m)	25 m	Y
A38-4X/Y	Canwell	Roadside	413989	300869	NO_2	N	Y	15 m	Y
A5 - 1	Muckley Corner	Roadside	407208	306513	NO_2	N	N[b]	4 m	Y
A5 - 1A	Muckley Corner	Roadside	407895	306516	NO_2	N	N (6 m)	1 m	Y
A5 - 2A	Muckley Corner	Roadside	408893	306549	NO_2	N	N (12 m)	5 m	Y
A5 - 2B	Muckley Corner	Roadside	408667	306500	NO_2	N	N (6 m)	2 m	Y
A5 - 3	Lichfield	Roadside	412063	305379	NO_2	N	N (13 m)	10 m	Y
B	Burntwood	Urban background	405086	309344	NO_2	N	N (127 m)	N/A	Y
L	Lichfield	Urban background	410544	310760	NO_2	N	N (42 m)	N/A	Y

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Pollutants Monitored	In AQMA?	Relevant Exposure?	Distance to Kerb of Nearest Road (m)	Does this Location Represent Worst-Case Exposure?
MUC - 1	Muckley Corner Hotel Ground Floor	Roadside	408164	306513	NO_2	Y	N[c]	5 m	Y
MUC - 1A/B/C	Muckley Corner Hotel First Floor	Roadside	408164	306513	NO_2	Y	Y	5 m	Y
MUC - 2	Muckley Corner A5 Westbound	Roadside	408165	306487	NO_2	Y	N (9 m)	5 m	Y
MUC - 3	Muckley Corner A461 Southbound	Roadside	408097	306468	NO_2	Y	N (10 m)	5 m	Y
MUC - 4	Muckley Corner A5 Westbound	Roadside	408029	306501	NO_2	Y	N (2 m)	4 m	Y
MUC - 5	Muckley Corner A5 Eastbound	Roadside	408030	306516	NO_2	Y	N (5 m)	2 m	Y
MUC - 6	Muckley Corner A461 Southbound	Roadside	408161	306556	NO_2	Y	N (5 m)	2 m	Y

[a] The nearest relevant exposure is over 200 m southwest of the monitoring location but is alongside the same road. This exposure is 9 metres from kerb.
[b] No relevant exposure within 200 m of tube location.
[c] Relevant exposure at first floor height.

2.2 Comparison of Monitoring Results with Air Quality Objectives

2.2.1 Nitrogen Dioxide

There are two Air Quality Objectives for NO_2, namely:

- the annual mean of 40µg/m^3, and
- the 1-hour mean of 200µg/m^3 not to be exceeded more than 18 times a year.

Diffusion Tube Monitoring Data

The NO_2 diffusion tube data are summarised in Table 2.3. The full dataset (monthly mean values) are included in Appendix A.

The diffusion tubes are supplied and analysed by Staffordshire Scientific Services utilising the 20% Triethanolamine (TEA) in water preparation method. Full details of the bias adjustment and QA/QC procedure are provided in Appendix A.

As data capture for 2013 was good (above 90%) for all the sites, annualisation was not required.

For the 2013 data set there were eight sites where the annual mean NO_2 objective was exceeded. Five of these sites were located within the existing AQMA. Site MUC - 1A/B/C - Muckley Corner Hotel First Floor – is located on a façade of a relevant receptor (the concentration of 46.6 µg/m^3). Site MUC - 1 - Muckley Corner Hotel Ground Floor does not have relevant receptors. Those are covered by MUC - 1A/B/C - Muckley Corner Hotel First Floor. The concentrations at MUC-3, MUC-4 and MUC-5 were distance corrected to estimate the concentration at the receptors (Table 2.2). All exceeded the objective with the concentrations of 46.4 µg/m^3 (MUC-3), 49.2 µg/m^3 (MUC-4) and 41.9 µg/m^3 (MUC-5). These sites have also shown exceedences in previous years; therefore the AQMA is still required for this area.

The three sites which showed an exceedence of the annual mean objective and were located outside of the current AQMA were:

- A38-2A/B – Fradley (42.7 µg/m^3);
- A38-4A/B – Canwell (45.3 µg/m^3); and
- A5-2B – Muckley Corner (43.2 µg/m^3).

The three sites have shown consistent exceedences in the past.

The below table (Table 2.2) provides information on Site A38-4A/B – Canwell and Site A5-2B – Muckley Corner. These sites have been distance corrected to the nearest relevant exposure façade. When these sites were used to calculate concentrations at locations of relevant exposure (facades of residential properties), the annual mean concentrations fell to be below the objective at Site A5-2B – Muckley Corner (37.2 μg/m^3) while Site A38-4A/B – Canwell still exceeded the objective at 42.1 μg/m^3. However, Site A38-4X/Y is at the façade of the nearest relevant receptor to A38-4A/B. The annual mean at this site was 30.5 μg/m^3 in 2013. There is therefore no requirement to carry out a Detailed Assessment for this location.

Table 2.2 Fall-off with Distance Correction of Sites Exceeding the NO_2 Annual Mean Objective

Site ID	In AQMA?	Distance Kerb-Receptor (m)	Distance Kerb-Monitor (m)	Bias Adjusted Annual Mean (μg/m^3)	Distance Corrected Annual Mean (μg/m^3)
A38-4A/B - Canwell	**N**	10.0	6.9	**45.3**	**42.1**
A5-2B – Muckley Corner	**N**	6.0	2.0	**43.2**	37.2
MUC - 1 - Muckley Corner Hotel Ground Floor	Y	N/A – no relevant exposure*	5.0	**44.2**	N/A – no relevant exposure*
MUC – 3 - Muckley Corner A461 Southbound	Y	10.0	5.0	**53.3**	**46.4**
MUC-4 - Muckley Corner A5 Westbound	Y	2.0	4.0	**44.4**	**49.2**
MUC – 5 - Muckley Corner A5 Eastbound	Y	5.0	2.0	**48.0**	**41.9**

* Relevant exposure at first floor height – MUC - 1A/B/C.

Site A38-2A/B is located on the façade of a relevant receptor and has therefore not been distance adjusted. The annual mean concentrations of NO_2 at this site also exceeded the objective during 2012 and 2011. It was recommended in the 2013 Progress Report that a Detailed Assessment should be carried out for this area. In view of the limited number of receptors close to the A38 in this area, and as it is stated in TG(09) that the aim of a Detailed Assessment is to determine, with reasonable certainty, whether or not there is a likelihood of the objectives not being achieved, with a focus on maximum relevant public exposure, it is considered appropriate to make this decision based on the diffusion tube monitoring data in the vicinity. In 2013, the annual mean objective of 40μg/m^3 was exceeded at site A38–2A/B,

but not at sites A38 – 1 and A382/2(1), which are closer to the A38 than any nearby sensitive receptors. As monitoring covers all receptors close to the A38 in this area, it can be concluded that the exceedence is an isolated occurrence at the properties close to tube site A38-2A/B which results from their proximity to the road. It is therefore recommended that these four properties on the A38 (Rykneld Street) should be declared as an AQMA as a result of recorded exceeedences of the NO_2 annual mean objective. It is therefore assumed, on the basis of an average of 2.3 people per household[1], that around 9 people are exposed to this concentrations exceeding this objective in this area.

With respect to the hourly NO_2 objective, there could be a potential risk of exceedence where the annual mean concentration is greater than 60$\mu g/m^3$. For the 2012 results there are no sites where the annual mean is greater than 60$\mu g/m^3$; therefore it is unlikely that the hourly mean objective will be exceeded at any of the monitoring sites.

Figure 2.7 shows the trend across the diffusion tube monitoring locations in LDC from 2008 to 2013. From this it can be seen that the majority of sites showed a peak in annual mean concentration between 2008- 2010. The LAQM Support website states that '*Monitoring results obtained across the country in 2010 indicate that concentrations of NO_x/NO_2 were generally elevated compared to other recent years.*'[2]. This is a result of the meteorological conditions in 2010. This was followed by a general reduction in concentrations in 2011. The 2012 data sets shows that annual mean NO_2 concentrations have increased, but remained lower than those observed in 2010 at majority of sites. The concentrations in 2013 reduced when compared to the previous year.

[1] 2011 Census. Office for National Statistics.
[2] LAQM Support Website, FAQ136 http://laqm.defra.gov.uk/laqm-faqs/faq136.html

Table 2.3 Results of NO_2 Diffusion Tubes 2013

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months)	2013 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.87
A38 - 1	Alrewas	Roadside	N	N	12	38.1
A38 - 2/2(1)	Fradley	Roadside	N	Y (Duplicate)	10	35.1
A38 - 2A/B	Fradley	Roadside	N	Y (Duplicate)	11	**42.7**
A38 - 3	Lichfield	Roadside	N	N	12	36.4
A38 - 4A/B	Canwell	Roadside	N	Y (Duplicate)	12	**45.3**
A38 - 5A/B	Canwell	Roadside	N	Y (Duplicate)	11	36.8
A38 - 6A/B	Canwell	Roadside	N	Y (Duplicate)	12	31.1
A38-4X/Y	Canwell	Roadside	N	Y (Duplicate)	12	30.5
A5 - 1	Muckley Corner	Roadside	N	N	12	35.6
A5 - 1A	Muckley Corner	Roadside	N	N	12	38.1
A5 - 2A	Muckley Corner	Roadside	N	N	12	31.9
A5 - 2B	Muckley Corner	Roadside	N	N	12	**43.2**
A5 - 3	Lichfield	Roadside	N	N	11	29.0
B	Burntwood	Urban background	N	N	11	15.8

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2013 (Number of Months)	2013 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.87
L	Lichfield	Urban background	N	N	12	17.0
MUC - 1	Muckley Corner Hotel Ground Floor	Roadside	Y	N	11	**44.2**
MUC - 1A/B/C	Muckley Corner Hotel First Floor	Roadside	Y	Y (Triplicate)	12	**46.6**
MUC - 2	Muckley Corner A5 Westbound	Roadside	Y	N	12	38.7
MUC - 3	Muckley Corner A461 Southbound	Roadside	Y	N	12	**53.3**
MUC - 4	Muckley Corner A5 Westbound	Roadside	Y	N	12	**44.4**
MUC - 5	Muckley Corner A5 Eastbound	Roadside	Y	N	11	**48.0**
MUC - 6	Muckley Corner A461 Southbound	Roadside	Y	N	12	34.9

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3
* R- Roadside, B – Urban background

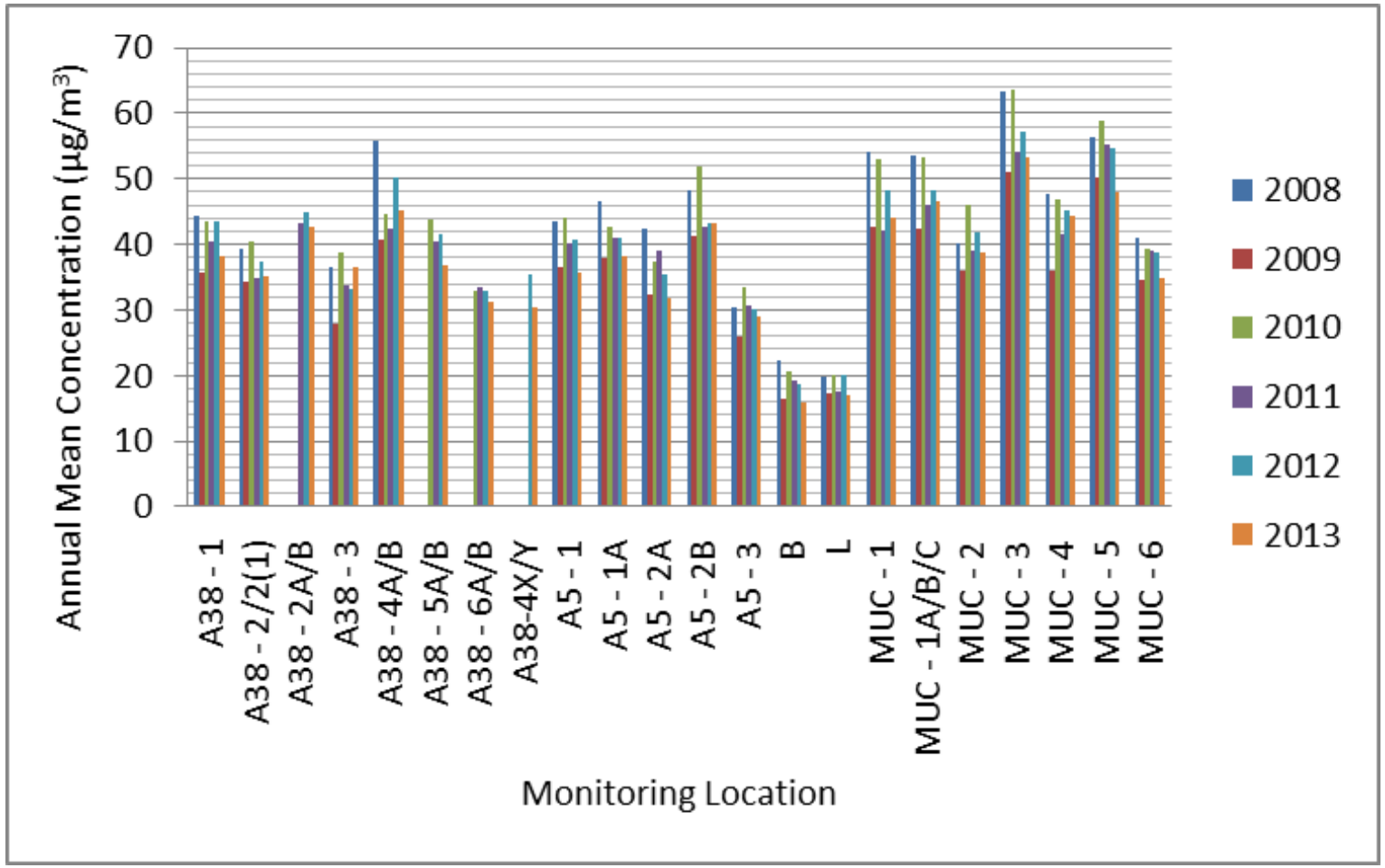
Table 2.4 Results of NO_2 Diffusion Tubes (2008 to 2013)

Site ID	Site Type*	Triplicate or Co-located Tube	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]					
				2008 (Bias Adjustment Factor = 1.03)	2009 (Bias Adjustment Factor = 0.81)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.88)	2012 (Bias Adjustment Factor = 0.86)	2013 (Bias Adjustment Factor = 0.87)
A38 - 1	R	N	N	**44.3**	35.7	**43.4**	**40.5**	**43.5**	38.1
A38 - 2/2(1)	R	Duplicate	N	39.3	34.4	**40.4**	35.0	37.4	35.1
A38 - 2A/B	R	Duplicate	N	N/A	N/A	N/A	**43.3**	**45.0**	**42.7**
A38 - 3	R	N	N	36.5	27.8	38.8	33.7	33.1	36.4
A38 - 4A/B	R	Duplicate	N	**55.8**	**40.8**	**44.5**	**42.4**	**50.1**	**45.3**
A38 - 5A/B	R	Duplicate	N	N/A	N/A	**43.9**	**40.4**	**41.7**	36.8
A38 - 6A/B	R	Duplicate	N	N/A	N/A	33.0	33.5	32.9	31.1
A38- 4X/Y	R	Duplicate	N	N/A	N/A	N/A	N/A	35.5	30.5
A5 - 1	R	N	N	**43.5**	36.5	**44.0**	**40.2**	**40.6**	35.6
A5 - 1A	R	N	N	**46.5**	37.8	**42.8**	**41.1**	**41.1**	38.1
A5 - 2A	R	N	N	**42.5**	32.4	37.3	39.0	35.5	31.9
A5 - 2B	R	N	N	**48.3**	**41.2**	**52.0**	**42.7**	**43.3**	**43.2**
A5 - 3	R	N	N	30.4	26.0	33.6	30.6	30.2	29.0
B	B	N	N	22.2	16.5	20.6	19.2	18.6	15.8
L	B	N	N	19.7	17.4	20.1	17.6	20.1	17.0
MUC - 1	R	N	Y	**54.1**	**42.7**	**53.1**	**42.1**	**48.4**	**44.2**
MUC - 1A/B/C	R	Triplicate	Y	**53.7**	**42.3**	**53.4**	**45.9**	**48.3**	**46.6**
MUC - 2	R	N	Y	**40.1**	**35.9**	**45.9**	**39.1**	**41.9**	38.7
MUC - 3	R	N	Y	**63.4**	**51.0**	**63.5**	**54.0**	**57.2**	**53.3**
MUC - 4	R	N	Y	**47.7**	**36.0**	**46.9**	**41.6**	**45.1**	**44.4**
MUC - 5	R	N	Y	**56.4**	**50.3**	**58.9**	**55.3**	**54.8**	**48.0**

Site ID	Site Type*	Triplicate or Co-located Tube	Within AQMA?	Annual Mean Concentration (µg/m^3) - Adjusted for Bias [a]					
				2008 (Bias Adjustment Factor = 1.03)	2009 (Bias Adjustment Factor = 0.81)	2010 (Bias Adjustment Factor = 0.85)	2011 (Bias Adjustment Factor = 0.88)	2012 (Bias Adjustment Factor = 0.86)	2013 (Bias Adjustment Factor = 0.87)
MUC - 6	R	N	Y	**41.0**	**34.5**	**39.4**	**39.1**	**38.7**	34.9

In bold, exceedence of the NO_2 annual mean AQS objective of 40µg/m^3
* R- Roadside, B – Urban background

Figure 2.7 Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites (2008-2013)



2.2.2 Particulate Matter (PM_{10})

No monitoring of particulate matter was undertaken by Lichfield District Council in 2013 as previous monitoring showed no risk to compliance with the objectives.

2.2.3 Sulphur Dioxide (SO_2)

No monitoring of sulphur dioxide was undertaken by Lichfield District Council in 2013 as there are no significant sources and no locations where air quality objectives are likely to be exceeded.

2.2.4 Benzene

No monitoring of benzene was undertaken by Lichfield District Council in 2013 as there are no locations where air quality objectives are likely to be exceeded.

2.2.5 Summary of Compliance with AQS Objectives

Lichfield District Council has measured concentrations of nitrogen dioxide above the annual mean objective at a relevant location outside of the AQMA at Site A38-2A/B – Fradley. The annual mean concentrations of nitrogen dioxide at this site also exceeded the objective during 2012 and 2011, therefore it is recommended that the four properties in the vicinity of this tube on the A38 (Rykneld Street) are declared as an AQMA as a result of exceedences of the annual mean objective.

Concentrations within the AQMA still exceed the annual mean objective for NO_2 at four diffusion tube monitoring locations (MUC-1A/B/C, MUC-3, MUC-4 and MUC-5); as such the AQMA should remain.

3 New Local Developments

3.1 Road Traffic Sources

LAQM requires local authorities to consider the following:

- Narrow congested streets with residential properties close to the kerb;
- Busy streets where people may spend one hour or more close to traffic;
- Roads with a high flow of buses and/or HGVs;
- Junctions;
- New roads constructed since the last Updating and Screening Assessment;
- Roads with significantly changed traffic flows; and
- Bus or coach stations.

Lichfield District Council confirms that of the above categories there have been no new or newly identified which have not previously been considered in previous rounds of review and assessment.

3.2 Other Transport Sources

LAQM requires local authorities to consider the following:

- Airports;
- Locations where diesel or stream trains are regularly stationary for periods of 15 minutes or more, with relevant exposure within 15m;
- Locations with a large number of movements of diesel locomotives and long term relevant exposure within 30m; and
- Shipping ports.

Lichfield District Council confirms that of the above categories there have been no new or newly identified sources which have not been considered in previous rounds of review and assessment.

3.3 Industrial Sources

LAQM requires local authorities to consider the following:

- Industrial Installations: new or proposed;
- Industrial installations: existing where emissions have increased substantially or relevant exposure introduced;
- Major fuel storage depots;
- Petrol stations; and
- Poultry farms.

Lichfield District Council received a planning application for the construction of six poultry units (planning application 11/01074/FULMEI registered in September 2011 with planning permission granted at appeal in January 2014) at:

- Cleat Hill Farm, Syerscote Lane, Haunton, Tamworth

The proposed sheds will house a maximum of 221,000 birds, which is below the screening criteria for mechanically ventilated poultry farms (Technical Guidance LAQM.TG (09)). As such, the development is not considered to give rise to significant emissions of particulate matter (PM_{10}).

Planning Reference /Decision	Location	Description	Additional Information
11/01074/FULMEI Planning permission granted at appeal.	Cleat Hill Farm Syerscote Lane Haunton Tamworth Staffordshire B79 9HB	Formation of 6 poultry units and associated works, including the construction of a new access track.	Air Quality Assessment focused on odour and ammonia emissions.

3.4 Commercial and Domestic Sources

LAQM requires local authorities to consider the following:

- Biomass combustion plant – individual installations;
- Areas where the combined impact of several biomass combustion sources may be relevant; and
- Areas where domestic solid fuel burning may be relevant.

Lichfield District Council confirms that of the above categories there have been no new or newly identified sources which have not been considered in previous rounds of review and assessment.

3.5 New Developments with Fugitive or Uncontrolled Sources

LAQM requires local authorities to consider the following:

- Landfill sites;
- Quarries;
- Unmade haulage roads on industrial sites;
- Waste transfer stations; and
- Any other potential sources of fugitive particulate emissions.

Lichfield District Council confirms that of the above categories there have been no new or newly identified sources which have not been considered in previous rounds of review and assessment.

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

Lichfield District Council confirms that all the following have been considered:

- **Road traffic sources**
- **Other transport sources**
- **Industrial sources**
- **Commercial and domestic sources**
- **New developments with fugitive or uncontrolled sources.**

4 Local / Regional Air Quality Strategy

The Staffordshire Air Quality Forum (SAQF)

LDC is an active member of the Staffordshire Air Quality Forum. The Forum is a local authority founded organisation, formed at the time of the commencement of the LAQM regime. The Forum currently comprises all Staffordshire's local planning authorities, Stoke-on-Trent City Council, the Highways Agency and Staffordshire County Council. It aims to work in partnership to reduce emissions by implementing and harmonising cost-effective measures, and sharing information regarding air quality reviews and assessments. Meetings are held at quarterly intervals to share information and resources between local authorities and the County Council.

5 Planning Applications

LDC has identified two planning applications for developments with potential to have an impact upon local air quality, the details of which are given below.

Planning Application 10/01498/OUTMEI

A planning application has been received in November 2010 for the redevelopment of land at Fradley Park, Halifax Avenue, Fradley to provide up to 750 new homes, primary school, health centre, nursery, public house, public and private open space, this including car and cycle parking. LDC has requested an Environmental Impact Assessment for the proposed scheme. The conclusions from An Air Quality Assessment submitted in November 2010 have been as follows:

- Construction activities are likely to give rise to dust emissions, the adoption of mitigation measures should reduce the risks of dust soiling . Air quality effects during construction will be short-term.
- The residual air quality effects due to traffic associated with the Proposed Development are expected to be of negligible significance at existing receptors and at new receptors introduced on the Application Site.

However, the development site is located near the A38 Rykneld Street and the additional traffic will add to pollutant concentrations at relevant receptors in the vicinity of the A38. As the annual mean concentrations of nitrogen dioxide at the diffusion tube monitoring site in that area - A38-2A/B - exceeded the objective in 2013 and previous years, it is recommended that the monitoring continues at this location.

Planning Application 10/01498/OUTMEI

Rugeley Power Station in Cannock Chase District, close to the boundary with LDC has been granted planning permission in May 2013 for building works to enable biomass burning as well as coal burning. An air quality assessment was carried out in 2012 as part of the planning application which concluded that emissions will be below the relevant objectives and limit values and concentrations at worst case receptors will be below the objectives. No Detailed Assessment is therefore required as a result of this planned change to the power station.

High Speed Rail line (HS2)

In January 2012 the Government announced it was to proceed with a High Speed Rail line (HS2) linking London and Birmingham.

The Phase One proposal is within the Lichfield District and passes through the Parish's of Drayton Bassett, Hints, Weeford, Swinfen & Packington, Whittington, Fradely & Streethay and Kings Bromley. The 13 mile railway through Lichfield joins the West Coast Main Line near to Handsacre.

The Environmental Statement for Phase One proposal was published at the end of 2013 and the Council have made comments during the consultation period. The next stage for Stage 1 is petitioning and the select committee process. The proposed Phase Two preferred route consultation recently closed and the Council submitted comments. It is expected that the Government with publish the outcome of that consultation towards the end of 2014.

Planning Reference /Decision	Location	Grid Reference	Description	Additional Information
10/01498/OUTMEI Permitted	Land At Fradley Park Halifax Avenue Fradley Lichfield Staffordshire	415683 313494	Site redevelopment to provide up to 750 new homes, primary school, health centre, nursery, public house, public and private open space, car and cycle parking together with landscaping and associated servicing.	Air Quality Assessment submitted in November 2010. Development has not been constructed yet.
CH/12/0270 Permitted	Rugeley Power Limited, Power Station Road, Rugeley		Erection of additional plant and equipment to existing power station comprising of biomass fuel storage and associated infrastructure to facilitate biomass as a primary fuel source for power station.	An air quality assessment produced in 2012. Development has not been constructed yet.

6 Air Quality Planning Policies

6.1 Local Development Framework and Core Strategy

The Core Strategy is the central document of the Local Development Framework and will plan for, and manage future growth and change in Lichfield District up until 2029. The old 'Local Plan' system focused upon a set of policies against which planning applications would be assessed, determining whether or not a development would be acceptable. The Local Development Framework looks much more widely, covering issues such as climate change, housing, economic development, natural resources, the built environment, health, community safety, sustainable transport and infrastructure needs including schools, different kinds of open space and play areas, transport improvements and investment in health centres.

The Core Strategy sets out the following polices with respect to air quality:

Core Policy 3: Use of Energy & Resources

Development must contribute to the prudent use of energy and natural resources, including water and waste minimisation. To achieve this, all development will be required to:

Minimise levels of pollution or contamination to air, land, soil or water, including noise and light pollution and avoid unacceptable uses within source protection zone 1 areas to safeguard water resources and ensure water quality.

Policy SC1: Renewable Energy: Biomass Energy Development

Projects and developments which utilise bio-energy will be supported by the District Council.

.....opportunities for biomass energy developments will be assessed on the following basis:

preference should be to utilise brown field sites or be co-located with other wood processing industries

located and scaled to avoid adverse off-site impacts, including any visual intrusion of plant, such as chimney or biomass storage facility;

located close to the point of demand or adjacent to existing transport corridors;

minimise pollution from noise, emissions and odours;

minimise emissions and waste products, including airborne emissions, emissions to watercourses and ash; *and minimise any adverse impacts on amenity.*

Core Policy 5: Sustainable Transport

Accessibility will be improved and transport choice widened, by ensuring that all new development is well serviced by an attractive choice of transport modes, including public transport, footpaths and cycle routes to provide alternatives to the use of the private car and promote healthier lifestyles.

Development proposals will, either individually or collectively, have to make appropriate provisions for:

Air Quality....

Reducing the need to travel;

Widening travel choices and making travel by sustainable means of transport more attractive than the private car;

Improving road safety; and

Improving air quality and reducing the impact of travel upon the environment, in particular reducing carbon emissions that contribute to climate change.

Core Policy 10: Healthy & Safe Lifestyles

..... The District Council will ensure that the current high standard of air quality in the District is monitored and maintained and, where possible, improved with no decline in standards being deemed acceptable as a result of new development.

7 Local Transport Plans and Strategies

7.1 A5 Transport Liaison Group

LDC is part of the A5 Transport Liaison Group, which works to develop a strategy for the A5 route corridor, to address challenges presented by the A5 road to local authorities and planners. The A5 is a significant source of vehicle emissions within Lichfield District, in particular within the AQMA. Strategy Statement T1 states that ”long distance traffic will generally be discouraged (from using the A5) given the availability of more suitable alternatives”, whilst Strategy Statement T2 recognises the need to “reduce congestion and improve air quality in Air Quality Management Areas”.

A £5 million bid for junction improvements at Muckley Corner has been submitted through the Transport Liaison Group, however it was not successful.

7.2 LTP3

The County Council has published its third Local Transport Plan (LTP) (Staffordshire County Council, 2011). This sets out the County Council's proposals for transport provision within the county, including walking, cycling, public transport, car based travel and freight, together with the management and maintenance of local roads and footways.

Alongside the Strategic Plan, the County Council has also published an Implementation Plan (Staffordshire County Council, 2011) which uses available funding to deliver the LTP objectives over the period 2011/12 to 2014/15, together with the arrangements in place for overseeing LTP delivery and ensuring that it remains on track to meet its objectives.

The key policies in the LTP with respect to air quality are detailed below.

Policy 5.1:

- *We will promote alternatives to private motor vehicles. This will be achieved by:*
- *Investing in measures to improve conditions for pedestrians and cyclists, particularly in urban areas where a real opportunity for modal change exists.*
- *Encouraging major employers to develop travel plans as a way of managing travel to and from work in a sustainable way.*
- *Encouraging local planning authorities to secure development patterns and mixes that reduce the need to travel and enable the use of smarter travel modes.*

- *Supporting new development that includes or is located in areas with good public transport links, well-connected to walking and cycling networks and facilities, and where the demand of 'place' and 'movement' is considered together.*
- *Working with local planning authorities and developers to mitigate impacts of development in less sustainable locations but which is essential to support regeneration and economic growth.*
- *Promoting the financial and environmental benefits to businesses of adopting flexible working practices, especially in areas where traffic levels are approaching their capacity, where future development is expected, in AQMAs or where the workforce travels some distance to get to work.*
- *Ensuring transport and access is considered at an early stage in service design and delivery.*
- *Raising awareness of the financial, environmental and social benefits of taking services to communities/people.*
- *Sharing information about improving local air quality through the SAQF.*
- *Promoting the financial, environmental and health benefits of smarter travel modes to individuals, especially in areas where traffic levels are approaching their capacity, where future development is expected or in AQMAs.*
- *Promoting (and running) schemes that encourage the take up of smarter travel modes.*
- *Encouraging local planning authorities to keep their car parking strategies under review.*
- *Introducing Traffic Regulation Orders (such as clear zones, low-emission zones and no stopping/parking zones), subject to there being suitable alternative routes, especially in urban areas, AQMAs, and areas given specific environmental designation such as Special Areas of Conservation (SAC) and Areas of Outstanding Natural Beauty (AONB).*

Policy 5.2:

We will promote the use of low-emitting vehicles and vehicle efficiency. This will be achieved by:

- *Investigating measures that will encourage the adoption of low-emitting vehicles such as the installation of electric vehicle charging points in pilot areas.*

- *Encouraging individuals to purchase low-emitting vehicles and undertake eco-driver training.*
- *Investigating the possibility of giving low emitting vehicles greater road priority.*
- *Delivering the priorities and actions contained in the Staffordshire Freight Strategy (Appendix L).*
- *Encouraging businesses with a company car fleet that when replacing vehicles they consider purchasing lower emitting vehicles, put their drivers through eco-driver training and minimise their business mileage.*
- *Encouraging public transport operators that when replacing vehicles they consider purchasing lower emitting vehicles and put their drivers through eco-driver training.*
- *Lobbying Government, Network Rail and train operating companies to electrify more of the county's rail lines.*
- *Creating Freight Quality Partnerships where partners are willing and benefits are identifiable.*

Policy 5.3:

We will lead by example and reduce our own road transport emissions. This will be achieved by:

- *Replacing our vehicles (when required) with ones that are less polluting and more fuel efficient, wherever possible (see Box 5.2 of LTP3, Chapter 5).*
- *Assessing our essential car user criteria to ensure that it is fit for purpose.*
- *Reviewing our staff car parking facilities.*
- *Continuing to develop initiatives, such as flexible working, that reduce the need for employees to use their cars to get to work.*
- *Investigating the introduction of eco-driver training for some essential car users.*
- *Ensuring all main council offices have access to a pool bicycle and/or car.*
- *Using recycled and locally sourced materials whenever possible in County Council highway construction and maintenance schemes.*
- *Delivering other priorities contained within the County Council's Travel Plan (available on request).*

Policy 5.4:

We will improve the resilience of the transport network to changing climatic conditions. This will be achieved by:

- *Delivering the priorities contained within the Council's Climate Change Adaptation Strategies (www.staffordshire.gov.uk).*
- *Assessing, managing and minimising risks posed by climate change to people and property where it relates to the transport network.*
- *Managing disruption and ensuring rapid recovery of the transport network from the impact of a climate change related event.*
- *Encouraging all owners of the transport network to manage, maintain and develop it with climate change in mind.*
- *Supporting new development that has been designed with climate change in mind by, for example, including green space, tree planting and artificial shade.*

8 Climate Change Strategies

8.1 Local Development Framework Core Strategy

As set out in section 6, the LDF will be the main driver behind all local development until 2026. In terms of climate change the framework sets out the key strategies and policies:

Strategic Objective 3: Climate Change

To create a District where development meets the needs of our communities whilst minimising its impact on the environment and helps the District to mitigate and adapt to the adverse effects of climate change.

Core Policy 1: The Spatial Strategy

..... Proposals will promote sustainability by minimising and/or mitigating pressure on the natural, built and historic environment, natural resources, utilities and infrastructure and areas at risk of flooding, whilst also mitigating and adapting to climate change and reducing the need to travel.

..... Development will be co-ordinated with an appropriate transport strategy to support sustainable lifestyles and help address climate change.

Core Policy 2: Principles for Sustainable Development

All development will be required to contribute to the creation and maintenance of sustainable communities, bringing about a long term and continuous improvement to Lichfield District's economic, social and environmental circumstances without precluding future opportunities. Proposals for all new development must be compatible with the following principles:

Climate change.....

- *mitigate against the adverse effects of climate change and pursue adaptation measures, particularly in relation to the location of new development, renewable technologies, design and construction techniques, biodiversity, landscape and historic environment management proposals, the creation of green infrastructure and flood risk management.*

Sustainable Communities Policy SC2: Development & Sustainable Construction

Minimum sustainability standards are required for all new build and retrofitted developments to ensure that development minimises environmental impacts, including lowering the demand for energy and water, securing the efficient use of resources and achieving greater resilience to changes in climate.

Core Policy 5: Sustainable Transport

Accessibility will be improved and transport choice widened, by ensuring that all new development is well serviced by an attractive choice of transport modes, including public transport, footpaths and cycle routes to provide alternatives to the use of the private car and promote healthier lifestyles.

Development proposals will, either individually or collectively, have to make appropriate provisions for:

Climate change.....

- *Improving air quality and reducing the impact of travel upon the environment, in particular reducing carbon emissions that contribute to climate change.*

9 Implementation of Action Plans

The joint 2010 Further Assessment and Action Plan for Muckley Corner (AECOM, 2010) described the findings of the Council's air quality action planning appraisal, including an impact assessment of the committed works being undertaken for the A5 Muckley Corner Improvements.

The key findings of the assessment were summarised in the 2010 Further Assessment as:

- Exceedences of the UK NO_2 annual mean objective remain in the 2010 with-scheme scenario;
- The number of exceedences of the NO_2 annual mean objective for the 2010 with-scheme assessment is seen to decrease to 4 from the 7 seen in the 2009 base year;
- Background sources make up the largest individual contribution at 23 of the 30 receptors with OGV2 making up the largest single contributor at the remaining 7 receptors;
- The second largest contributors after background sources were OGV2 at 25 of the 30 receptors and OGV1 at the remaining 5 receptors; and
- The original designation of the Air Quality Management Area for the NO_2 annual mean objective is correct and does not need to be revoked or amended.

The Muckley Corner Improvement scheme was completed in June 2011. As shown in section 2.2.3 and Figure 2.7, the improvement works at Muckley Corner have not had the desired impact on air quality in the AQMA and there are still significant exceedences of the annual mean nitrogen dioxide objective.

Funding has been granted as part of the 'pinch point' scheme for road widening and traffic signalling work to be carried out at the A5/A5148 Wall Island roundabout during 2014. The improvements will reduce congestion by widening some of the approach and exit roads to the roundabout and installing traffic signals. This supports Lichfield's future LDF housing and employment growth. It is hoped that the works will also help to reduce concentrations of nitrogen dioxide within the AQMA. It is anticipated that the scheme will be completed in 2014.

LDC has applied for funding from Ecostars Fleet Recognition Scheme for further improvements at the Muckley Corner junction but was unsuccessful. The bid may be resubmitted as a joint bid for authorities with AQMAs to put forward a stronger case.

LDC is working on a number of initiatives which, it is hoped, will bring concentrations below the objectives. These include those discussed above as well as the work of the A5 Transport Liaison Group discussed in section 6.1.

A standalone Action Plan detailing the ongoing and future air quality work will be completed and submitted in 2014 to Defra.

10 Conclusions and Proposed Actions

10.1 Conclusions from New Monitoring Data

Outside of the AQMA, the review of new diffusion tube monitoring data has identified one location where the AQS annual NO_2 objective was exceeded in 2013 at the façade of a relevant receptor: A38-2A/B – Fradley. As exceedences at this site were also recorded for 2012 and 2011, it is recommended that the four properties in the vicinity of this tube on the A38 (Rykneld Street) are declared as an AQMA as a result of exceedences of the annual mean objective.

Concentrations within the AQMA still exceed the annual mean objective for NO_2 at four diffusion tube monitoring locations (MUC-1A/B/C, MUC-3, MUC-4 and MUC-5); as such the AQMA should remain.

10.2 Conclusions relating to New Local Developments

Lichfield District Council has identified one planning application which may impact upon air quality; this is the redevelopment of land at Fradley Park, Halifax Avenue, Fradley to provide up to 750 new homes, primary school, health centre, nursery, public house, public and private open space, this including car and cycle parking. The Air Quality Assessment supporting the application has predicted negligible impacts associated with both the construction and operation phases of the development. However, the development site is located near the A38 Rykneld Street and the additional traffic will add to pollutant concentrations at relevant receptors in the vicinity of the A38. As the annual mean concentrations of nitrogen dioxide at the diffusion tube monitoring site in that area - A38-2A/B - exceeded the objective in 2013 and previous years, it is recommended that the monitoring continues at this location.

10.3 Proposed Actions

Proposed actions arising from the 2014 Annual Progress Report are as follows:

- Continue NO_2 diffusion tube monitoring in the district to identify future changes in pollutant concentrations;
- Continue NO_2 diffusion tube monitoring at site A38-2A/B , which has exceeded the annual mean NO_2 objective for the past three years and which is located in the area scheduled for new development;

- Declare the four properties close to monitoring site A38-2A/B on the A38 (Rykneld Street) as an AQMA for the annual mean nitrogen dioxide objective;
- Finalise the Lichfield Air Quality Action Plan;
- Proceed to the 2015 Updating and Screening Assessment.

11 References

- AEA Technology (2007) *Air Quality Review and Assessment: Detailed Assessment 2007. Report to Lichfield Council.*
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- Department for Environment, Food and Rural Affairs (Defra) (2009) *Local Air Quality Management Technical Guidance LAQM.TG(09).*
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- Lichfield Borough Council (2012) *Lichfield District Local Plan. Our Strategy*.
- Lichfield District Council (2014) *Schedule of Proposed 'Other/Additional' Modifications to the Local Plan: Strategy.*
- Staffordshire County Council *(2011) Local Transport Plan.*
- Staffordshire County Council *(2011) Local Transport Plan Implementation Plan.*

12 Glossary of Terms

APR – Annual Progress Report

AQAP – Air Quality Action Plan

AQMA – Air quality Management Area

AQS – Air Quality Strategy

Defra – Department for Environment, Food and Rural Affairs

LAQM – Local Air Quality Management

LDC – Lichfield District Council

LDF – Local Development Framework

LTP – Local Transport Plan

$\mu g/m^3$ – Micrograms per cubic meter

NO_2 – Nitrogen Dioxide

PM_{10} - Particulate Matter less than 10µg in aerodynamic diameter

TEOM – Tapered Element Oscillating Microbalance

VCM - Volatile Correction Model – Used to correct TEOM measurements for the loss of volatile components of particulate matter that occur due to the high sampling temperatures employed by this instrument

13 Appendices

Appendix A: Quality Assurance / Quality Control (QA/QC) Data

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

The diffusion tubes are supplied and analysed by Staffordshire Scientific Services utilising the 20% triethanolamine (TEA) in water preparation method.

As there are no automatic monitoring stations within Lichfield District, a local bias adjustment factor has not been calculated. A bias adjustment of 0.87 for the year 2013 (based on 11 studies) has been derived from the national bias adjustment spreadsheet[3].

For previous data, years 2008 to 2012, the bias adjustment factors have been taken from the Council's previous LAQM annual reports. The factors used were 1.03 (2008), 0.81 (2009), 0.85 (2010), 0.88 (2011) and 0.86 (2012).

QA/QC of Diffusion Tube Monitoring

Staffordshire Scientific Services is a UKAS accredited laboratory and has conducted its analyses in accordance with the procedures set out in the Harmonisation Practical Guidance since January 2009. These provide strict performance criteria for participating laboratories to meet, thereby ensuring NO_2 concentrations reported are of a high calibre. The lab follows the procedures set out in the Harmonisation Practical Guidance. In the latest available WASP results, rounds 120 through to 123 (January 2013 to December 2013) Staffordshire Scientific Services have achieved a 50% satisfactory rating in round 120, and 100% satisfactory in rounds 121-123. The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$. In 2013 100% of all local Authority co-location studies were rated as 'good' (tubes are considered to have "good" precision where the coefficient of variation of duplicate or triplicate diffusion tubes for eight or more periods during the year is less than 20%).

[3] [3] National Diffusion Tube Bias Adjustment Factor Spreadsheet, version 03/14 published in March 2014.

Bureau Veritas **Lichfield District Council**

Monthly Diffusion Tube Results

Site Ref	NO_2 Concentrations µg/m^3														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	COUNT	% DATA CAPTURE	AVERAGE
A38 - 1	50.5	49.4	40.4	34.5	34.5	37.8	45.4	47.9	51.6	44.2	51.5	37.4	12	100.0	43.8
A38 - 2	50.1	51.4	61.9	35.5		37.3		32.2	35.2	31.1	31.0	42.0	10	83.3	40.8
A38 - 2(1)	56.8	44.3	60.3	39.1		40.0	17.9	33.3	38.8	31.3	35.7	41.1	11	91.7	39.9
A38 - 2A	57.0	59.5	55.4	42.2	46.3	50.0	54.8	46.7	52.1	43.8	41.2	46.4	12	100.0	49.6
A38 - 2B	62.7	47.9	53.0	38.2	40.6	44.9	56.5	46.0	56.7	46.6	45.0	44.9	12	100.0	48.6
A38 - 3	51.4	54.7	63.2	35.3	33.6	44.4		31.0	43.1	33.9	40.3	28.9	11	91.7	41.8
A38 - 4A	60.6	62.4	55.0	38.4	49.3	48.9	50.0	49.7	62.6	46.6	59.3	43.7	12	100.0	52.2
A38 - 4B	63.3	60.0	53.2	40.1	46.7	55.4	56.3	53.8	59.7	32.8	54.2	47.0	12	100.0	51.9
A38 - 5A	52.2	37.3	32.8	29.5	36.3	37.7	44.7	43.2	53.4	26.8	54.6	42.3	12	100.0	40.9
A38 - 5B	54.3	44.6	32.8	30.4	49.0	38.5	49.0	49.5	58.5	31.6	44.4	41.8	12	100.0	43.7
A38 - 6A	46.3	35.8	27.9	23.3	34.4	28.6	34.0	37.3	42.4	26.3	46.3	42.7	12	100.0	35.4
A38 - 6B	47.5	40.2	27.3	25.7	38.6	27.7	34.0	39.0	39.1	29.9	44.5	39.1	12	100.0	36.1
A38-4(X)	39.3	37.1		25.7	34.2	31.4	33.3	39.0	39.4	34.2	42.8	24.5	11	91.7	34.6
A38-4(Y)	46.8	38.1		25.6	34.4	28.8	31.7	32.0	38.4	33.4	43.2	37.0	11	91.7	35.4
A5 - 1	59.7	49.7	41.4	27.8	25.6	27.1	40.8	45.0	46.9	31.1	40.3	55.7	12	100.0	40.9
A5 - 1A	58.9	53.2	35.6	29.8	31.2	30.9	50.4	45.7	52.1	47.1	47.0		11	91.7	43.8
A5 - 2A	53.8	41.8	29.8	29.7	28.6	21.3	37.7	41.4	48.2	27.7	40.6	39.6	12	100.0	36.7
A5 - 2B	63.4	62.8	67.2	44.1	37.6	44.3	49.9	48.5	56.4	42.0	53.0	27.2	12	100.0	49.7
A5 - 3	43.8	42.5	41.8	25.0	31.2	27.1	32.8	27.9	38.1	20.9	39.3	29.4	12	100.0	33.3
B	26.3	7.3	23.5	16.1	13.7	14.2	14.8	17.5	22.2	18.3	23.2	20.7	12	100.0	18.2
L	35.2	22.3	20.9	18.0	13.4	14.7	18.3	16.4		11.2	22.1	22.9	11	91.7	19.6
MUC - 1	58.7	56.3	56.9	28.3	46.0	57.2	67.1	51.3	58.8	46.5	45.1	37.1	12	100.0	50.8
MUC - 1A	56.8	62.5	60.8	28.2	47.6	57.1	60.5	46.9	53.7	40.1	49.1	37.9	12	100.0	50.1
MUC - 1B	55.1	68	69.3		53.8	59.6	67	50	60.6	33.2	60.4	44.5	11	91.7	56.5
MUC - 1C	61.4	57.2	71.6		51.5	49.2	64.6	54.1	56.8	42.5	49.2	37.2	11	91.7	54.1
MUC - 2	48	56.7	53.6	34.6	38.8	43.1	55.5	42.9	52.3	28.5	49.9	29.8	12	100.0	44.5
MUC - 3	75.4	61.9	69.3	39.5	49.1	58.1	62.4	68.4	75.1	62.5	71.6	41.2	12	100.0	61.2
MUC - 4	56.1	71.6	68.3	49.1	43.9	53.2	60.8	42.3	49	37.5	44.6	36.1	12	100.0	51.0
MUC - 5	64.6	60	52.5	45.8	44.9	46.2	55.5	66.9	72.4	49.4	49.2	55.2	12	100.0	55.2
MUC - 6	56	54	35.2	25.4	27.1	28.5	42	42.5	43.8	41.5	47.4	37.5	12	100.0	40.1