Lichfield District Council
Annual Status Report 2016

Bureau Veritas

September 2016

Move Forward with Confidence

Document Control Sheet

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2015 Air Quality Annual Status Report (ASR)

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

September 2016

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Endorsement from the Director of Health and Care, Staffordshire County Council

Staffordshire County Council is committed to working with partners to ensure that Staffordshire will be a place where improved health and wellbeing is experienced by all. Poor air quality has a negative impact on public health, with potentially serious consequences for individuals, families and communities. Identifying problem areas and ensuring that actions are taken to improve air quality forms an important element in protecting the health and wellbeing of Staffordshire residents. Improving air quality is often a complex issue, presenting a multi-agency challenge – so it is essential that all agencies work together effectively to deliver improvements where they are needed. As Director of Health and Care across Staffordshire I endorse this Annual Status Report which sets out the position in Lichfield District Council and which will support an on-going work programme to address air quality issues.

Dr Richard Harling
Director of Health and Care
Staffordshire County Council

September 2016

Executive Summary: Air Quality in Our Area

Air Quality in Lichfield District Council

Air pollution is associated with a number of adverse health impacts. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas[1,2].

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion[3].

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.

In November 2015, Lichfield District Council undertook a dispersion modelling Detailed Assessment of the area surrounding the A38 and extending from the A38/A5127 junction to the District's northern boundary. The report concluded that an Air Quality Management Area (AQMA) should be declared in the area. The Council has declared AQMA No.2 which came into force on 1st August 2016.

During 2015, there were eight sites where the annual mean NO_2 objective was exceeded. Two of these sites (A38-4A/B and A38-5A/B) are outside the AQMAs. The highest annual mean NO_2 concentration was observed at the site MUC-3.

The annual mean concentrations at A38-4A/B, A38-5A/B, MUC-3, MUC-4 and MUC-5 were distance corrected to estimate the concentration at relevant exposure. Only

[1] Environmental equity, air quality, socioeconomic status and respiratory health, 2010
[2] Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006
[3] Defra. Abatement cost guidance for valuing changes in air quality, May 2013

the sites MUC-3 and MUC-4 exceeded the annual mean NO_2 objective at the receptor façade with the concentrations of 42.2µg/m^3 and 40.9µg/m^3 respectively.

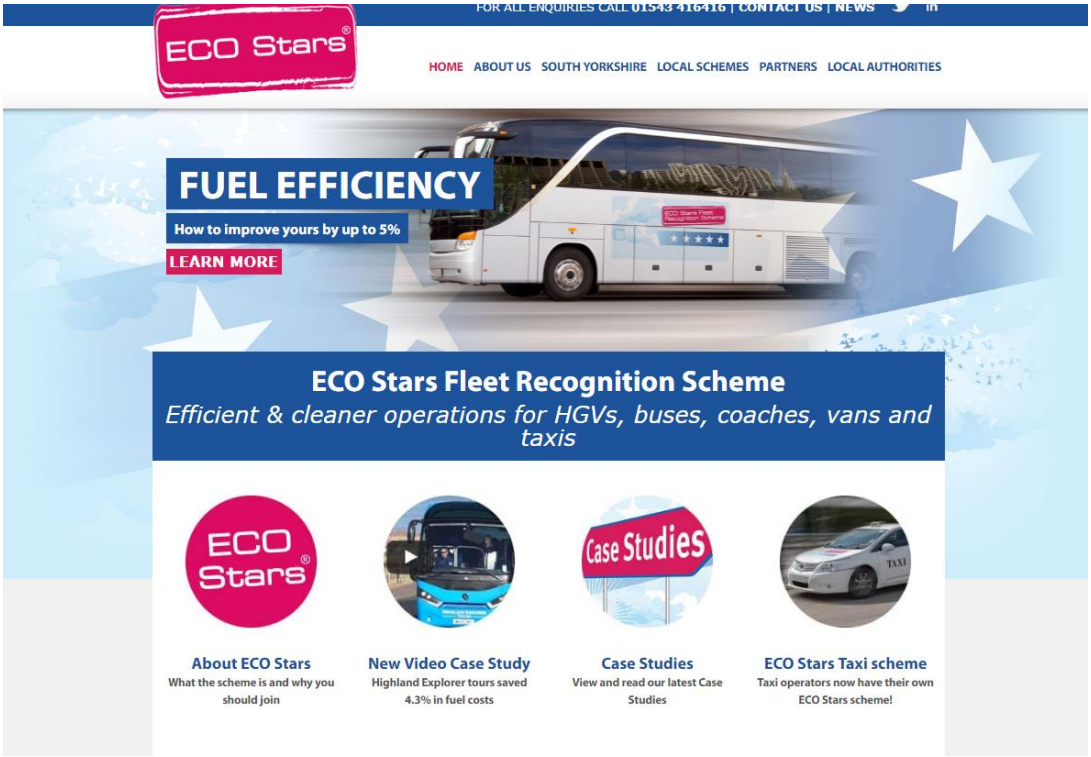
The planned HS2 project will pass through the Lichfield Council area, although at this stage it is not considered likely to cause any adverse air quality impacts at present as detailed in Appendix C.

Actions to Improve Air Quality

The Council is preparing AQAP to tackle the air quality issue within AQMAs. The following main actions were identified and proposed in AQAP, based on the area and type of effects that may be achieved:

- Reduce traffic numbers on A5 and A38, either total volume or only HGVs depending on future M6 toll use;
- EcoStars - upgrade commercial vehicles (buses, HGVs and LGV) to euro V/VI; and
- Upgrade to expressways - either/a combination of either reducing length of any junction links; increasing speed on free flow or amending road widths in some areas.

Figure 0.1 – The ECO Stars Fleet Recognition Scheme



In addition to the AQAP, the Local Plan (2008-2029) and Integrated Transport Strategy (2015-2029) include policies and actions in relation to sustainable transport within the District. The core actions are:

- Improve everyone's access to public transport, their ability to walk and cycle, minimising the need to travel by car and reducing levels of congestion;
- Improve transport infrastructure; and
- Continue and improve partnership working between operators, developers and public sector agencies.

Figure 0.2 – Road traffic on the A38

Local Priorities and Challenges

There are two AQMAs declared within the District for the exceedances of annual mean NO_2 objective with road traffic being the major source. Given the need to meet the NO_2 annual mean objective, the focus will need to be on reducing the annual mean concentrations of NO_2. The key priorities and challenges for the coming year will be

- To produce an air quality action plan to determine the best policies and intervention measures to put in place in order to reduce local NO_2 concentrations; and
- .To install additional monitoring locations at the A38 Rykneld Street near Croxhall Road and near A5127/A39 junction) to confirm existing concentrations.

How to Get Involved

Due to the main source of air pollution within Lichfield District Council being from transport sources, the easiest way for the public to get involved with helping improving air quality within the area would be to look at alternatives to the way they usually travel.

The following are suggested alternatives to private travel that would contribute to improving the air quality within the District:

- Use public transport where available – This reduces the number of private vehicles in operation reducing pollutant concentration through the number of vehicles and reducing congestion;
- Walk or cycle if your journey allows – From choosing to walk or cycle for your journey the number of vehicles is reduced and also there is the added benefit of keeping fit and healthy. In addition many of the cycle routes are off-road meaning you are not in close proximity to emissions from road traffic sources;
- Car/lift sharing – Where a number of individuals are making similar journeys, such as travelling to work or to school car sharing reduces the number of vehicles on the road and therefore the amount of emissions being released. This can be promoted via travel plans through the workplace and within schools; and
- Alternative fuel / more efficient vehicles – Choosing a vehicle that meets the specific needs of the owner, fully electric, hybrid fuel and more fuel efficient cars are available and all have different levels benefits by reducing the amount of emissions being released.

Table of Contents

List of Tables

List of Figures

1 Local Air Quality Management

This report provides an overview of air quality in Lichfield District Council during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) 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 an exceedance is considered likely the local authority must 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. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Lichfield District Council to improve air quality and any progress that has been made.

The statutory air quality objectives applicable to LAQM in England can be found in Table E.1 in Appendix E.

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

Air Quality Management Areas (AQMAs) are declared when there is an exceedance or likely exceedance of an air quality objective. After declaration, the authority must prepare an Air Quality Action Plan (AQAP) within 12-18 months setting out measures it intends to put in place in pursuit of the objectives.

A summary of AQMAs declared by Lichfield District Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at https://uk-air.defra.gov.uk/aqma/details?aqma_id=80.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
A5 Muckley Corner AQMA No.1	NO_2 annual mean	Lichfield	An area encompassing the Muckley Corner Roundabout on the A5 along with a number of surrounding buildings.	-
AQMA No.2	NO_2 annual mean	Lichfield	A38, Wall Island to Alrewas	-

2.2 Progress and Impact of Measures to address Air Quality in Lichfield District Council

Lichfield District Council has taken forward a number of measures during the current reporting year of 2015 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2. More details on the measures can be found in the Local Plan (2008-2029) and Integrated Transport Strategy(2015-2029) .

Key completed measures are:

- Public transport services have been maintained and improved through 2014/15 with more bus services linking to Burntwood and Tamworth, and more frequent services to Burton on Trent; and
- The A5/A5148 Wall Island improvement scheme was required due to traffic congestion and queuing problems during peak periods. Works were delivered in 2014 as part of the Highways Agency's Pinch Point Programme. Traffic signals were introduced on two junction approaches with gap closures and

carriageway widening works. This has helped to alleviate daily traffic congestion and reduce journey times as well as improving road safety at the junction.

Lichfield District Council expects the following measures to be completed over the course of the next reporting year:

- Produce AQAP;
- Continue to work with partners to improve accessibility, by enhancing sustainable transport opportunities and encouraging development that, reduces the need to travel, and changes to travel behaviour through a balance of transport measures; and
- Future development within the District will be focused on the most accessible settlements and locations to reduce the need to travel.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Ecostars	Vehicle Fleet Efficiency	Fleet efficiency and recognition schemes	Lichfield DC and supported by Third Party	-	On-going	Reduction in fuel consumption & emissions	-	On-going	On-going	http://www.ecostars-uk.com/
2	Staffordshire Air Quality Forum	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	County-wide	Completed	On-going	-	-	On-going	On-going	
3	Improvement of A38	Traffic Management	Strategic highway improvements	Lichfield DC	Completed	On-going	-	-	On-going	On-going	Muckley Corner has AQMA order imposed on it
4	Increase the Volume of through traffic using M6 Tool	Traffic Management	UTC, Congestion management, traffic reduction	Lichfield DC	Planning	-	-	-	-	-	-
5	Upgrading to Expressways	Traffic Management	UTC, Congestion management, traffic reduction	Lichfield DC	Planning	-	Reduction in traffic congestion	-	-	-	-
6	Improvements to Lichfield Trent Valley rail station	Promoting Travel Alternatives	Promote use of rail and inland waterways	Lichfield DC	Completed	On-going	-	-	On-going	On-going	-
7	The A5/A5148 Wall Island improvement scheme	Traffic Management	UTC, Congestion management, traffic reduction	Lichfield DC	Completed	Completed	Reduction in journey time	-			

2.3 $PM_{2.5}$ – Local Authority Approach to Reducing Emissions and or Concentrations

As detailed in Policy Guidance LAQM.PG16 (Chapter 7), local authorities are expected to work towards reducing emissions and/or concentrations of $PM_{2.5}$ (particulate matter with an aerodynamic diameter of 2.5µm or less). There is clear evidence that $PM_{2.5}$ has a significant impact on human health, including premature mortality, allergic reactions, and cardiovascular diseases.

The Public Health Outcomes Framework indicator for the fraction of deaths attributable to $PM_{2.5}$ in Lichfield District Council is 5.1%, which is below national average of 5.3%.

Lichfield District Council does not currently undertake any monitoring of PM_{10} or $PM_{2.5}$, and consequently there are currently no specific measures in place to address $PM_{2.5}$ concentrations within Lichfield District Council.

LAQM.TG16 Table A.1 Action Toolbox provides a list of measures that can be implemented to tackle $PM_{2.5}$.

Lichfield District Council will review these actions with the County Council Public Health Team in 2016 to consider whether any specific actions are required.

3 Air Quality Monitoring Data and Comparison with Air Quality Objectives and National Compliance

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

This section sets out what monitoring has taken place and how it compares with objectives.

Lichfield District Council did not undertake any automatic (continuous) monitoring during 2015.

3.1.2 Non-Automatic Monitoring Sites

Lichfield District Council undertook non- automatic (passive) monitoring of NO_2 at 22 sites during 2015. Table A.1 in Appendix A shows the details of the sites.

This includes six duplicate sites and one triplicate site as follows. There have not been any changes to the sites numbers or locations from the previous year.

The duplicate sites are:

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

The triplicate site is:

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

Maps showing the location of the monitoring sites are provided in Appendix D. Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

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.

3.2 Individual Pollutants

The air quality monitoring results presented in this section are, where relevant, adjusted for bias. Further details on adjustments are provided in Appendix C.

3.2.1 Nitrogen Dioxide (NO_2)

Table A.2 in Appendix A compares the ratified and adjusted monitored NO_2 annual mean concentrations for the past 5 years with the air quality objective of 40µg/m^3.

For diffusion tubes, the full 2015 dataset of monthly mean values is provided in Appendix B.

Data capture for 2015 was good (above 75%), with no sites requiring short to long term adjustment (annualisation).

Results for year 2015 have been bias adjusted using a national bias adjustment factor of 0.85. Full details of the bias adjustment and QA/QC procedure are provided in Appendix A.

For the 2015 data set there were eight sites where the annual mean NO_2 objective was exceeded. The highest annual mean NO_2 concentration was observed at the site MUC-3.

Figure 1– Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites Outside AQMAs

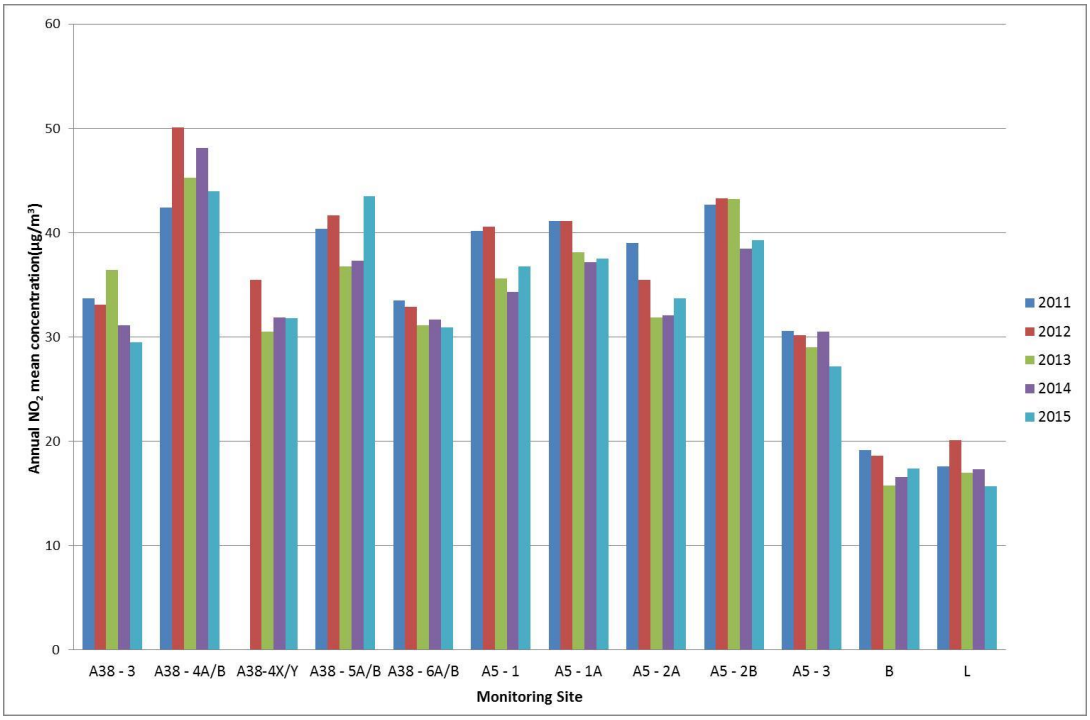


Figure 1 shows the trend across the diffusion tube monitoring locations outside the AQMAs in Lichfield District Council from 2011 to 2015. The annual mean objective for NO_2 has been met at the majority of the locations over the past five years. During 2015, the following two sites outside of the current AQMAs were recorded an exceedance of the annual mean objective:

- A38-4A/B–Canwell (44.4µg/m^3); and
- A38-5A/B–Canwell (45.4µg/m^3);

The site A38-4A/B has been observed to show exceedences of the annual mean NO_2 objective in each of the last five years. Site A38-5A/B has not been observed to exceed the annual mean NO_2 objective since 2012. When these two sites were used to calculate the concentration at a location of relevant exposure (façade of a residential property), the annual mean concentration fell to below the objective at site A38-4A/B and A38-5A/B with the results of 36.9µg/m^3 and 32.9µg/m^3 respectively in 2015 (see Table 3 1).

Figure 2 – Trends in Annual Mean Nitrogen Dioxide Concentrations Measured at Diffusion Tube Monitoring Sites within AQMAs

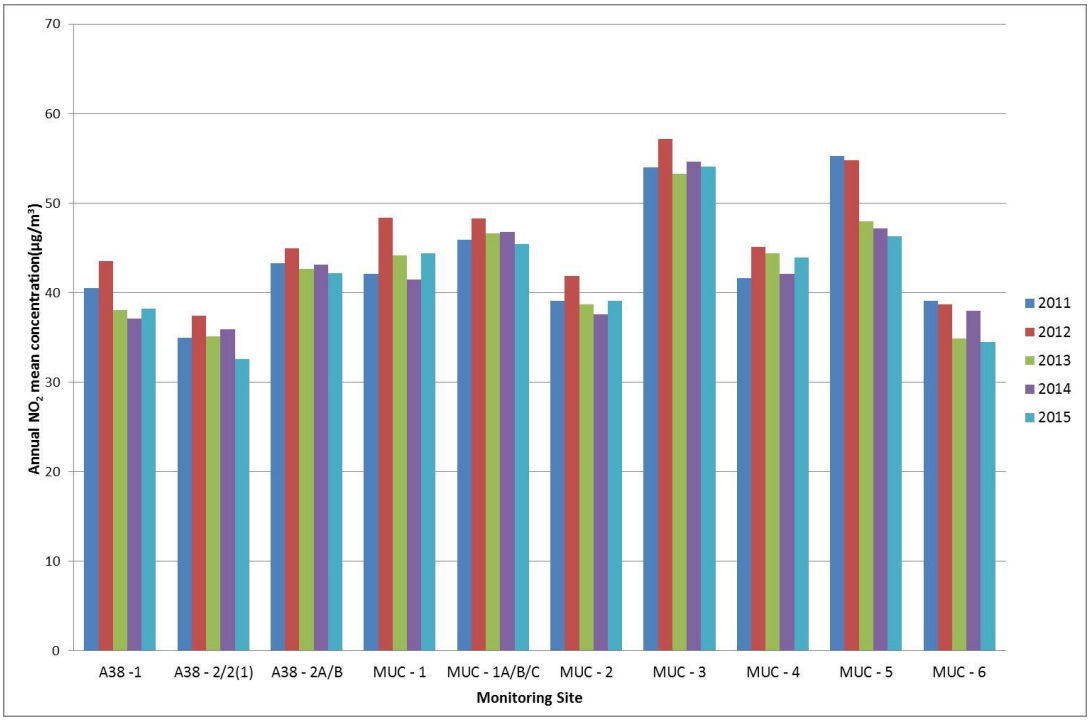


Figure 2 shows that six of these sites have recorded an exceedance of the annual mean objective within the existing AQMAs:

- A38-2A/B: Fradley (within AQMA No.2)
- MUC-1: Muckley Corner Hotel Ground Floor (within AQMA No.1)
- MUC-1A/B/C: Muckley Corner Hotel First Floor (within AQMA No.1)
- MUC-3: Muckley Corner A461 Southbound (within AQMA No.1)
- MUC-4: Muckley Corner A5 Westbound (within AQMA No.1)
- MUC-5: Muckley Corner A5 Eastbound (within AQMA No.1)

The sites A38-2A/B and MUC-1A/B/C are located at the façade of relevant receptors and have therefore not been distance adjusted. The site MUC-1 does not have relevant receptors; those are covered by MUC-1A/B/C. Therefore, this site has also not been distance adjusted.

The concentrations at MUC-3, MUC-4 and MUC-5 were distance corrected to estimate the concentration at relevant exposure (see Table 3 1). The sites MUC-3 and MUC-4 exceeded the objective at the receptor façade with the concentrations of 42.2µg/m^3 and 40.9µg/m^3 respectively. The site MUC-5 met the objective at the

receptor façade; but very close to an exceedance. All three sites have shown exceedences in previous years; as such an AQMA is still required for this area.

Table 3 1 provides information on Sites A38-4A/B and A38 - 5A/B – Canwell and Sites MUC 3 to 5 at Muckley Corner. These sites have been distance corrected to the nearest relevant exposure façade. Details of fall-off distance correction of sites exceeding the NO_2 annual mean objective are present in Appendix C.

Table 3 1–Fall-off with Distance Correction of Sites Exceeding the NO2 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	16.9	6.9	44.4	36.9
A38 - 5A/B Canwell	N	35	10.0	45.4	32.9
MUC – 3 - Muckley Corner A461 Southbound	Y	15	5.0	54.1	**42.2**
MUC-4 - Muckley Corner A5 Westbound	Y	6.0	4.0	43.9	**40.9**
MUC – 5 - Muckley Corner A5 Eastbound	Y	7.0	2.0	46.3	37.9

With respect to the hourly NO_2 objective, there could be a potential risk of exceedance where the annual mean concentration is greater than 60µg/m^3. For the 2015 results there are no sites where the annual mean is greater than 60µg/m^3; therefore it is unlikely that the hourly mean objective will be exceeded at any of the monitoring sites.

Appendix A: Monitoring Results

Table A.1 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
A38 -1	Alrewas	Roadside	417101	314180	NO_2	Y	9	1	N	2
A38 - 2/2(1)	Fradley	Roadside	416295	313186	NO_2	Y	10	5	N	2
A38 - 2A/B	Fradley	Roadside	416290	313175	NO_2	Y	0	6	N	2
A38 - 3	Lichfield	Roadside	412891	306817	NO_2	N	6	2	N	2
A38 - 4A/B	Canwell	Roadside	413978	300834	NO_2	N	10	6.85	N	2
A38-4X/Y	Canwell	Roadside	413989	300869	NO_2	N	0	15	N	2
A38 - 5A/B	Canwell	Roadside	413950	300574	NO_2	N	35	10	N	2
A38 - 6A/B	Canwell	Roadside	413961	300539	NO_2	N	10	25	N	2
A5 - 1	Muckley Corner	Roadside	407208	306513	NO_2	N	>200	4	N	2
A5 - 1A	Muckley Corner	Roadside	407895	306516	NO_2	N	6	1	N	2
A5 - 2A	Muckley Corner	Roadside	408893	306549	NO_2	N	12	5	N	2
A5 - 2B	Muckley Corner	Roadside	408667	306500	NO_2	N	6	2	N	2
A5 - 3	Lichfield	Roadside	412063	305379	NO_2	N	13	10	N	2
B	Burntwood	Urban Background	405086	309344	NO_2	N	127	N/A	N	2
L	Lichfield	Urban Background	410544	310760	NO_2	N	42	N/A	N	2
MUC - 1	Muckley Corner Hotel Ground Floor	Roadside	408164	306513	NO_2	Y	N/A	5	N	2
MUC - 1A/B/C	Muckley Corner Hotel First Floor	Roadside	408164	306513	NO_2	Y	0	5	N	2
MUC - 2	Muckley Corner A5 Westbound	Roadside	408165	306487	NO_2	Y	9	5	N	2
MUC - 3	Muckley Corner A461 Southbound	Roadside	408097	306468	NO_2	Y	10	5	N	2

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
MUC - 4	Muckley Corner A5 Westbound	Roadside	408029	306501	NO_2	Y	2	4	N	2
MUC - 5	Muckley Corner A5 Eastbound	Roadside	408030	306516	NO_2	Y	5	2	N	2
MUC - 6	Muckley Corner A461 Southbound	Roadside	408161	306556	NO_2	Y	5	2	N	2

(1) 0m if the monitoring site is at a location of exposure (e.g. installed on/adjacent to the façade of a residential property).

(2) N/A if not applicable.

Table A.2 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration (µg/m^3) (3)				
					2011	2012	2013	2014	2015
A38 -1	Roadside	Diffusion Tube	100	100	**40.5**	**43.5**	38.1	37.1	38.2
A38 - 2/2(1)	Roadside	Diffusion Tube	100	100	35.0	37.4	35.1	35.9	32.6
A38 - 2A/B	Roadside	Diffusion Tube	100	100	**43.3**	**45.0**	**42.7**	**43.1**	**42.2**
A38 - 3	Roadside	Diffusion Tube	100	100	33.7	33.1	36.4	31.1	29.5
A38 - 4A/B	Roadside	Diffusion Tube	100	100	**42.4**	**50.1**	**45.3**	**48.1**	**44.0**
A38-4X/Y	Roadside	Diffusion Tube	100	100	N/A	35.5	30.5	31.9	31.8
A38 - 5A/B	Roadside	Diffusion Tube	83	83	**40.4**	**41.7**	36.8	37.3	**43.5**
A38 - 6A/B	Roadside	Diffusion Tube	100	100	33.5	32.9	31.1	31.7	30.9
A5 - 1	Roadside	Diffusion Tube	100	100	**40.2**	**40.6**	35.6	34.3	36.8
A5 - 1A	Roadside	Diffusion Tube	100	100	**41.1**	**41.1**	38.1	37.2	37.5
A5 - 2A	Roadside	Diffusion Tube	100	100	39.0	35.5	31.9	32.1	33.7
A5 - 2B	Roadside	Diffusion Tube	83	83	**42.7**	**43.3**	**43.2**	38.5	39.3
A5 - 3	Roadside	Diffusion Tube	100	100	30.6	30.2	29.0	30.5	27.2
B	Urban background	Diffusion Tube	100	100	19.2	18.6	15.8	16.6	17.4
L	Urban background	Diffusion Tube	100	100	17.6	20.1	17.0	17.3	15.7
MUC - 1	Roadside	Diffusion Tube	100	100	**42.1**	**48.4**	**44.2**	**41.5**	**44.4**
MUC - 1A/B/C	Roadside	Diffusion Tube	100	100	**45.9**	**48.3**	**46.6**	**46.8**	**45.4**
MUC - 2	Roadside	Diffusion Tube	92	92	39.1	41.9	38.7	37.6	39.1
MUC - 3	Roadside	Diffusion Tube	100	100	**54.0**	**57.2**	**53.3**	**54.6**	**54.1**
MUC - 4	Roadside	Diffusion Tube	100	100	**41.6**	**45.1**	**44.4**	**42.1**	**43.9**
MUC - 5	Roadside	Diffusion Tube	92	92	**55.3**	**54.8**	**48.0**	**47.2**	**46.3**
MUC - 6	Roadside	Diffusion Tube	100	100	39.1	38.7	34.9	38.0	34.5

Notes: Exceedances of the NO_2 annual mean objective of 40µg/m^3 are shown in **bold**.

NO_2 annual means exceeding 60µg/m^3, indicating a potential exceedance of the NO_2 1-hour mean objective are shown in **bold and underlined.**

(1) data capture for the monitoring period, in cases where monitoring was only carried out for part of the year.

(2) data capture for the full calendar year (e.g. if monitoring was carried out for 6 months, the maximum data capture for the full calendar year is 50%).

(3) Means for diffusion tubes have been corrected for bias. All means have been "annualised" as per Technical Guidance LAQM.TG16 if valid data capture for the full calendar year is less than 75%. See Appendix C for details.

Appendix B: Full Monthly Diffusion Tube Results for 2016

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2016

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
A38 -1	50.2	55.1	39	37.8	42	36.4	45	44.5	51.1	49.4	49.5	39.2	44.9	38.2
A38 - 2/2(1)	38.95	46.15	32.95	35.15	32.1	30.85	28.55	37.15	38.35	50.7	42.75	46	38.3	32.6
A38 - 2A/B	50.05	55.7	45.65	42.45	41.15	42.45	44.6	49.9	50.5	61.35	53.95	57.45	49.6	**42.2**
A38 - 3	34.1	35.1	36	43.6	27.8	23.7	25.1	31.6	38.3	53.5	35.8	31.7	34.7	29.5
A38 - 4A/B	52.7	71.55	57.2	50.2	44.3	44.9	45.85	54.65	47.35	57.9	47.7	46.65	51.7	**44.0**
A38-4X/Y	41.45	42	37.55	34.15	31.2	31.3	33.8	40.05	37.45	43.2	41.8	34.35	37.4	31.8
A38 - 5A/B	56.8	55.7	45.4	-	-	38.7	52.4	55.8	45.4	55.3	57.2	49.5	51.2	**43.5**
A38 - 6A/B	41.2	43.1	37.4	35.9	31.0	30.2	34.3	34.1	35.1	37.3	38.8	38.2	36.4	30.9
A5 - 1	50.5	52.2	36.1	30	12.9	36.1	51.1	45.8	45.3	44	54.9	60.7	43.3	36.8
A5 - 1A	48.2	47.9	42.3	34.9	36.7	40.4	50	40.1	44.8	42.2	53.8	47.6	44.1	37.5
A5 - 2A	41.6	47.8	36.9	47.8	30	27.5	39.9	36.4	34.7	37.3	52.3	43.5	39.6	33.7
A5 - 2B	49.3	49.2	48	45	46.3	42.6	45.1	I/S	I/S	65.4	44	27.2	46.2	39.3
A5 - 3	40.3	36.2	34.4	26.1	20.5	25.7	27.1	29.6	35.2	47.1	34.4	28	32.1	27.2
B	26.5	26.2	18	13.9	31	11	14.1	15	19	22.8	26.8	21.7	20.5	17.4
L	20.8	24.5	17.9	19.9	14.1	12.7	13.2	15.3	13.9	22.8	23	23	18.4	15.7
MUC - 1	52.4	53.3	52.4	57.9	47.5	49.2	50.7	51.1	52.2	65.1	52.5	42.6	52.2	**44.4**
MUC - 1A/B/C	55.3	52.8	50.6	56.1	47.8	43.1	49.1	50.5	63.8	70.1	52.8	48.3	53.4	**45.4**
MUC - 2	45.9	46.6	I/S	40.9	45.8	42	37.3	41.8	58.9	61.9	51	33.4	46.0	39.1
MUC - 3	68.6	68.2	64.6	45.2	57.7	58.4	60.6	77.4	73	83.9	55.5	50.6	63.6	**54.1**
MUC - 4	47	49.5	58.9	47.3	41.9	49.1	51.6	56.3	59.2	69.9	45.1	43.5	51.6	**43.9**
MUC - 5	52.9	58.2	53.3	56.5	56.3	50.4	68.3	53.4	51.6	40.7	I/S	57	54.4	**46.3**
MUC - 6	55	42.5	34.9	35	34.5	35.1	38.8	32.7	36.6	46.2	51.7	44.6	40.6	34.5

(1) See Appendix C for details on bias adjustment

Appendix C: Supporting Technical Information / Air Quality Monitoring Data QA/QC

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 national bias adjustment factor has not been calculated. A bias adjustment of 0.85 for the year 2015 based on 16 studies; has been obtained from the national bias adjustment calculator. National bias adjustment factors were also used in the previous years.

For previous data, years 2011 to 2014, the bias adjustment factors have been taken from the Council's previous LAQM annual reports. The factors used were 0.88 (2011), 0.86 (2012), 0.87 (2013).and 0.83 (2014)

Short to Long Term Adjustment

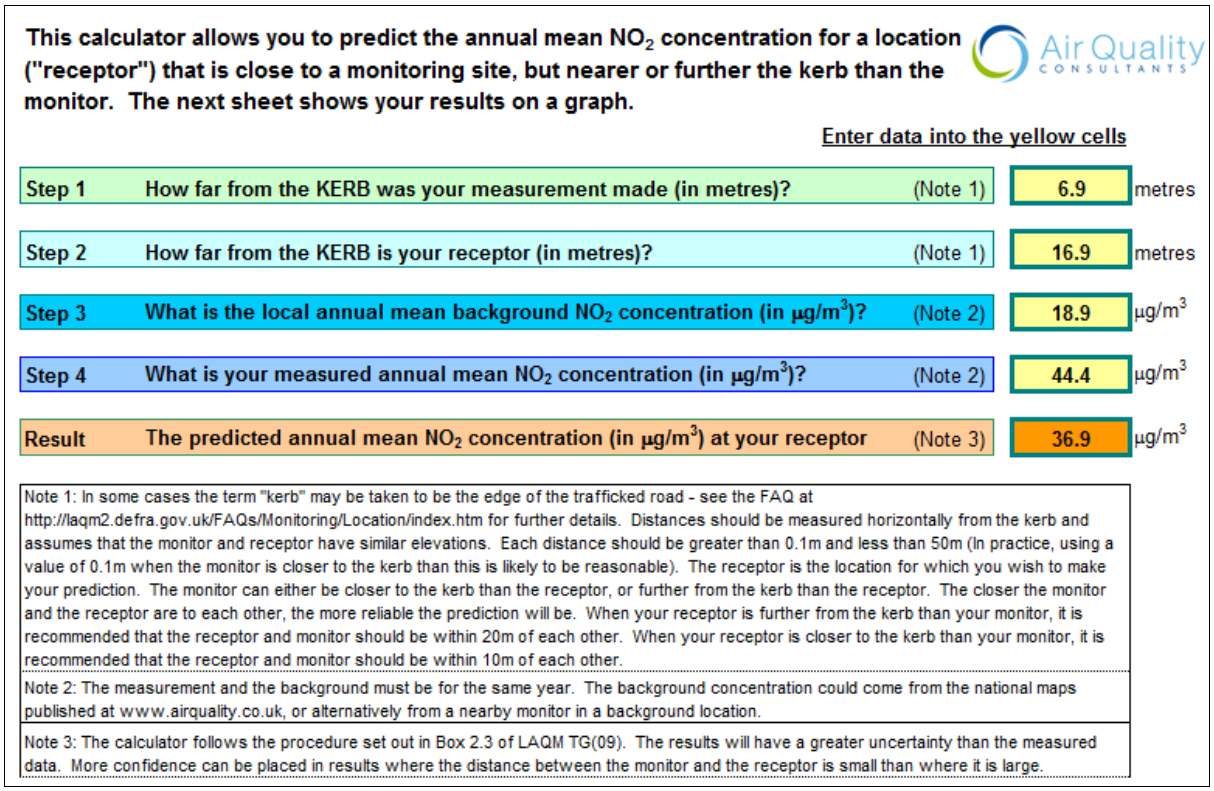
There were no monitoring sites requiring annualisation in 2015.

QA/QC of Diffusion Tube Monitoring

Staffordshire Scientific Services is a UKAS accredited laboratory and participates in the in the new AIR-PT Scheme (a continuation of the Workplace Analysis Scheme for Proficiency (WASP)) for NO_2 tube analysis and the Annual Field Inter-Comparison Exercise. 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 2015, Staffordshire Scientific Services scored 100% in the AIR-PT rounds AR 006 (January to February 2015) and AR007 (April to May 2015), and 75% in AR 009 (July to August 2015) and AR010 (October to November 2015). The percentage score reflects the results deemed to be satisfactory based upon the z-score of $< \pm 2$. Based on 16 diffusion tube studies, all local Authority co-location studies in 2015 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%).

Monitoring Results – Distance Correction

Figure C. 1 – Site A38-4A/B (Canwell)



This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

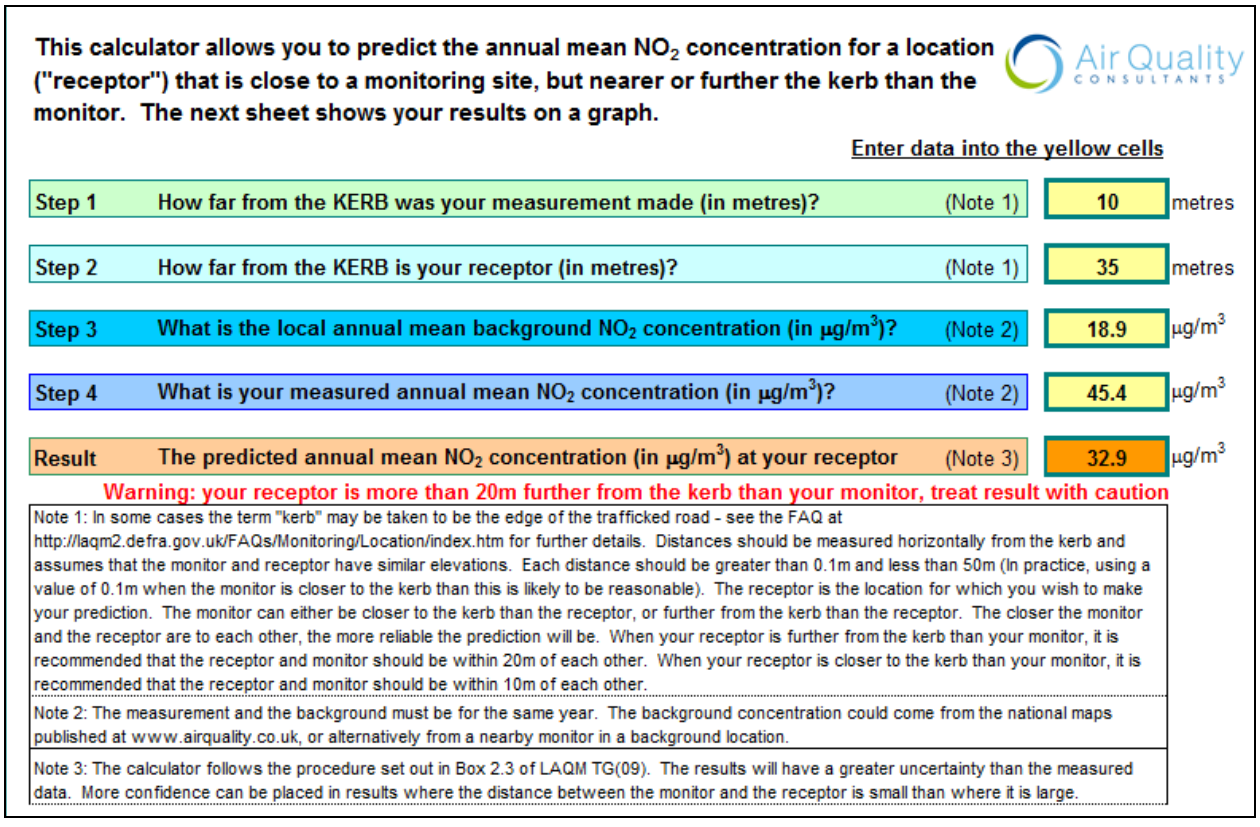
Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	6.9	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	16.9	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	18.9	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	44.4	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	36.9	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

Figure C. 2– Site A38-5A/B (Canwell)



This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	10	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	35	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	18.9	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	45.4	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	32.9	$\mu g/m^3$

Warning: your receptor is more than 20m further from the kerb than your monitor, treat result with caution

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

Figure C. 3– Site MUC-3 (Muckley Corner A461 Southbound)

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	5	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	15	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	17.8	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	54.1	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	42.2	µg/m^3

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

Figure C. 4– Site MUC-4(Muckley Corner A5 Westbound)

This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

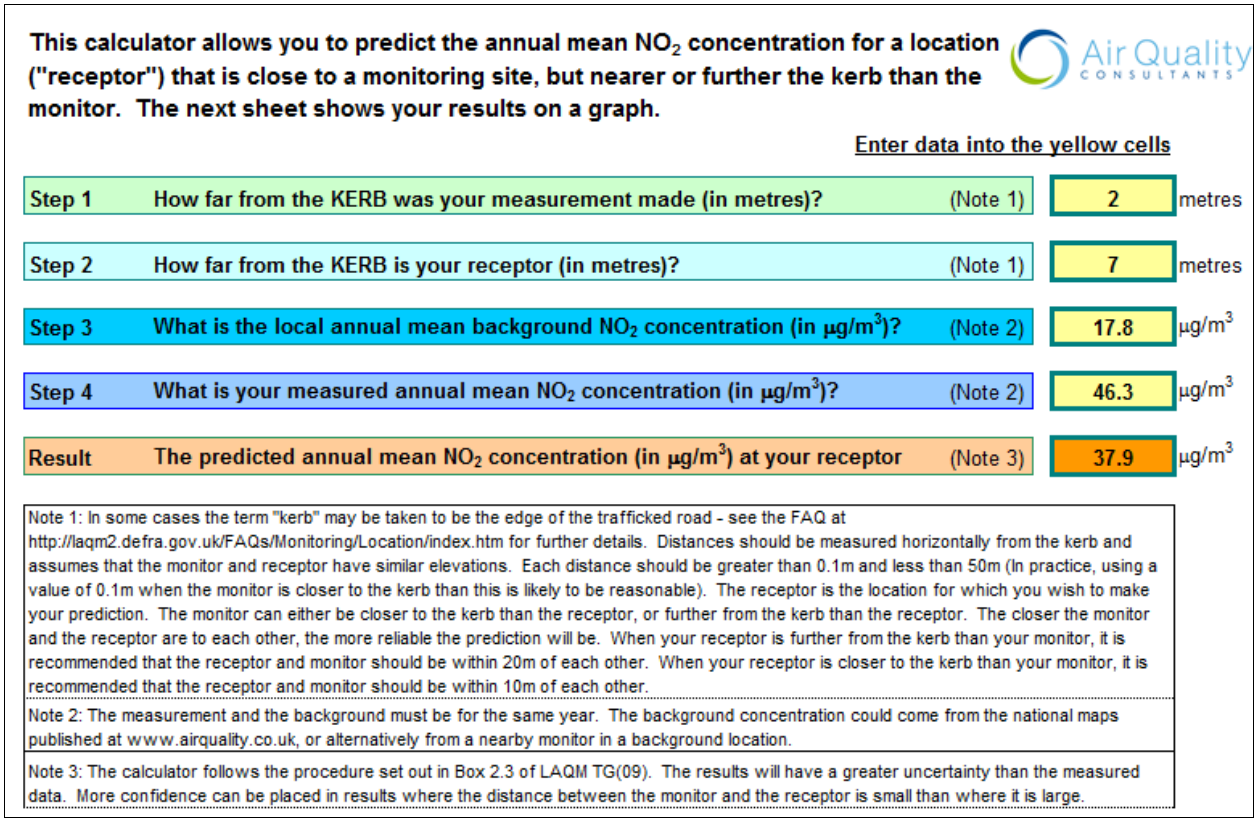
Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	4	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	6	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	17.8	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	43.9	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	40.9	µg/m^3

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

Figure C. 5 – Site MUC-5(Muckley Corner A5 Eastbound)



This calculator allows you to predict the annual mean NO_2 concentration for a location ("receptor") that is close to a monitoring site, but nearer or further the kerb than the monitor. The next sheet shows your results on a graph.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	7	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	17.8	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	46.3	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	37.9	$\mu g/m^3$

Note 1: In some cases the term "kerb" may be taken to be the edge of the trafficked road - see the FAQ at http://laqm2.defra.gov.uk/FAQs/Monitoring/Location/index.htm for further details. Distances should be measured horizontally from the kerb and assumes that the monitor and receptor have similar elevations. Each distance should be greater than 0.1m and less than 50m (In practice, using a value of 0.1m when the monitor is closer to the kerb than this is likely to be reasonable). The receptor is the location for which you wish to make your prediction. The monitor can either be closer to the kerb than the receptor, or further from the kerb than the receptor. The closer the monitor and the receptor are to each other, the more reliable the prediction will be. When your receptor is further from the kerb than your monitor, it is recommended that the receptor and monitor should be within 20m of each other. When your receptor is closer to the kerb than your monitor, it is recommended that the receptor and monitor should be within 10m of each other.

Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

Note 3: The calculator follows the procedure set out in Box 2.3 of LAQM TG(09). The results will have a greater uncertainty than the measured data. More confidence can be placed in results where the distance between the monitor and the receptor is small than where it is large.

New Developments

High Speed 2 (HS2) is a planned high-speed railway in the United Kingdom linking London, Birmingham, the East Midlands, Leeds, Sheffield and Manchester. It would be the second high-speed rail line in Britain, after High Speed 1 (HS1) which connects London to the Channel Tunnel.

Phase one is a north westerly to route between London Euston onto the northbound classic WCML just north of Lichfield in Staffordshire taking service to the North West of England and Scotland.

Phase two will create two branch lines from Birmingham running north either side of the Pennines creating a "Y" network. Phase 2 is split into two phases, phase 2a and 2b. Phase 2a is the section from Lichfield to Crewe on the western section of the "Y" and phase 2b the remainder of phase 2.

Although the HS2 project will pass through the Lichfield Council area it is not considered likely to cause any adverse air quality impacts at present.

Appendix D: Map(s) of Monitoring Locations

Figure D. 1 – Map of Non-Automatic Monitoring Sites: Muckley Corner

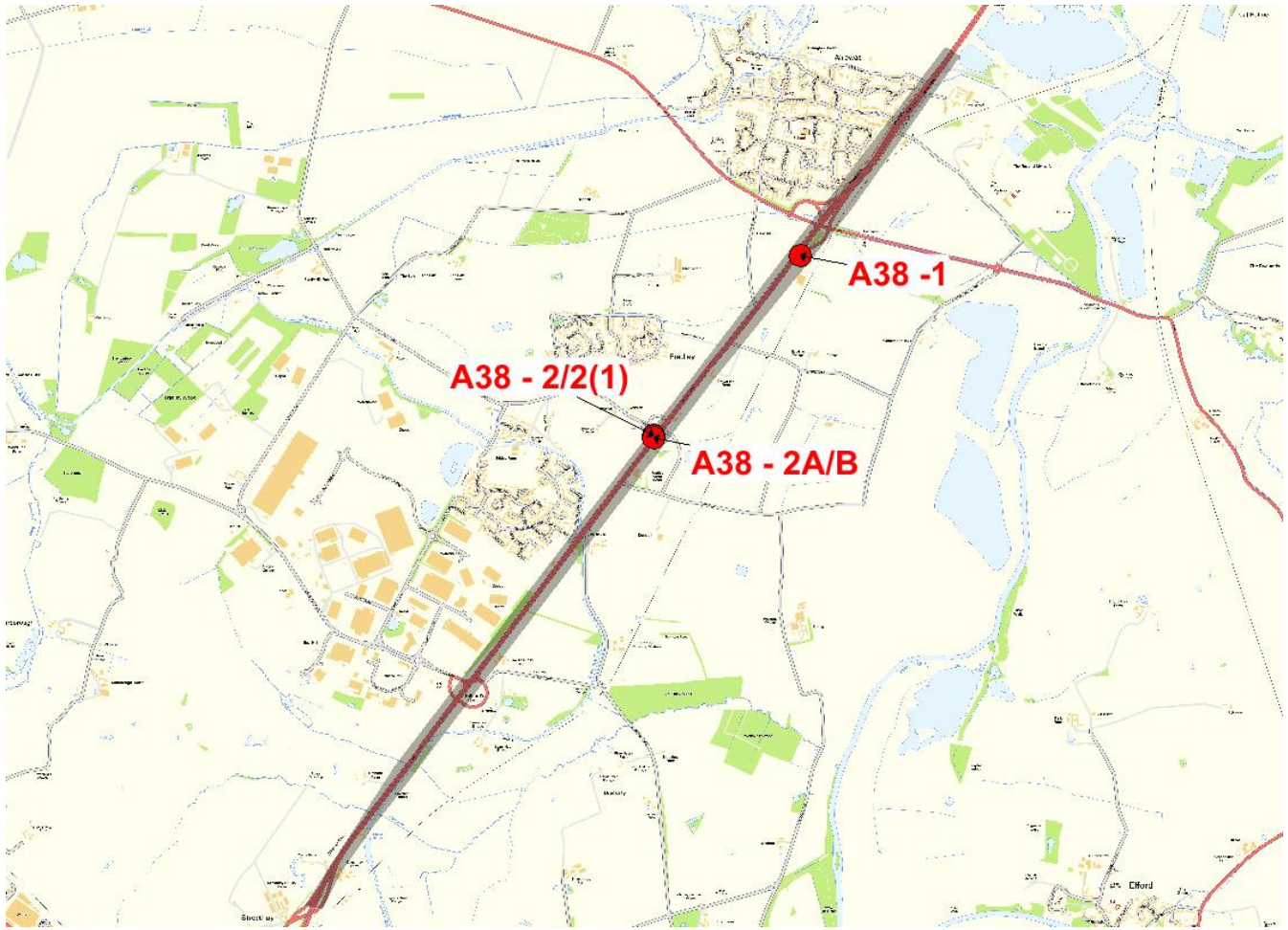
Legend

- Diffusion Tube Monitoring Site
- AQMA No.1

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Muckley Corner**
Title	**Non-Automatic Monitoring Sites**
By FL	**Approved** JC
Scale Not To Scale	**Job Ref** 6380588
Date August 2016	**Figure No.** D.1

Figure D. 2 – Map of Non-Automatic Monitoring Sites: Alrewas and Fradley



Legend

Diffusion Tube Monitoring Site

AQMA No.2

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Alrewas and Fradley**
Title	**Non-Automatic Monitoring Sites**
By FL	**Approved** JC
Scale Not To Scale	**Job Ref** 6380588
Date August 2016	**Figure No.** D.2

Figure D. 3 – Map of Non-Automatic Monitoring Sites: Canwell

Legend

Diffusion Tube Monitoring Site

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location
Canwell

Title
Non-Automatic Monitoring Sites

By	Approved
FL	JC
Scale	**Job Ref**
Not To Scale	6380588
Date	**Figure No.**
August 2016	D.3

Figure D. 4 – Map of Non-Automatic Monitoring Sites: Lichfield

Legend

Diffusion Tube Monitoring Site

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	
Lichfield	
Title	
Non-Automatic Monitoring Sites	
By	**Approved**
FL	JC
Scale	**Job Ref**
Not To Scale	6380588
Date	**Figure No.**
August 2016	D.4

Figure D. 5 – Map of Non-Automatic Monitoring Sites. A5 –Roman Road

Legend

Diffusion Tube Monitoring Site

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location

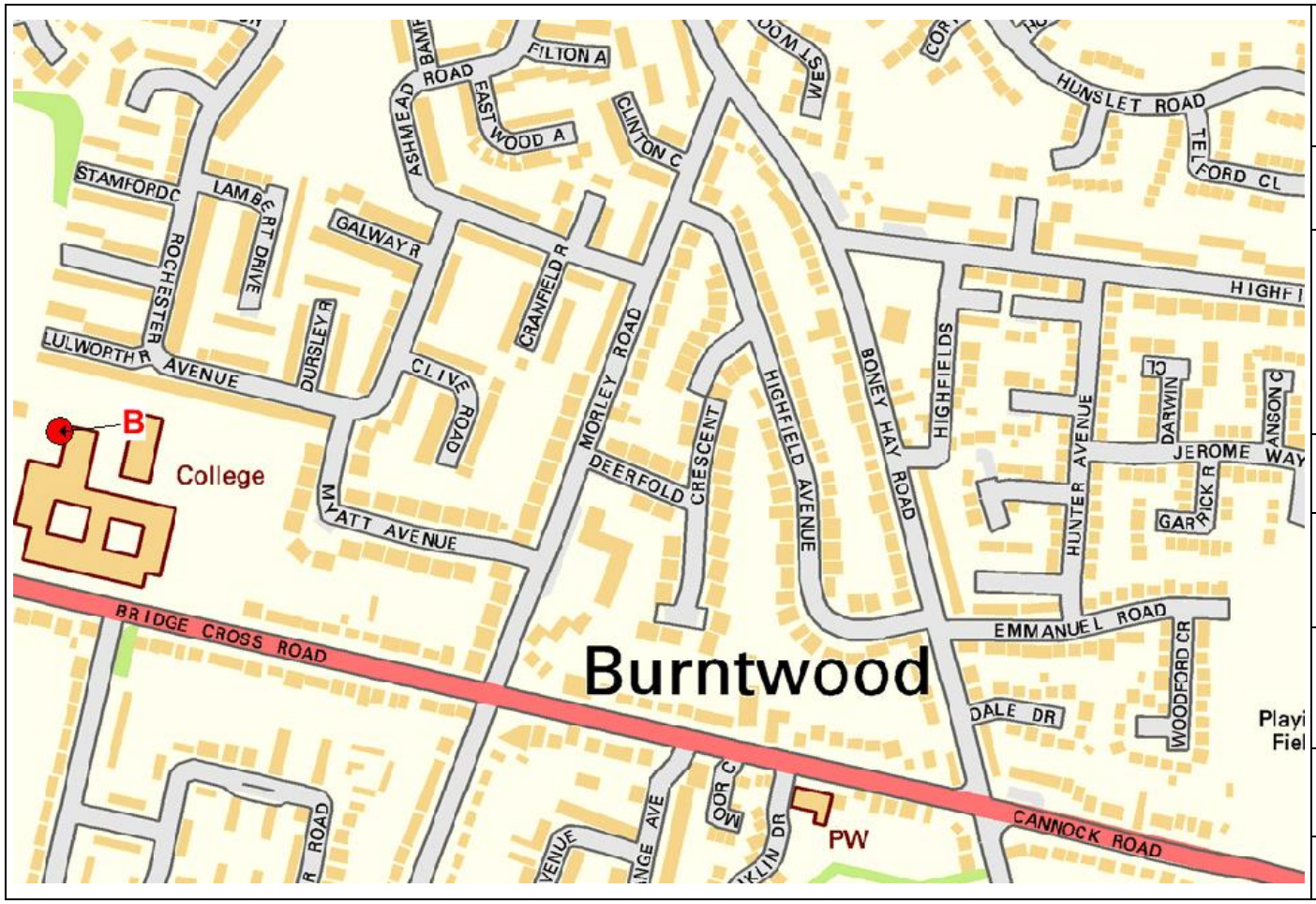
A5 –Roman Road

Title

Non-Automatic Monitoring Sites

By	Approved
FL	JC
Scale	**Job Ref**
Not To Scale	6380588
Date	**Figure No.**
August 2016	D.5

Figure D. 6 – Map of Non-Automatic Monitoring Sites: Burntwood



Legend

Diffusion Tube Monitoring Site

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location	**Burntwood**
Title	**Non-Automatic Monitoring Sites**
By FL	**Approved** JC
Scale Not To Scale	**Job Ref** 6380588
Date August 2016	**Figure No.** D.6

Figure D. 7 – Map of Non-Automatic Monitoring Sites: A38 near Evelyn Wood

Legend

Diffusion Tube Monitoring Site

Air Quality
Bureau Veritas
5th Floor
66 Prescot Street
London, E1 8HG

Location
A38 near Evelyn Wood

Title
Non-Automatic Monitoring Sites

By	Approved
FL	JC

Scale	Job Ref
Not To Scale	6380588

Date	Figure No.
August 2016	D.7

Appendix E: Summary of Air Quality Objectives in England

Table E.1 – Air Quality Objectives in England

Pollutant	Air Quality Objective[4]	
	Concentration	Measured as
Nitrogen Dioxide (NO_2)	200 µg/m^3 not to be exceeded more than 18 times a year	1-hour mean
	40 µg/m^3	Annual mean
Particulate Matter (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24-hour mean
	40 µg/m^3	Annual mean
Sulphur Dioxide (SO_2)	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean

[4] The units are in microgrammes of pollutant per cubic metre of air (µg/m^3).

Glossary of Terms

Abbreviation	Description
AQAP	Air Quality Action Plan - A detailed description of measures, outcomes, achievement dates and implementation methods, showing how the local authority intends to achieve air quality limit values'
AQMA	Air Quality Management Area – An area where air pollutant concentrations exceed / are likely to exceed the relevant air quality objectives. AQMAs are declared for specific pollutants and objectives
ASR	Air quality Annual Status Report
Defra	Department for Environment, Food and Rural Affairs
DMRB	Design Manual for Roads and Bridges – Air quality screening tool produced by Highways England
EU	European Union
FDMS	Filter Dynamics Measurement System
LAQM	Local Air Quality Management
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
PM_{10}	Airborne particulate matter with an aerodynamic diameter of 10µm (micrometres or microns) or less
$PM_{2.5}$	Airborne particulate matter with an aerodynamic diameter of 2.5µm or less
QA/QC	Quality Assurance and Quality Control
SO_2	Sulphur Dioxide
HGV	Heavy Goods Vehicle
LGV	Light Goods Vehicle
Lichfield DC	Lichfield District Council
WCML	West Coast Main Line

References

- Local Air Quality Management Technical Guidance LAQM.TG (16). Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- Local Air Quality Management Policy Guidance LAQM.PG (16). Published by Defra in partnership with the Scottish Government, Welsh Assembly Government and Department of the Environment Northern Ireland.
- NO_2 Fall off With Distance Tool, available at http://laqm.defra.gov.uk/toolsmonitoring-data/no2-falloff.html
- National Diffusion Tube Bias Adjustment Spreadsheet, version 06/16 published in June 2016.
- http://laqm.defra.gov.uk/documents/LAQM-AIR-PT-Rounds-1-12-(April-2014-February-2016)-NO2-report.pdf
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- https://www.staffordshire.gov.uk/transport/transportplanning/localtransportplan/Lichfield-District-Integrated-Transport-Strategy-Nov-2015.pdf
- https://www.lichfielddc.gov.uk/Council/Planning/The-local-plan-and-planning-policy/Resource-centre/Local-Plan-documents/Downloads/Local-Plan-Strategy/Lichfield-District-Local-Plan-Strategy-2008-2029.pdf