2012 Air Quality Updating and Screening Assessment for *Lichfield District Council*

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

April 2012

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2012 Updating and Screening Assessment

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Executive Summary

An Updating and Screening Assessment of air quality has been undertaken on behalf of Lichfield District Council by AECOM in fulfilment of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents.

Road traffic is the main emission source of pollutants in Lichfield. At present, there is one Air Quality Management Area (AQMA) for the exceedence of the annual mean NO_2 objective at Muckley Corner.

Updated monitoring data indicate that the annual mean NO_2 objective continues to be exceeded at roadside locations within the District. Diffusion tube monitoring has highlighted exceedences within the existing AQMA at Muckley Corner, alongside the A5 close to Muckley Corner, and alongside the A38 at Canwell and Fradley. A Detailed Assessment for NO_2 is not proposed to be undertaken at this stage for the A38 at Canwell and Fradley, but it is recommended that additional monitoring at the façade is carried out to determine whether the annual mean NO_2 objective is likely to be exceeded at locations of relevant exposure in the vicinity of site A38-4/4(1).

None of the UK air quality objectives for the six other pollutants (1,3-butadiene, benzene, lead, sulphur dioxide (SO_2), carbon monoxide (CO) and particulate matter (PM_{10})) are likely to be exceeded within the District. Therefore, a Detailed Assessment will not be required for any of these key pollutants.

The assessment of NO_2 and PM_{10} emissions from the biomass unit at Haunton Manor Farm shows that the estimated pollutant emission rates are higher than the "background adjusted" threshold emission rates for PM_{10} and the threshold emission rate for NO_2, which indicates that the biomass boiler may have a potentially significant effect on air quality. A Detailed Assessment is therefore required for NO_2 and PM_{10} of the biomass unit at Haunton Manor Farm.

Table of contents

List of Tables

List of Figures

Appendices

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 lies Walsall and then Birmingham. LDC is moderately industrialized, but there are a number of major roads links 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 Report

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

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

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of microgrammes per cubic metre $\mu g/m^3$ (milligrammes 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	Running annual mean	31.12.2010
1,3-Butadiene	2.25 μg/m^3	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 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
Particles (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[1] 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 (2004)[2] 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 more monitoring data the Detailed Assessment (2005)[3] was produced. The 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 USA[4]. 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.

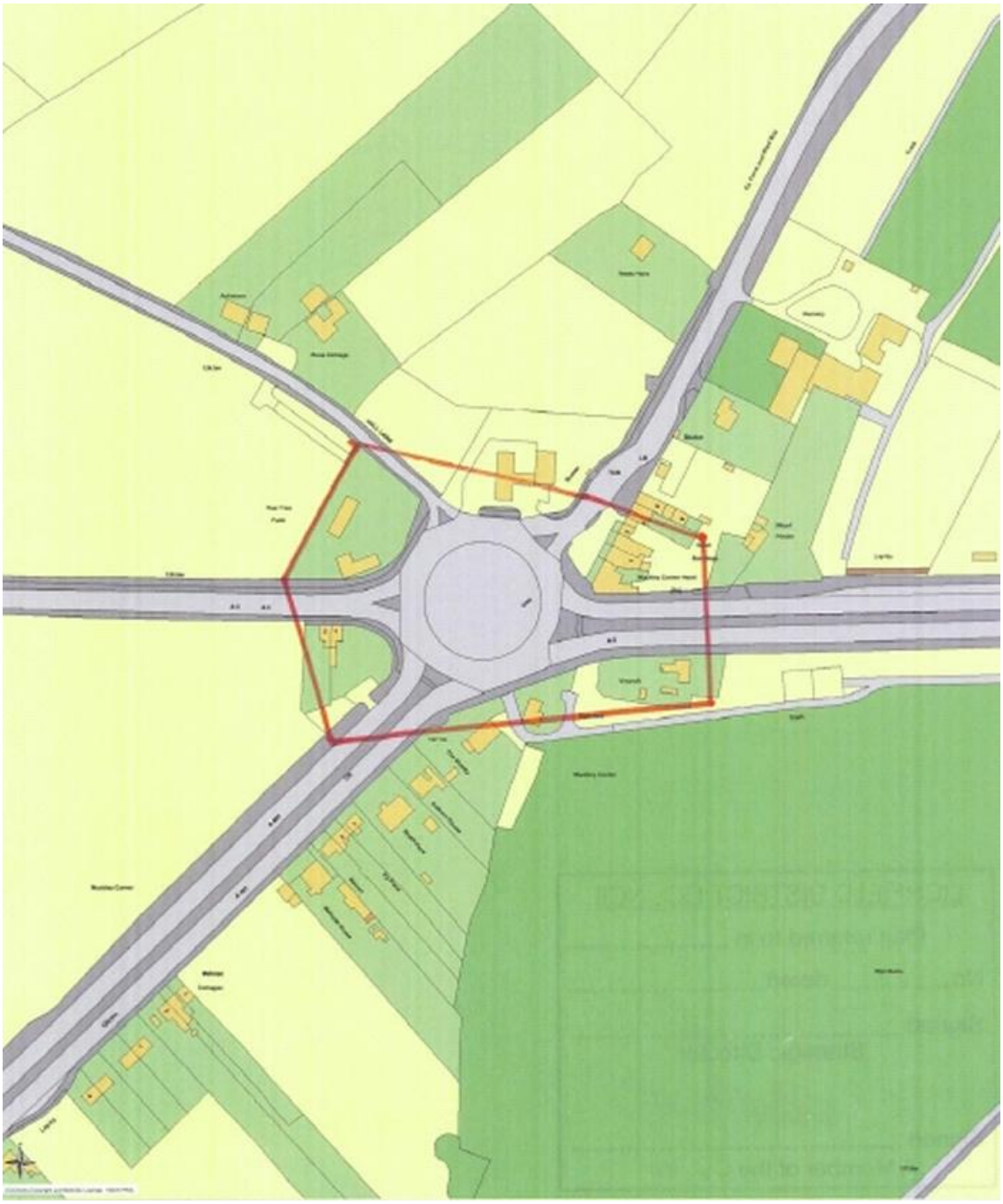
The Detailed Assessment (2007)[5] concluded that the annual mean NO_2 objective was likely to be exceeded at several properties surrounding the Muckley Corner roundabout and that an AQMA should be declared covering this area. Modelling results for PM_{10} indicated that the air quality objectives were likely to be achieved for this pollutant and no further action was necessary.

Updated diffusion tube monitoring data presented in the 2009 USA[6] 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 Detailed Assessment (2010)[7] one exceedence of the annual mean NO_2 objective was predicted at a residential receptor location near to the A38 at Canwell (2 Weeford Park Cottages | 40.2 µg/m^3) in 2009. The modelled results for 2010 predicted that the objective and EU Limit value 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[12] 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 façade 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.

Figure 1.1 Map of Muckley Corner AQMA Boundary



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. In 2009, a chemiluminescence NO_X analyser was deployed for a period of eight months at Muckley Corner to investigate predicted exceedences of the air quality objectives for the 2010 Detailed Assessment[7] of NO_2. This was operated by AECOM on behalf of LDC. In 2007, a similar station was installed at Muckley Corner for a period of nine months to inform the 2007 Detailed Assessment. The period of monitoring during 2007 was conducted by AEA on behalf of LDC.

Details of QA/QC procedures for the 2009 monitoring campaign are outlined in Appendix A. Details of the QA/QC procedures were described in the 2007 Detailed Assessment.

Details of the site are given in Table 2.1 below.
Maps depicting the monitoring locations are also provided (Figures 2.1 to 2.5).

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	X OS GridRef	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
Muckley Corner CM	Roadside	408198[A]	306516[A]	NO_2	N	Chemiluminescence NO_X analyser	N (10)	5 m	N
	Roadside	408082[B]	306459[B]	NO_2	Y	Chemiluminescence NO_X analyser	N (12)	4 m	N

Note [A] Site location during the 2007 monitoring period. The monitor was active prior to the declaration of the AQMA. [B] Site location during the 2009 monitoring period (April 2009 to December 2009).

The continuous monitoring and 2010 Detailed Assessment[7] concluded that the annual air quality objective for NO_2 was achieved at Muckley Corner. As there were no measured exceedences of the 1-hour mean standard of 200 µg/m^3 during the 8- month survey and the annual mean objective was achieved, it was considered likely that the 1-hour mean objective was achieved.

2.1.2 Non-Automatic Monitoring Sites

LDC uses diffusion tubes at 23 locations throughout the District to monitor NO_2 concentrations. The details of the monitoring locations are summarized in Tables 2.2-2.4. Following the conclusions of the 2009 USA, two additional duplicate diffusion tube monitoring sites (A38-5 and A38- 6) were set up in the Canwell area in September 2009, and as a consequence of unusually high annual mean concentration at tube A38(2) reported in the 2011 Progress Report, two duplicate diffusion tube monitoring sites (A38(2)/A38(2)-1 and A38-2A and A38-2B) were installed to confirm local concentrations.

Details of QA / QC for LDCs diffusion tube monitoring are presented in Appendix A.

Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	Location	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
A38(1)	Alrewas	Roadside	417101	314180	NO_2	N	N (9)[a]	1	Y
A38(2)	Fradley	Roadside	416295	313186	NO_2	N	N (10)	5	Y
A38(2)-1	Fradley	Roadside	416295	313186	NO_2	N	N (10)	5	Y
A38-2A	Fradley	Roadside	416290	313175	NO_2	N	Y	6	Y
A38-2B	Fradley	Roadside	416290	313175	NO_2	N	Y	6	Y
A38(3)	Lichfield	Roadside	412891	306817	NO_2	N	N (6)	2	Y
A38-4A	Canwell	Roadside	413978	300834	NO_2	N	N (15)	6.85	Y
A38-4B	Canwell	Roadside	413978	300834	NO_2	N	N (15)	6.85	Y
A38-4	Canwell	Roadside	413981	300888	NO_2	N	N (15)	5.65	Y
A38-4(1)	Canwell	Roadside	413981	300888	NO_2	N	N (15)	5.65	Y
A38-5A	Canwell	Roadside	413950	300574	NO_2	N	N (35)	10	Y
A38-5B	Canwell	Roadside	413950	300574	NO_2	N	N (35)	10	Y
A38-6A	Canwell	Roadside	413961	300539	NO_2	N	N (10)	25	Y
A38-6B	Canwell	Roadside	413961	300539	NO_2	N	N (10)	25	Y

Site Name	Location	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
A5(1)	Muckley Corner	Roadside	407208	306513	NO_2	N	N[b]	4	Y
A5(1A)	Muckley Corner	Roadside	407895	306516	NO_2	N	N (6)	1	Y
A5(2A)	Muckley Corner	Roadside	408893	306549	NO_2	N	N (12)	5	Y
A5(2B)	Muckley Corner	Roadside	408667	306500	NO_2	N	N (6)	2	Y
A5(3)	Lichfield	Roadside	412063	305379	NO_2	N	N (13)	10	Y
B	Burntwood	Urban Background	405086	309344	NO_2	N	N (127)	N/A	Y
L	Lichfield	Urban Background	410544	310760	NO_2	N	N (42)	N/A	Y
MUC(1)	Muckley Corner Hotel Ground Floor	Roadside	408164	306513	NO_2	Y	N[c]	5	Y
MUC(1A)	Muckley Corner Hotel First Floor	Roadside	408164	306513	NO_2	Y	Y	5	Y
MUC(1B)	Muckley Corner Hotel First Floor	Roadside	408164	306513	NO_2	Y	Y	5	Y
MUC(1C)	Muckley Corner Hotel	Roadside	408164	306513	NO_2	Y	Y	5	Y

Site Name	Location	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Does this location represent worst-case exposure?
	First Floor								
MUC(2)	Muckley Corner A5 Westbound	Roadside	408165	306487	NO_2	Y	N (9)	5	Y
MUC(3)	Muckley Corner A461 Southbound	Roadside	408097	306468	NO_2	Y	N (10)	5	Y
MUC(4)	Muckley Corner A5 Westbound	Roadside	408029	306501	NO_2	Y	N (2)	4	Y
MUC(5)	Muckley Corner A5 Eastbound	Roadside	408030	306516	NO_2	Y	N (5)	2	Y
MUC(6)	Muckley Corner A461 Southbound	Roadside	408161	306556	NO_2	Y	N (5)	2	Y

Notes: [a] Relevant exposure 9 metres from kerb located more than 200 metres southwest of the monitoring location. [b] No relevant exposure within 200 m of tube location. [c] Relevant exposure at first floor height. Tubes MUC (1A), 1(B) and 1(C) positioned at first floor.

2.2 Comparison of Monitoring Results with AQ Objectives

2.2.1 Nitrogen Dioxide

Automatic Monitoring Data

Continuous monitoring of NO_2 at Muckley Corner between April and December 2009 reported an annual mean NO_2 concentration during this period of 32.6 µg/m^3. Data capture was shown to be 95.8% during the measurement period and 67.1% considering 2009 as a whole.

Given the short term nature of the monitoring, a seasonal adjustment factor was calculated to estimate the annual mean NO_2 concentration from the measured period mean. The seasonally adjusted annual mean NO_2 concentration at Muckley Corner in 2009 was therefore 38.2 µg/m^3 (Table 2.4), which is below the annual mean NO_2 objective of 40 µg/m^3.

As there were no measured exceedences of the 1-hour mean standard of 200 µg/m^3 during the 8-month survey and the annual mean objective was achieved, it is considered likely that the 1-hour mean objective was achieved (Table 2.5). In 2007, a chemiluminescence NO_X analyser and a TEOM-FDMS PM_{10} Monitor were deployed for a period of nine months at Muckley Corner to investigate predicted exceedences of the air quality objectives for the 2007 Detailed Assessment of NO_2 and PM_{10}. The results of this monitoring for NO_2 have been reported in the tables below for comparison.

Table 2.4: Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site Name	Within AQMA?	Valid Data Capture for 2009 Monitoring Period (%)		Period Mean ($\mu g/m^3$)		Seasonally Adjusted Annual Mean ($\mu g/m^3$)	
		Period of monitoring	2009	2007	2009	2007	2009
Muckley Corner CM [a]	Y	98.5	67.1	**48.0**	32.6	**54.9**	38.2

[a] Refer to Table 2.1 for details of the automatic monitoring locations

Table 2.5: Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site Name	Within AQMA?	Valid Data Capture %		Number of Exceedences of hourly mean ($\mu g/m^3$)	
		Period of monitoring	2009	2007	2009
Muckley Corner CM	Y	98.5	67.1	0	0 (101)[a]

Notes: [a] 99.8th percentile of hourly mean NO_2 concentrations in brackets.

Diffusion Tube Monitoring Data

Results of the diffusion tube surveys undertaken by LDC since 2007 are presented in Tables 2.7 and 2.8. Unless otherwise indicated, all results have been adjusted for bias. A bias adjustment factor of 0.88 was obtained from the national spreadsheet of Diffusion Tube Bias Adjustment Factors (Inputs: Staffordshire Scientific Services, 2011, 20% TEA / Water). Further details on the derivation of the bias adjustment factor are presented in Appendix A. The raw diffusion tube data from 2011 can be found in Appendix C.

In August 2011, following the 2011 Progress Report results, a new duplicate site (A38-2A and A38-2B) was created and the site A38(2) was made a duplicate (A38(2)-1). A seasonal adjustment factor was calculated to estimate the annual mean NO_2 concentration at these sites from the measured period mean. Period means and annual means collated from four nearby AURN monitoring sites measuring NO_2 and with data capture rates greater than 90% were used to calculate the seasonal adjustment factor (details of this calculation are shown in Appendix A, Table A.2). The average ratio of the Annual Means to Period Means was 0.994.

Annual mean NO_2 concentrations in excess of the objective of 40 µg/m^3 are highlighted in **bold**. Data capture for 2011 was good. Only one site had a data capture of 75% or less, while all the other sites achieved data capture greater than 75%. Thirteen tubes measured NO_2 concentrations greater than 40 µg/m^3 in 2011. The highest annual mean concentration occurred at MUC(5) with a concentration of 55.3 µg/m^3. This tube also reported the second highest annual mean NO_2 concentration of the survey during 2009 and 2010.

The tubes located at Muckley Corner {MUC (1), MUC(1A), (1B) and (1C), and MUC(3) to MUC(5)} exceeded the annual mean objective for NO_2 during 2011. These locations also recorded exceedences in 2010. MUC(2) recorded an exceedence in 2010, but the 2011 result showed that that the annual mean objective was achieved. MUC(1), (1A) to (1C) and MUC(2) to MUC(6) are located within the existing AQMA boundary. The MUC(1) tube is situated on the façade of the hotel at Muckley Corner

at ground level; MUC (1A) to (1C) are located at the same site as MUC(1) but at first-floor height, which are considered representative of relevant exposure.

Five sites have exceeded the annual mean NO_2 objective of 40 µg/m^3 in every year since 2007. These are:

- A5(2B), located approximately 500 metres to the east of Muckley Corner interchange; and
- MUC(1), MUC(1A)/(1B)/(1C), MUC(3) and MUC(5), located within the existing AQMA at Muckley Corner.

The other sites that recorded exceedences of the annual mean NO_2 objective in 2011 were A38(1), A38-2A/2B, A38-4A/4B, A38-5A/5B, A38-4/-4(1), A5(1), A5(1A), and A5(2B). A38-2A/2B and MUC(1A/1B/1C) sites are at positions representing relevant exposure.

Monitoring at site A38-2A/2B commenced in August 2011 and so the result for this site (43.3 µg/m^3) represents an estimated annual mean NO_2 concentration that may not be representative. Given the short-term nature of the monitoring at this site LDC proposes to decide upon whether to proceed to a Detailed Assessment for this location once a full year of monitoring has been completed at the site, which will provide a more accurate indication of the NO_2 concentration in the area.

For the other sites which do not represent relevant exposure, NO_2 concentrations at the nearest relevant exposure have been calculated following the procedure in Box 2.3 of LAQM.TG(09). Results are given in Table 2.9. There are no relevant receptors within 200 metres of A38(1), MUC(1) and A5(1), therefore the calculation has not been performed for these locations.

Following adjustment for locations of relevant exposure, annual mean NO_2 concentrations are predicted to be just above the annual mean NO_2 objective at only one site (Site A38-4/A38-4(1) at Canwell), where the predicted concentration is 40.9 µg/m^3 (Table 2.5 and 2.7). It is recommended that diffusion tube monitoring at the façade is carried out to determine whether the annual mean NO_2 objective is

likely to be exceeded at locations of relevant exposure in this area. If monitoring at the façade indicates exceedences of the air quality objectives for NO_2 then LDC shall proceed to a Detailed Assessment.

Table 2.5 Results of Nitrogen Dioxide Diffusion Tubes in 2011

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88) 2011 ($\mu g/m^3$)
A38(1)	Alrewas	Roadside	N	Single	100%	N	N	**40.5**
A38(2)/A38(2)-1	Fradley	Roadside	N	Duplicate	92%[a]	Y	N	35.0
A38-2A/2B	Fradley	Roadside	N	Duplicate	42%[b]	Y	N	**43.3**
A38(3)	Lichfield	Roadside	N	Single	92%	N	N	33.7
A38-4A/4B	Canwell	Roadside	N	Duplicate	92%	N	N	**42.4**
A38-5A/5B	Canwell	Roadside	N	Duplicate	100%	N	N	**40.4**
A38-6A/6B	Canwell	Roadside	N	Duplicate	100%	N	N	33.5
A38-4/A38-4(1)	Canwell	Roadside	N	Duplicate	100%[c]	N	N	**49.1**
A38(X/Y/Z)	Canwell	Roadside	N	Triplicate	8%	N	N	N/A
A5(1)	Muckley Corner	Roadside	N	Single	92%	N	N	**40.2**
A5(1A)	Muckley Corner	Roadside	N	Single	83%	N	N	**41.1**
A5(2A)	Muckley Corner	Roadside	N	Single	92%	N	N	39.0
A5(2B)	Muckley Corner	Roadside	N	Single	92%	N	N	**42.7**

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88) 2011 ($\mu g/m^3$)
A5(3)	Lichfield	Roadside	N	Single	92%	N	N	30.6
B	Burntwood	Urban Background	N	Single	83%	N	N	19.2
L	Lichfield	Urban Background	N	Single	100%	N	N	17.6
MUC(1)	Muckley Corner Hotel Ground Floor	Roadside	Y	Single	83%	N	N	**42.1**
MUC(1A/B/C)	Muckley Corner Hotel First Floor	Roadside	Y	Triplicate	92%[d]	N	N	**45.9**
MUC(2)	Muckley Corner A5 Westbound	Roadside	Y	Single	100%	N	N	39.1
MUC(3)	Muckley Corner A461 Southbound	Roadside	Y	Single	100%	N	N	**54.0**
MUC(4)	Muckley Corner A5 Westbound	Roadside	Y	Single	100%	N	N	**41.6**
MUC(5)	Muckley Corner A5 Eastbound	Roadside	Y	Single	75%	N	N	**55.3**

Site ID	Location	Site Type	Within AQMA?	Triplicate or Collocated Tube	Data Capture 2011 (%)	Data with less than 9 months has been annualised (Y/N)	Confirm if data has been distance corrected (Y/N)	Annual mean concentration (Bias Adjustment factor = 0.88) 2011 ($\mu g/m^3$)
MUC(6)	Muckley Corner A461 Southbound	Roadside	Y	Single	100%	N	N	39.1

[a] Data capture for the monitoring period of the tube A38(2)-1 was 80% (August 2011-December 2011), and 33% for the full 2011.
[b] Data capture for the monitoring period (August 2011 – December 2011) was 100%
[c] Data capture for tube A38-4(1) was 83%.
[d] Data capture for tube MUC(1B) was 83%.

Table 2.6 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2007 (Bias factor = 0.97)	2008 (Bias factor = 1.03)	2009 (Bias factor = 0.81)	2010 (Bias factor = 0.85)	2011 (Bias factor = 0.88)
A38(1)	Roadside	N	**42.5**	**44.3**	35.7	**43.4**	**40.5**
A38(2)/A38(2)-1[1]	Roadside	N	28.9	39.3	34.4	**40.4**	35.0
A38-2A/2B	Roadside	N	N/A	N/A	N/A	N/A	**43.3**
A38(3)	Roadside	N	33.4	36.5	27.8	38.8	33.7
A38-4A/4B	Roadside	N	**53.2**	**55.8**	**40.8**	**44.5**	**42.4**
A38-5A/5B	Roadside	N	N/A	N/A	N/A	**43.9**	**40.4**
A38-6A/6B	Roadside	N	N/A	N/A	N/A	33.0	33.5
A38-4/A38-4(1)	Roadside	N	N/A	N/A	**47.2**	**49.9**	**49.1**
A5(1)	Roadside	N	35.1	**43.5**	36.5	**44.0**	**40.2**
A5(1A)	Roadside	N	38.3	**46.5**	37.8	**42.8**	**41.1**
A5(2A)	Roadside	N	33.3	**42.5**	32.4	37.3	39.0
A5(2B)	Roadside	N	**49.5**	**48.3**	**41.2**	**52.0**	**42.7**
A5(3)	Roadside	N	30.4	30.4	26.0	33.6	30.6
A5(4)	Roadside	N	21.9	19.9	N/A	N/A	N/A
B	Urban Background	N	19.6	22.2	16.5	20.6	19.2
L	Urban Background	N	17.3	19.7	17.4	20.1	17.6
M6T(1)	Roadside	N	23.4	24.0	N/A	N/A	N/A
M6T(2)	Roadside	N	26.1	30.0	N/A	N/A	N/A
M6T(2A)	Roadside		N/A	40.3	N/A	N/A	N/A
M6T(2B)	Roadside		N/A	41.5	N/A	N/A	N/A

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
			2007 (Bias factor = 0.97)	**2008 (Bias factor = 1.03)**	**2009 (Bias factor = 0.81)**	**2010 (Bias factor = 0.85)**	**2011 (Bias factor = 0.88)**
MUC(1)	Roadside	Y	**46.7**	**54.1**	**42.7**	**53.1**	**42.1**
MUC(1A)	Roadside	Y	**50.3**	**53.7**	**42.3**	**53.4**	**45.9**
MUC(1B)	Roadside	Y					
MUC(1C)	Roadside	Y					
MUC(2)	Roadside	Y	**45.6**	**40.1**	35.9	**45.9**	39.1
MUC(3)	Roadside	Y	**58.1**	**63.4**	**51.0**	**63.5**	**54.0**
MUC(4)	Roadside	Y	**42.8**	**47.7**	36.0	**46.9**	**41.6**
MUC(5)	Roadside	Y	**50.6**	**56.4**	**50.3**	**58.9**	**55.3**
MUC(6)	Roadside	Y	35.1	**41.0**	34.5	39.4	39.1

[1] Site A38(2) was a single tube site until August 2011.

Table 2.7: Estimated Annual Mean NO2 Concentrations at Locations of Relevant Exposure

Site ID	2011 Annual mean concentration (µg/m^3) Bias Adjusted	2011 Estimated Background NO_2 Concentration (µg/m^3)	Distance of Tube from Kerb (m)	Distance of Nearest Relevant Exposure From kerb (m)	2011 Estimated Annual Mean NO_2 Concentration at Location of Relevant Exposure (µg/m^3)
MUC(1A/1B/1C)	**45.9**	22.4[a]	5	Relevant exposure	**45.9**
MUC(3)	**54.0**	22.4[a]	5	10	**47.5**
MUC(4)	**41.6**	22.4[a]	4	2	**45.3**
MUC(5)	**55.3**	22.4[a]	2	5	**48.2**
A5(1)	**40.2**	22.4[a]	4	N/A[e]	N/A
A5(1A)	**41.1**	22.4[a]	1	6	34.3
A5(2B)	**42.7**	22.4[b]	2	6	37.5
A38(1)	**40.5**	19.0[c]	1	9	31.0
A38-4/ A38-4(1)	**49.1**	22.1[d]	5.65	15	**40.9**
A38-4A/ A38-4B	**42.4**	22.1[d]	6.85	15	37.2
A38-5A/ A38-5B	**40.4**	22.1[d]	10	35	31.8
A38-6A/6B	33.5	22.1[d]	25	10	39.5

[a] NO_2 mapped background centered on 407500, 306500. [b] NO_2 mapped background centered on 408500, 306500. [c] NO_2 mapped background centered on 416500, 313500. [d] NO_2 mapped background centered on 413500, 300500. [e] N/A: no relevant exposure within 200 metres of tube location.

2.2.2 PM_{10}

Monitoring of PM_{10} is not currently performed by LDC as there are no locations where air quality objectives are likely to be exceeded.

2.2.3 Sulphur Dioxide

Sulphur dioxide is not currently monitored by LDC as there are no significant sources and no locations where the air quality objectives are likely to be exceeded.

2.2.4 Benzene

Monitoring of benzene is not currently performed by LDC as there are no locations where air quality objectives are likely to be exceeded.

2.2.5 Other pollutants monitored

There is currently no routine monitoring of any of the other pollutants (1,3-butadiene; lead; carbon monoxide) carried out within the district of Lichfield as the air quality objectives for these pollutants are unlikely to be exceeded at any locations with relevant exposure.

Figure 2.1: Monitoring Locations Around Muckley Corner AQMA

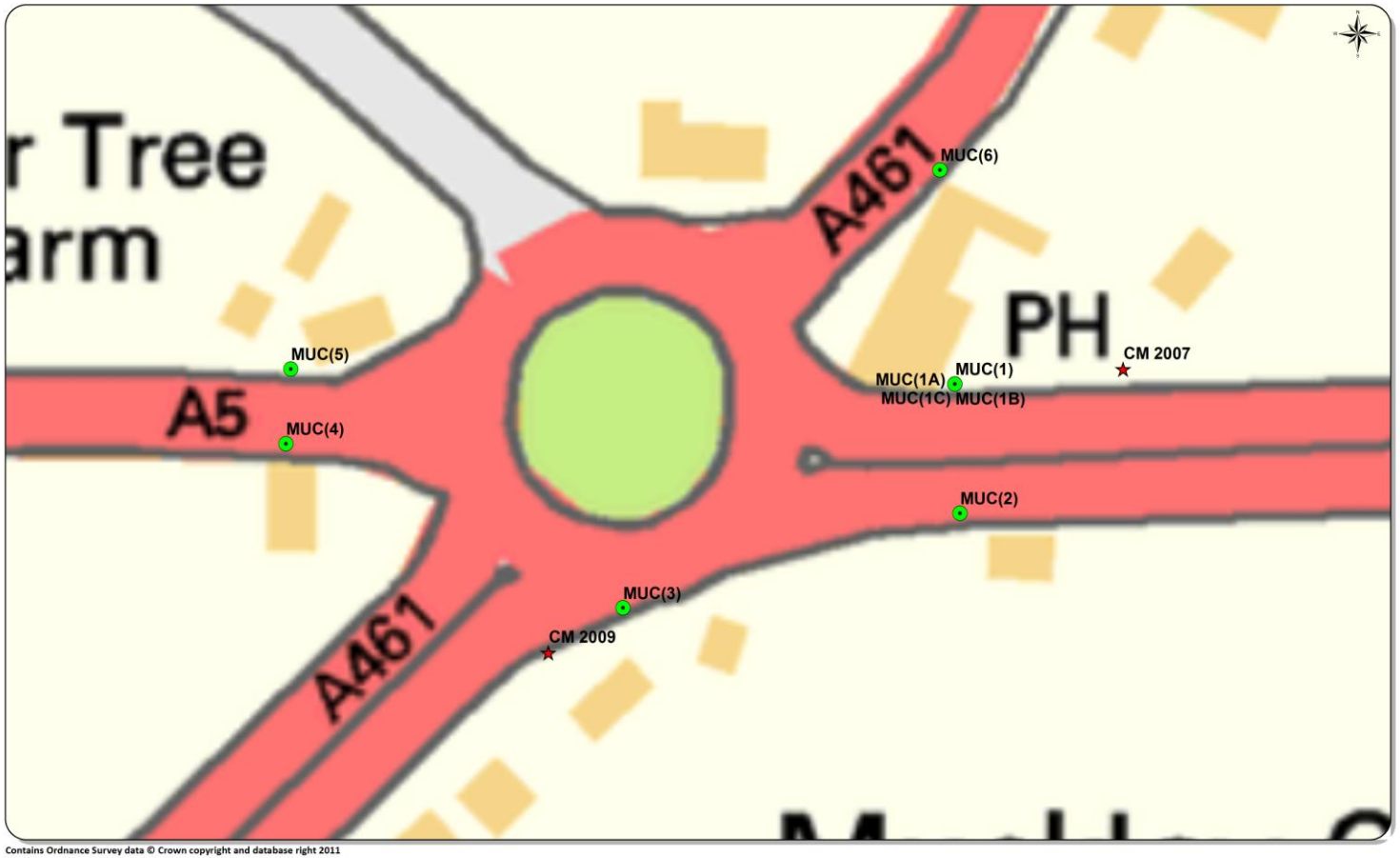


Figure 2.2: Other Monitoring Locations Around Muckley Corner

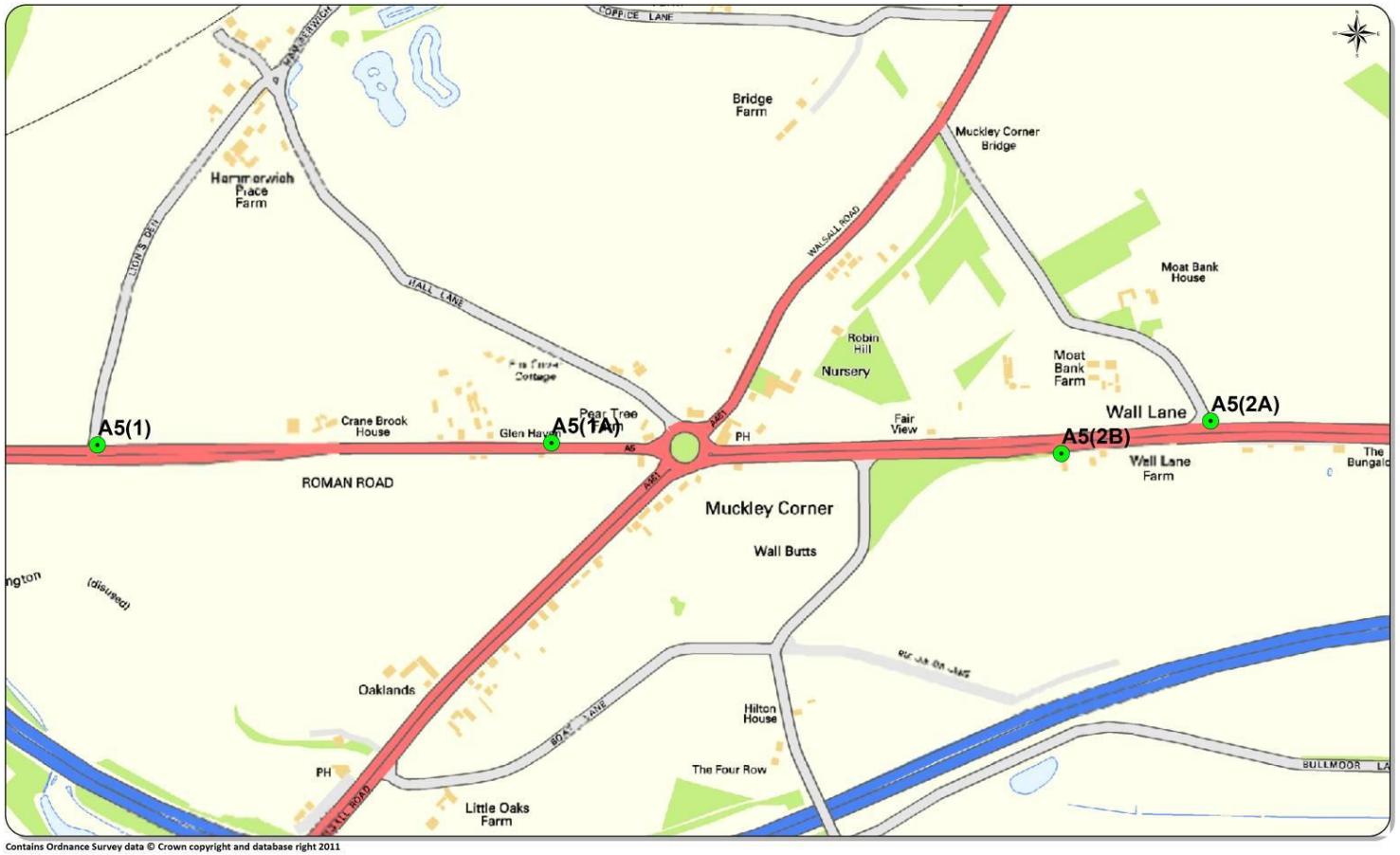
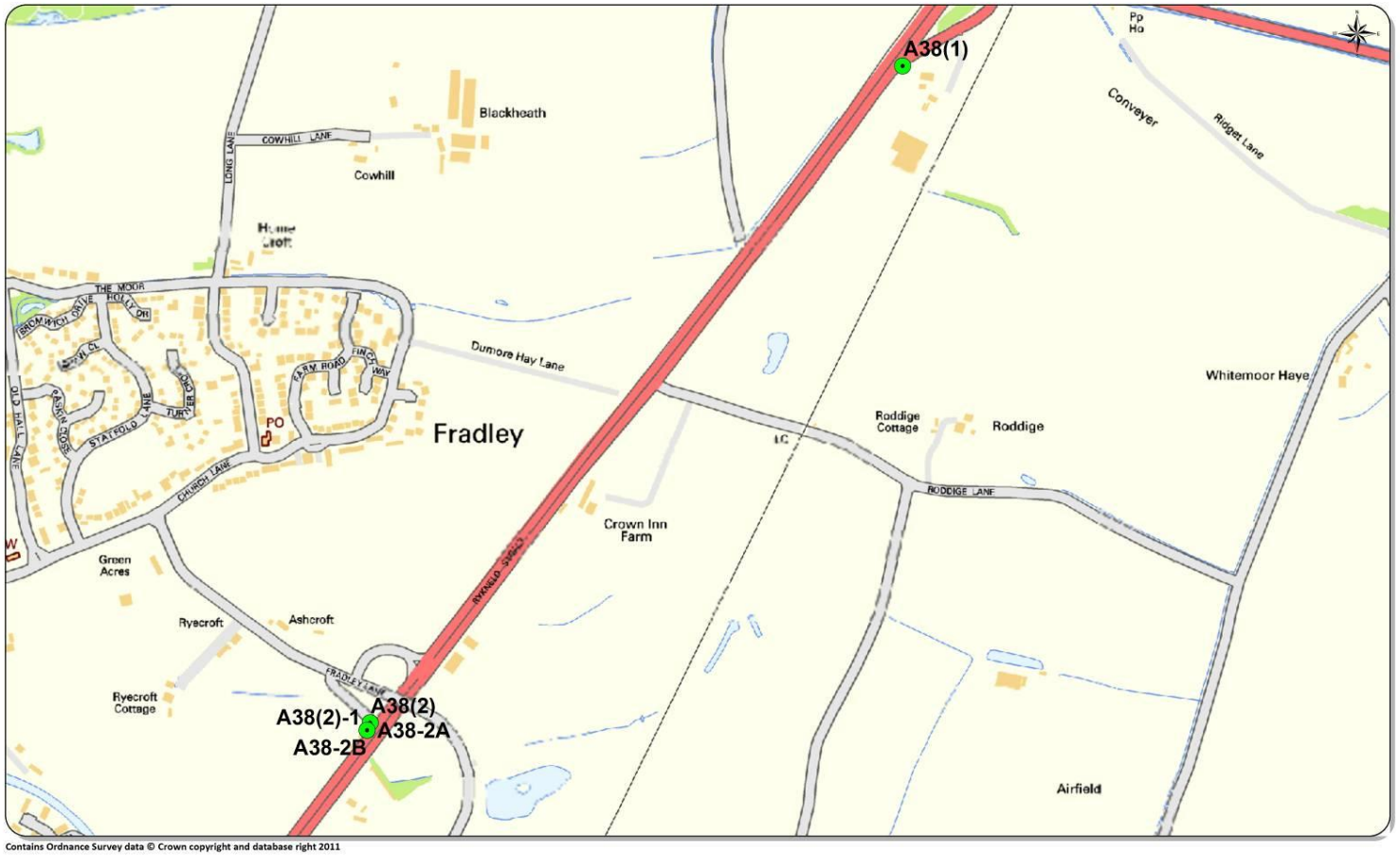


Figure 2.3: Monitoring Locations Around A38 at Fradley



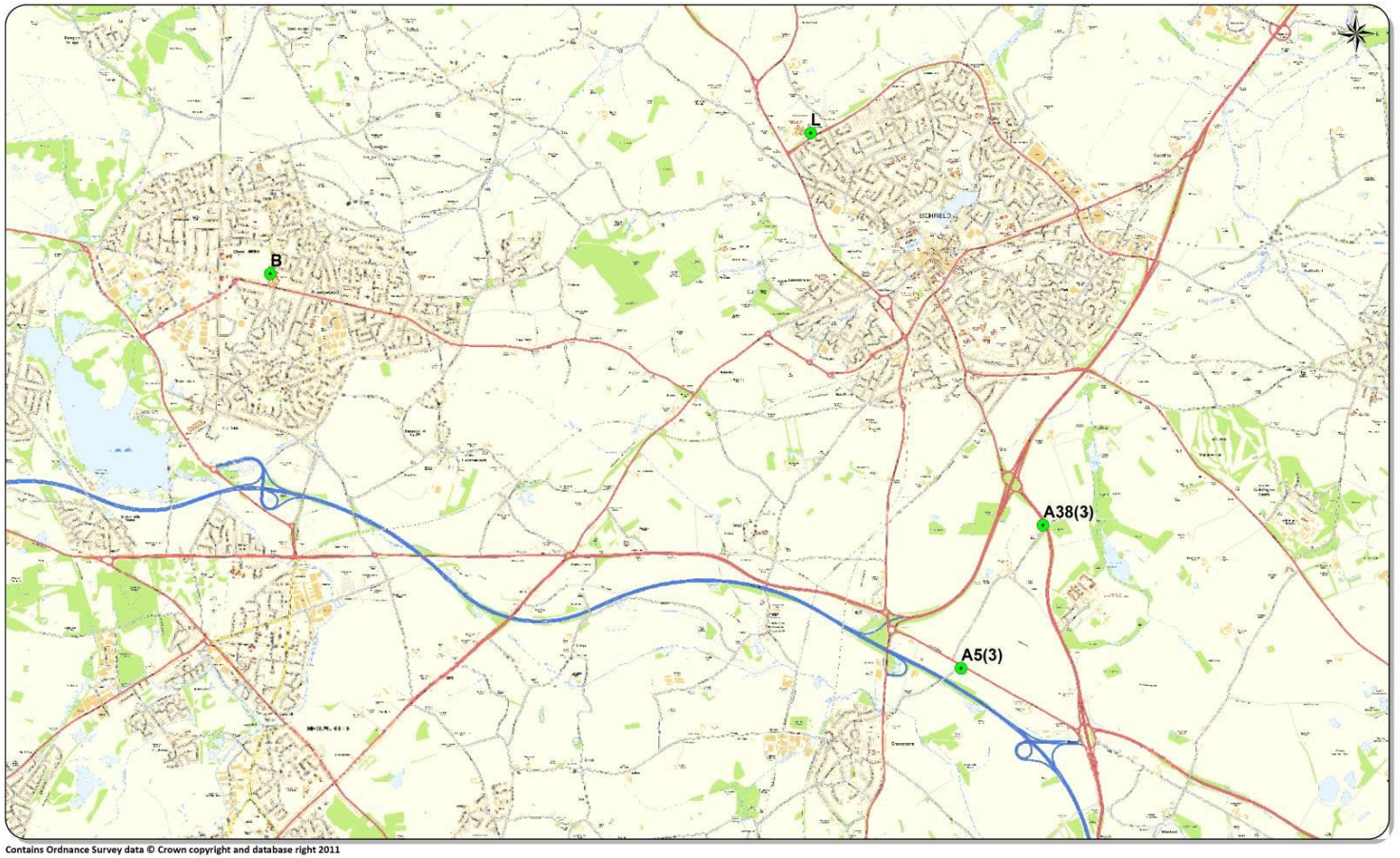
Contains Ordnance Survey data © Crown copyright and database right 2011

Client: Lichfield District Council
Title: Other Monitoring Locations in Lichfield District Council

Diffusion Tubes

AECOM 77 Hatton Garden, London EC1N 8JS
Tel: +44 (0)20 7645 2000, Fax: +44 (0)20 7645 2099
www.aecom.com

Figure 2.4:Other Monitoring Locations in the Lichfield District

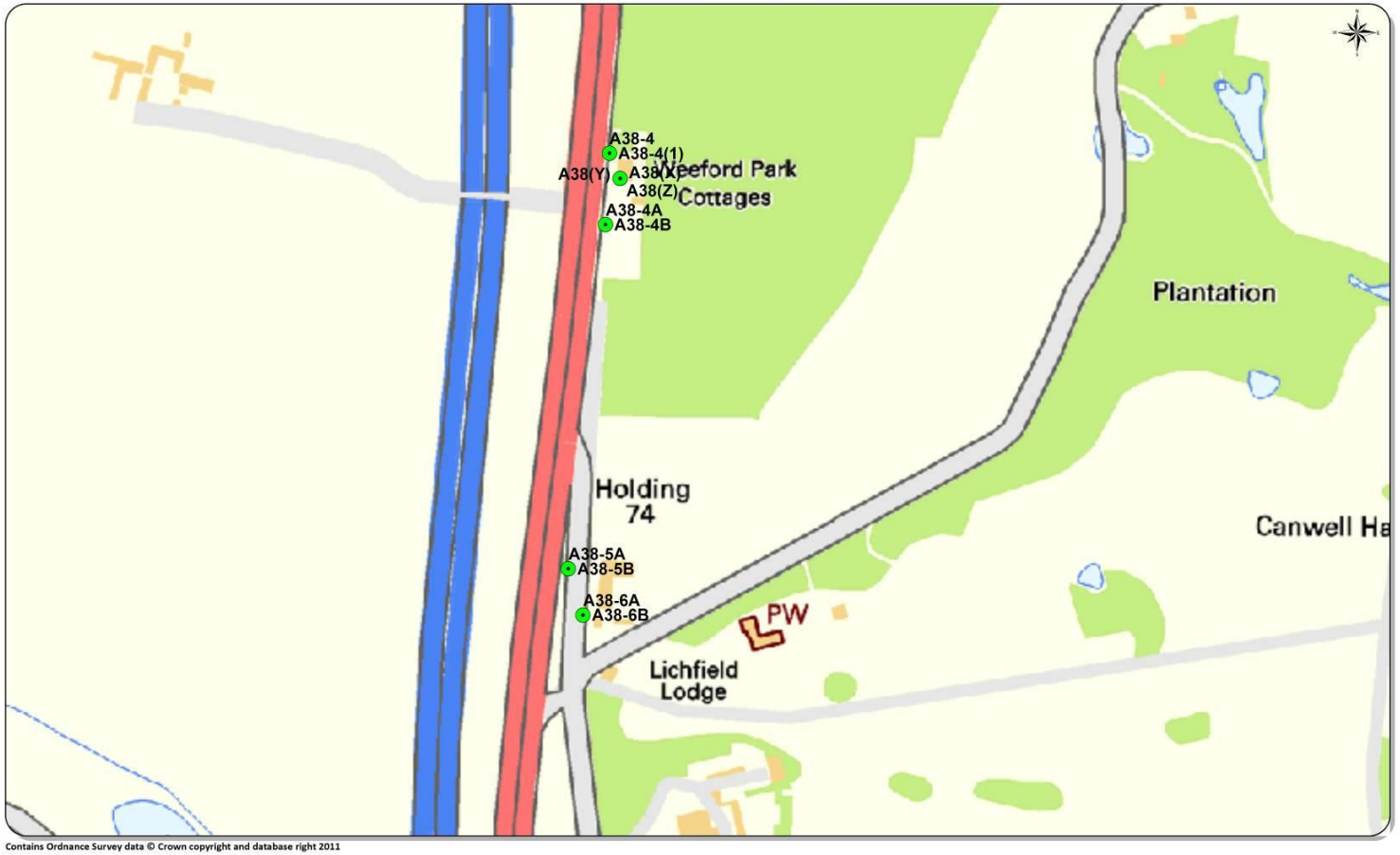


Client: Lichfield District Council
Title: Other Monitoring Locations in Lichfield District Council

Diffusion Tubes

AECOM 77 Hatton Garden, London EC1N 8JS
Tel: +44 (0)20 7645 2000, Fax: +44 (0)20 7645 2099
www.aecom.com

Figure 2.5: Other Monitoring Locations in the Lichfield District



Summary of Compliance with AQS Objectives

LDC monitors for the pollutant NO_2 using NO_2 diffusion tubes at 23 locations.

The results of the 2011 diffusion tube survey showed that tubes located at Muckley Corner {MUC (1), MUC(1A), (1B) and (1C), MUC(3) to MUC(5)}) and A38(1), A38-2A/2B, A38-4A/4B, A38-5A/5B, A38-4/-4(1), A5(1), A5(1A), and A5(2B) recorded an annual mean NO_2 concentration above the annual mean objective.

Further analysis of these sites, using the appropriate façade distance correction calculations, shows that the annual mean air quality objectives for NO_2 are likely to be exceeded at locations of relevant exposure for sites A38-4/A38-4(1) and A38-2A/2B located outside the AQMA, and MUC(1A), (1B) and (1C), MUC(3) to MUC(5) located in the AQMA.

The façade distance calculation for the site A38-4/A38-4(1) indicated a concentration of 40.9 µg/m^3 at a distance of 15 m from the A38. Despite this representing an exceedence of the annual mean NO_2 objective it is proposed to carry out diffusion tube monitoring at the façade of the nearest property to site A38-4/4(1) to ascertain whether an exceedence is likely to occur at a location of relevant exposure. A Detailed Assessment of NO_2 will not be undertaken at this stage. The monitored exceedence at site A38-2A/2B is based on short-term monitoring data and it is proposed that a decision to proceed to a Detailed Assessment will be taken when a full year of monitoring data is available for comparison with the air quality objectives.

Lichfield District Council has examined the results from monitoring in the district. Concentrations of NO_2 exceeding the annual mean objective have been recorded at locations within and outside the existing AQMA which are not representative of relevant exposure. After façade distance correction the estimated annual mean NO_2 concentration at one location may exceed the annual mean NO_2 objective. However, it is proposed to undertake monitoring at the façade of the nearest property to determine with greater certainty the NO_2 concentration in this area.

3 Road Traffic Sources

Prior to the M6 Toll opening it was envisaged that traffic would ease along the A5 and A38 corridors and subsequently improve local air quality. Review and assessment reports concluded that these routes have in fact become busier, particularly with HGV traffic, and as a result local air quality has become poorer. In 2008, the LDC designated the A5 at Muckley Corner an Air Quality Management Area. This Area is designated in relation to a likely breach of the NO_2 annual mean objective.

LDC wrote to Midland Express Way Limited inviting them to an open discussion about air quality and the role that the M6 Toll plays within the District.[11]. Initial discussions have proven positive with Midland Express Way Limited stating that they are actively searching for strategies to attract more HGV companies to use the M6 Toll, which would have potential benefits for air quality within the Muckley Corner AQMA. Midland Express Way also indicated that the expanded use of the M6 Toll had been impeded by the A5 not being de-trunked as originally planned.

LDC has also become aware of the A5 Transport Liaison Group, which has been working to develop a strategy for the A5 route corridor to address challenges presented by the A5 to local authorities and planners. The strategy[17] touches upon the issue of air quality. 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"*. Through the Transport Liaison Group a £5 million bid for junction improvements at Muckley Corner has been submitted, which has the potential to improve air quality within the AQMA. LDC will attend future meetings of the Transport Liaison group with regard to Muckley Corner in particular and the entire section of the A5 that bisects LDC. Arrangements have also been made for Midlands Express Way Limited representatives to attend these meetings. LDC is optimistic that the meetings will help identify options for diverting traffic away from the A5 onto the M6 Toll to help alleviate congestion and improve air quality. Discussions are at an early stage but

options such as improved signage and identifying local heavy users of the A5 with whom Midland Express Way Limited might be able to negotiate a deal to promote the use of the M6 Toll.

LDC will report upon the outcomes of these meetings and discussions in the 2013 Air Quality Progress Report.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Earlier rounds of Review and Assessment did not identify any narrow congested street locations meeting the criteria for assessment. LDC has not identified any locations requiring assessment.

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

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

The 2009 USA did not identify any locations where individuals may spend one hour or more within 5 metres of the kerb of a busy road (> 10,000 AADT). There have been no significant changes since the 2009 USA and so there is no need to proceed further with this part of the assessment.

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

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

Following consultation with the Senior Environmental Protection Officer at LDC, there are no new or newly identified roads where the proportion of HGVs and/or buses is greater than 20% or where there is relevant exposure within 10 metres of such a road.

Lichfield District Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

There have been no significant changes since the 2009 USA and so there is no need to proceed further with this part of the assessment.

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

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

Staffordshire County Council completed both the Pipe Hill improvement works and the A38 Weeford Island to Bassett's Pole speed reduction project, where a 60 mph speed limit is enforced by average speed cameras. This was incorporated into the 2010 Detailed Assessment, the results of which suggested that the annual mean NO_2 air quality objective would be met at locations of relevant exposure.

Updated monitoring results for the tubes located at Canwell, close to the A38, {A38-4A/4B, A38-5A/5B, A38-6A/6B and A38-4/A38-4(1)} are shown in Table 2.8. Sites A38-4A/4B, A38-5A/5B exceeded the annual mean objective for NO_2 during 2011. After façade distance correction the predicted 2011 annual mean NO_2 concentrations at locations of relevant exposure were below the annual mean NO_2 objective at sites

A38 4A/4B and A38-5A/5B. The annual mean NO_2 objective was exceeded at site A38-4/A38-4(1) after façade distance correction (see Table 2.7).

Table 2.8 Results of Nitrogen Dioxide Diffusion Tubes (2007 to 2011)

Site ID	Site Type	Area	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3				
				2007 (Bias factor = 0.97)	2008 (Bias factor = 1.03)	2009 (Bias factor = 0.81)	2010 (Bias factor = 0.85)	2011 (Bias factor = 0.88)
A38-4A/4B	Roadside	Canwell	N	**53.2**	**55.8**	**40.8**	**44.5**	**42.4**
A38-5A/5B	Roadside		N	N/A	N/A	N/A	**43.9**	**40.4**
A38-6A/6B	Roadside		N	N/A	N/A	N/A	33.0	33.5
A38-4/A38-4(1)	Roadside		N	N/A	N/A	**47.2**	**49.9**	**49.1**
A5(1)	Roadside	Muckley Corner	N	35.1	**43.5**	36.5	**44.0**	**40.2**
A5(1A)	Roadside		N	38.3	**46.5**	37.8	**42.8**	**41.1**
A5(2A)	Roadside		N	33.3	**42.5**	32.4	37.3	39.0
A5(2B)	Roadside		N	**49.5**	**48.3**	**41.2**	**52.0**	**42.7**
MUC(1)	Roadside		Y	**46.7**	**54.1**	**42.7**	**53.1**	**42.1**
MUC(1A)	Roadside		Y	**50.3**	**53.7**	**42.3**	**53.4**	**45.9**
MUC(1B)	Roadside		Y					
MUC(1C)	Roadside		Y					
MUC(2)	Roadside		Y	**45.6**	**40.1**	35.9	**45.9**	39.1
MUC(3)	Roadside		Y	**58.1**	**63.4**	**51.0**	**63.5**	**54.0**
MUC(4)	Roadside		Y	**42.8**	**47.7**	36.0	**46.9**	**41.6**
MUC(5)	Roadside		Y	**50.6**	**56.4**	**50.3**	**58.9**	**55.3**
MUC(6)	Roadside		Y	35.1	**41.0**	34.5	39.4	39.1

Note: None of the results presented in Table 2.8 are façade distance corrected. For façade distance corrected concentrations refer to Table 2.7 and supporting text.

The A5 Muckley Corner Improvements scheme as assessed in the Further Assessment and Air Quality Action Plan 2010, was completed in June 2011. It was stated in that report that the impacts of the scheme would be assessed through a post-completion diffusion tube monitoring programme. There is currently insufficient data to draw any firm conclusions as to whether air quality in the Muckley Corner AQMA and its vicinity has improved as a result of the scheme.

The latest monitoring results for the tubes located at A5 Muckley Corner { A5(1), A5(1A), A5(2A), A5(2B), MUC(1), MUC(1A/B/C), MUC(2), MUC(3), MUC(4), MUC(5), and MUC(6)}, shown in Table 2.8, indicated that at sites within the AQMA annual mean NO_2 concentrations remained above or close to the annual mean NO_2 objective, but reduced between 2010 and 2011.

Three of the four sites outside of the existing AQMA boundary in the Muckley Corner area exceeded the annual mean NO_2 objective in 2011. However, after façade distance correction, the annual mean NO_2 objective was predicted to be achieved at locations of relevant exposure outside the AQMA boundary in 2011. The latest monitoring suggests that the current AQMA boundary at Muckley Corner is appropriate and should remain in its present form. Diffusion tube monitoring will continue in the area to determine whether the reduction in NO_2 concentrations in the Muckley Corner AQMA between 2010 and 2011 is part of a general downward trend and what influence the road improvements may have had on levels of NO_2 in the area.

Lichfield District Council confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

There have been no significant changes since the 2009 USA and so there is no need to proceed further with this part of the assessment.

Lichfield District Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

LDC has no bus stations with greater than 2500 vehicle movements per day or with relevant exposure within 10 metres of the bus station. According to the criteria outlined in Section A.7 Box 5.3 of TG(09), there are no bus stations qualifying for assessment.

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

4 Other Transport Sources

4.1 Airports

There are no major airports within the District of Lichfield that meet the criteria set out in Section B1 (Box 5.4) of LAQM.TG(09). There is no need to consider airport sources further.

Lichfield District Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

Since the Government's decision to go ahead with the new high speed line HS2, HS2 Ltd is taking forward the first phase of the project and it will begin the next stage of engineering, design and environmental work.
Key aspects of the proposed route include:

A line capable of up to 250 miles per hour;

- Up to 400 metre long trains with as many as 1,100 seats, and up to 14 trains per hour in each direction;
- Minimising impacts on the environment, by following existing rail or road transport corridors, using deep cuttings and tunnels, and avoiding sensitive sites wherever possible;
- Balancing cost and the other design aims.

Subject to consultation, the planning process will include the requirement to undertake an Environmental Impact Assessment (EIA). Any potential air quality issues will be covered through this EIA and subsequently reviewed and reported through the LAQM process.

4.2.1 Stationary Trains

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

4.2.2 Moving Trains

Table 5.1 of LAQM TG(09) provides a list of rail lines with a heavy traffic of diesel passenger trains. None of the sections listed pass through the District of Lichfield and therefore the effect of moving trains does not require any further consideration.

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

4.3 Ports (Shipping)

Lichfield District is landlocked and there are no busy waterways within the District.

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

5 Industrial Sources

Changes to Industrial Sources within the LDC area since the previous USA[6] were outlined in the 2011 Progress Report[11] and new planning applications are described in the following sections.

5.1 Industrial Installations

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

In accordance with Approach 1 in Section C.1 of Box 5.5 of TG(09) LDC have identified no new or approved proposed industrial sources for which an air quality assessment has been carried out either within the LDC area or in neighbouring authorities that are likely to impact on air quality in the Lichfield District.

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

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

None of the existing industrial facilities within the District or in neighbouring authorities considered in previous rounds of Review and Assessment have undergone significant changes in their operations whereby emissions have increased by 30% or more. No new exposure has been introduced in the vicinity of any industrial emission sources.

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

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

There have been no new or proposed industrial processes within the area or neighbouring areas since the previous round of Review and Assessment was completed.

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

5.2 Major Fuel (Petrol) Storage Depots

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

5.3 Petrol Stations

There are no petrol stations within the Lichfield area with an annual throughput of 2000 m^3 and with a busy road nearby that have not been assessed in previous rounds of Review and Assessment.

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

5.4 Poultry Farms

LDC has received an application for a Part A1 Permit for the Cleat Hill Farm Poultry Farm at Haunton, Tamworth. At present the application has not been determined yet, but if permitted it would require an A1 Environmental Permit of the Environment

Agency. The proposal includes a poultry farm of 221,000 birds, which would be mechanically ventilated. Consequently, there is no need to consider this source further at this stage.

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

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

A planning application for a biomass unit at Haunton Manor Farm, Haunton, Tamworth was granted permission on 21/09/2011.

The biomass unit has been commissioned and is now operational. The unit is a D35 Dragon Biomass with a capacity of 400 kW, a stack diameter of 300 mm, and a stack height of 6.7 m. The unit capacity was not provided and figures have been obtained from information on the manufacturer's website[13]. Emission rates of NO_X and PM_{10} have been estimated from the maximum thermal capacity and emission rates from the EMEP/CORINAIR Guidebook[14].

Effective Stack Height

LAQM.TG(09) states that the stack height should be assumed equal to the actual (physical) stack height (U_{act}) unless the height of release is greater than 3 m above the building on which it sits, but less than 2.5 times the height of the tallest adjacent building. An actual stack height of 6.7 m above ground was determined based on the available plans of the biomass heater. The building where the stack is located is 2.75 m in height, so the height of release is greater than 3 m above the building on which it sits. Furthermore, the stack height is less than 2.5 times the height of the tallest adjacent building within 5 actual stack heights distance (H; approximately 5.7 m in height). LAQM.TG(09) therefore indicates that the effective stack height is calculated as follows:

$U_{eff} = 1.66 \times (U_{act} – H)$
$U_{eff} = 1.66 \times (6.7 – 5.7)$
$U_{eff} = 1.66$ m

Background Pollutant Concentrations

Background NO_2 and PM_{10} concentrations for the study area were obtained from the Defra website[15] for the 1-km square centred on grid reference (423500, 310500) and are shown in Table 6.1.

Table 6.1: Background Pollutant Concentrations for 2010

Pollutant	Concentration (µg/m^3)
PM_{10}	16.19
NO_2	11.34

Nomograms

Nomograms are used to determine threshold emission rates (based upon the height of the stack and the stack diameter) above which potentially significant air quality impacts may occur. If the actual emission rates associated with a biomass boiler are higher than these threshold values, further more detailed assessment is required.

Nomograms for NO_2 and PM_{10} emissions have been prepared by Defra and can be found in Appendix E.

Emission Rates for Assessment Purposes

The emission rates in g/s, shown in Table 6.2, were determined for the biomass heater from the emissions rates reported in the EMEP/CORINAIR Guidebook and the maximum thermal capacity of the biomass boiler, and are shown in Table 6.2.

Table 6.2: Actual Pollutant Emission Rates

Parameter	PM_{10}	NO_X
Emission Rate (g/s)	0.06	0.06

Screening Assessment

For NO_2 and PM_{10}, the impact of an industrial source will be largely dependent upon the background concentration. LAQM.TG(09) states that a simplified (and precautionary) means of taking this into account is to determine the "background-adjusted" emission rate using the background concentrations in Table 6.1. "Background adjusted" emission rate (E_a) are calculated from the following formula:

$E_a(PM_{10})= E/(32 – G)$;

$E_a(NO_{2\ annual})=E/(40 – G)$;

$E_a(NO_{2\ hourly})=40 \times E/(200 – 2 \times G)$;

where E is the emission rate in g/s (Table 6.2), and G is the background concentration in µg/m^3 (Table 6.1).

Values are shown in Table 6.3 which can be compared to the threshold emission rate obtained from the horizontal axis of the relative nomogram. A stack diameter of 0.2 m has been assumed due to nomogram limitations. This represents a worst-case assessment scenario.

Table 6.3: Threshold Pollutant Emission Rates

Parameter	**PM_{10}**	**NO_2 Annual mean**	**NO_2 Hour-mean**
Threshold Emission Rate (g/s) from nomogram	0.0008	0.0015	0.008
"Background Adjusted" Threshold Emission Rate (g/s)	0.004	0.002	0.001

[a] Values taken from LAQM.TG(09) nomograms Figures 5.19, 5.20 and 5.21. See Appendix E.

As the estimated "background adjusted" pollutant emission rates in g/s are greater than the threshold emission rates from the nomogram, the biomass unit may have a potentially significant effect on air quality and a Detailed Assessment is required.

Lichfield District Council has assessed biomass combustion plant, and concluded that **it will be necessary to proceed to a Detailed Assessment for NO_2 and PM_{10}.**

6.2 Biomass Combustion – Combined Impacts

There are no areas of 500 x 500m squares within LDC with more than one biomass combustion appliance for commercial or domestic purposes. The combined impact of Biomass Combustion on Local Air Quality does not require further assessment.

Lichfield District Council confirms that there are no biomass combustion plant in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

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

7 Fugitive or Uncontrolled Sources

Since the previous round of Review and Assessment, one facility has applied for and been granted Part A1 permits for activities with the potential to give rise to fugitive or uncontrolled emissions.

The Colton Hall Farm permit was issued by Environment Agency on 30/09/2011 for use of waste to reclaim land including import of pulverised ash and soils. LDC has not received any dust complaints in relation to the operations at this facility. The nearest residential property is located 375 m from the permitted activity. Consequently, there is no need to consider this source further at this stage.

Lichfield District Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Conclusions and Proposed Actions

8.1 Conclusions from New Monitoring Data

Diffusion tube monitoring data indicate that the annual mean NO_2 objective was exceeded at thirteen diffusion tube locations in the District during 2011. Four of the recorded exceedences were inside the existing AQMA (four tubes were co-located – one at ground level height and triplicate tubes at first floor exposure height). The trends in concentration during recent years at sites within the AQMA indicate that NO_2 has slightly decreased compared to 2010 results, but the annual mean NO_2 objective is still being breached.

The highest monitored annual mean NO_2 concentration during 2011 was 55.5 µg/m^3, which suggests that the hourly mean objective is unlikely to have been exceeded at Muckley Corner. The latest diffusion tube monitoring results around the Muckley Corner AQMA indicate that the current AQMA should remain and its current extent is appropriate.

Exceedences of the annual mean NO_2 objective occurred at nine monitoring sites outside the boundaries of the existing AQMA. After correction of the measured NO_2 concentrations for distance from the road it was estimated that the annual mean NO_2 objective would be exceeded at two locations of relevant exposure outside the existing AQMA, alongside the A38 at Canwell (represented by diffusion tubes A38-4/A38-4(1)) and at Fradley at location A38-2A/2B.

Monitoring results indicated that NO_2 concentrations at A38-4/A38-4(1) site have exceeded the annual mean objective every year since 2009. Site A38-2A/2B was installed to confirm local concentrations after the 2011 Progress Report and has only been operational since August 2011.

It is proposed to continue monitoring at site A38-4/A38-4(1) but that the diffusion tubes are moved to the façade of the nearest residential property to confirm whether

or not the annual mean NO_2 objective is likely to be exceeded at locations of relevant exposure. Monitoring at site A38-2A/2B commenced in August 2011 and it is proposed that monitoring should continue at this location. The decision to proceed to a Detailed Assessment will be taken once a full year of monitoring data is available for comparison with the annual mean NO_2 objective.

8.2 Conclusions from Assessment of Sources

A planning application for a biomass unit at Haunton Manor Farm, Haunton, Tamworth was granted permission on 21/09/2011. The assessment for NO_2 and PM_{10} emission from the biomass plant shows that the estimated pollutant emission rates are higher than the "background adjusted" threshold emission rates for PM_{10} and the threshold emission rate for NO_2. This indicates that the biomass boiler may have a potentially significant effect on air quality. Therefore, a Detailed Assessment is required for both pollutants.

8.3 Proposed Actions

In line with LAQM.TG(09) guidance, potential exceedences of the air quality objectives have been identified at two locations outside the existing AQMA. These are:

- sites A38-4/A38-4(1) alongside the A38 at Canwell; and
- A38-2A/2B at Fradley.

Monitored annual mean NO_2 concentrations at these locations were above the objective after using the appropriate façade calculations. At A38-4/A38-4(1), following façade distance calculations, the estimated annual mean NO_2 concentration in 2011 at the nearest location of relevant exposure (40.9 $\mu g/m^3$) was just above the annual mean NO_2 objective. It is proposed to carry out diffusion tube monitoring at the façade of this property to determine the likelihood of an exceedence at locations of relevant exposure in the vicinity of site A38-4/4(1).

Site A38-2A/2B was installed in August 2011 to confirm local concentrations after the 2011 Progress Report. The reported exceedence at this site is based on the annualisation of short-term monitoring data and it is proposed to defer the decision to proceed to a Detailed Assessment for this location until a full year of diffusion tube monitoring data is available for comparison with the air quality objectives.

The Council is committed to continue monitoring air quality within its District as well as any new development that may have implications for local air quality. LDC will update and report these findings in its 2013 Air Quality Progress Report. The Council will consult the A5 Transport Liaison Group in order to determine how the Group's strategy may be developed to improve local air quality in Lichfield, particularly in the vicinity of the Muckley Corner AQMA. LDC have also invited Midlands Expressway Limited to an open discussion regarding the impact of the M6 Toll road on air quality in the Lichfield District. The outcomes of these discussions will be reported on in the 2013 Progress Report.

The assessment for NO_2 and PM_{10} emissions from the biomass unit at Haunton Manor Farm indicates that emissions of NO_X and PM_{10} from the biomass boiler have the potential to significantly affect local air quality. Therefore, a Detailed Assessment is therefore required for the pollutants NO_2 and PM_{10}.

9 References

[1] Faber Maunsell (2003), Lichfield District Council Updating and Screening Assessment 2003
[2] Casella Stanger (2004), Lichfield District Council Detailed Assessment 2004
[3] Casella Stanger (2005), Lichfield District Council Detailed Assessment 2005
[4] Faber Maunsell (2006), Lichfield District Council Updating and Screening Assessment 2006
[5] AEA Technology (2007). Air Quality Review and Assessment: Detailed Assessment 2007. Report to Lichfield District Council.
[6] Faber Maunsell (2009) Lichfield District Council Updating and Screening Assessment 2009
[7] AECOM (2010) Lichfield District Council Detailed Assessment 2010
[8] Summary of Laboratory Performance in WASP NO_2 Proficiency Testing Scheme for Rounds 104-108 (http://laqm.defra.gov.uk/documents/Summary_of_Laboratory_Performance_in_WASP_R104-108.pdf)
[9] Summary of Laboratory Performance in WASP NO_2 Proficiency Testing Scheme for Rounds 105-113 (http://laqm.defra.gov.uk/documents/WASP-NO2-Scheme-for-Rounds-105-113-(April-2009---June-2011).pdf)
Summary of Laboratory Performance in WASP NO_2 Proficiency Testing Scheme for Rounds 108-115 (http://laqm.defra.gov.uk/documents/WASP-Rounds-108-115-(January-2010-December-2011).pdf)
[10] AEA Technology (2007). Air Quality Review and Assessment: Detailed Assessment 2007. Report to Lichfield District Council.
[11] Personal Communication with Neil Wait, Senior Environmental Protection Officer (Lichfield District Council)
[12] AECOM (2011) Lichfield District Council Air Quality Progress Report 2011
[13] http://www.dragonheat.co.uk/specifications.html
[14] http://www.eea.europa.eu/publications/emep-eea-emission-inventory-guidebook-2009
[15] http://laqm.defra.gov.uk/review-and-assessment/tools/background-maps.html
[16] Air Quality Review and Assessment Website, Nitrogen Dioxide Diffusion Tube Bias Adjustment, Version 03/12.
[17] A5 Transport Liaison Group (2012). 'A Strategy for the A5, 2011 – 2026. A449 Gailey (Staffordshire) to A45 Weedon (Northamptonshire)'.

Appendices

Appendix A: QA:QC Data

Diffusion Tube Bias Adjustment Factors

Bias adjustment is effectively a calculated factor which shows whether diffusion tubes are over or under reading ambient concentrations and therefore allows for a correction to be made.

As there is not a local triplicate co-location site, LDC uses a national factor as given on the review and assessment help desk website[16] for Staffordshire Scientific Services. The preparation method is 20% TEA in water.

Discussion of Choice of Factor to Use

In absence of continuous monitoring station and co-located tubes, the bias adjustment factors used in the present assessment to correct the raw diffusion tube results have been obtained from the national database of co-location studies available from the Review and Assessment website (Spreadsheet Version 03/12). The bias factors used in this assessment are summarised below in Table A1.

Table A.1 Bias Adjustment Factors Used to Correct Diffusion Tube Data

Year	Preparation Method	Number of Studies	Bias Factor
2007	50% TEA in Water	6	0.97
2008	50% TEA in Water	7	1.03
2009	20% TEA in Water	9	0.81
2010	20% TEA in Water	9	0.85
2011	20% TEA in Water	11	0.88

PM Monitoring Adjustment

There are no permanent continuous monitoring locations in operation in the District

Short-term to Long-term Data adjustment

Table A.2: Calculation of Seasonal Adjustment Factor for Nitrogen Dioxide

Site	**Site type**	**NO_2 Concentration (µg/m^3)**		**Ratio**
		Annual Mean	**Period Mean (from 04/08/11 to 04/01/12)**	
Coventry Memorial Park	Urban Background	16.9	17.0	0.998
Chesterfield	Urban Background	14.9	14.8	1.003
Leamington Spa	Urban Background	20.7	21.2	0.977
Northampton	Urban Background	17.7	17.7	0.998
			Mean Ratio	**0.994**

QA/QC of automatic monitoring

2007 Monitoring Period at Muckley Corner

The measurement methods used for the automatic monitoring programme were identical to those used at the UK's national air quality monitoring stations in the Defra Automatic Urban and Rural Network (AURN). The gas analyser was calibrated approximately fortnightly by AEA staff, using ISO17025 accredited compressed gas mixtures. The gases were certified in AEA's Gas Standard Calibration Laboratory at Harwell (UKAS calibration laboratory no. 0401), ensuring traceability to both national standards and to the Defra monitoring networks through AEA's involvement in the AURN. The data from the analysers were collected on a datalogger and transferred to AEA's central computer by telemetry.

The performance of the analysers was checked during the monitoring period using AEA's accredited site QA/QC audit procedures.

2009 Monitoring Period at Muckley Corner

Monitoring at Muckley Corner, Lichfield was performed in accordance with the guidelines outlined in Technical Guidance Notes LAQM.TG(03) , LAQM.TG1(00) and LAQM.TG(09). The NO_X analyser was set up and calibrated in strict accordance with the manufacturers' recommended procedures prior to and during use. An overview of QA/QC procedures are provided below.

Manual calibrations were carried out every two to four weeks to quantitatively determine instrumental drift. Air Liquide specialist calibration gases were used to obtain span values. Instrumental drift was accounted for during the processing of the data. Analyser filters were changed during the routine site calibrations, with span and zero determinations being made before and after. Any instrument span or zero drift was assumed to be linear between discrete checks, and the data corrected linearly in accordance with any drift.

All fittings in contact with the sample gas stream were either polytetrafluoroethene (PTFE) or stainless steel, so that surface losses are minimised. Qualified engineers serviced the analysers at six monthly intervals.

All site visits were documented to describe any adjustments made and to record any problems encountered. Results of all analyser tests and calibrations were recorded. Following scheduled service visits service reports were issued by the service engineers to provide documentation of maintenance performed.

QA/QC of diffusion tube monitoring

The diffusion tubes used by LDC were supplied and analysed by Staffordshire Scientific Services. The tubes were prepared using a 20% TEA in water preparation. Prior to the beginning of 2009 the laboratory did not conduct its analyses in accordance with the procedures set out in the Harmonisation Practical Guidance, although since January 2009 Staffordshire Scientific have modified its procedure in accordance with the Guidance. The laboratory participates in the WASP scheme operated by the Health and Safety Laboratory. Rating achieved by Staffordshire Scientific Services, reported in the WASP Summary of Laboratory Performance reports covering Rounds 104 to 108[8], 105 to 113[9] and 108 to 115[10]. In the WASP Summary of Laboratory Performance report covering Rounds 104 to 108 Staffordshire Scientific Services achieved a rating of 'Good' against the updated RPI Criteria. In Rounds 105 to 115, the percentage (%) of results submitted from Staffordshire Scientific Services which were subsequently determined to be satisfactory was 100% for all tests between Round 105 (April-June 2009) and Round 115 (October-December 2011), except for Round 106 (June-August 2009) and Round 110 (June – August 2010), in which the satisfactory percentage was 75% and 50%, respectively.

Appendix B: LAPC / LAPPC Register

LDC Reference	Premises Grid Reference Process Notes ,	Grid Reference	Process	Notes
PPC1/D/93	RMC Readymix Limited, Moneymore Farm, London Road, Weeford, Nr. Lichfield, West Midlands.	SK1357-0201	Storage and use of Bulk Cement PG3/1	Authorised 27/05/93 **Surrendered 14/11/07**
PPC2/C/93	Bison Concrete Products Limited, Birmingham Road, Lichfield, Staffordshire. WS14 9BP	SK1162-0846	Storage and use of Bulk Cement PG3/1	Authorised 29/07/93 **Revoked 15/9/05**
EPA3	Boral Edenhall Concrete Products Limited, Unit 14, Fradley Industrial Estate, Nr. Lichfield, Staffordshire.	SK1488-1327	Storage and use of Bulk Cement PG3/1	**Plant closed down**
PPC4/C/93	Lafarge Aggregates Limited, Weeford Plant, London Road, Canwell, Sutton Coldfield, West Midlands. B75 5SX	SK1400-0201	Coating of Roadstone PG3/15	Authorised 23/09/93
PPC5/F/93	Cemex UK Materials Limited, Weeford Quarry, London Road, Canwell, Sutton Coldfield, West Midlands. B75 5SZ	SK1400-0235	Batching of ready mixed mortars PG3/1	Authorised 23/09/93
PPC6/D/93	Tarmac Central Limited, Hints Quarry, Hints, Nr Tamworth, Staffordshire B78 8DD	SK1592-0393	Batching of ready mixed concrete PG3/1	Authorised 27/05/93
EPA7/1/93	Douglas Concrete and Aggregates Limited, Knox Grave Lane, Hopwas, Tamworth, Staffordshire. B78 3AR	SK1622-0480	Batching of ready mixed concrete PG3/1(95)	Authorised 24/08/93 **Revoked 25/08/99**
EPA8/2/96	Tarmac Topmix Limited, Shire Oak Quarry, Lichfield Road, Shire Oak, Brownhills, West Midlands. WS9 9PE	SK0608-0425	Batching of ready mixed concrete PG3/1(95)	Authorised 24/08/93 **Revoked 30/03/01**
PPC9/C/93	GKN Sinter Metals Limited, Trent Valley Road, Lichfield, Staffordshire. WS13 6HF	SK1330-0990	Production of ferrous alloys PG2/4(96) & 2/9(96)	Authorised 28/10/93 **Revoked 15/1/07**
PPC10/C/96	Coltman Pre-cast Concrete Limited, London Road, Canwell, Sutton Coldfield, West Midlands. B75 5SX	SK1347-0180	Storage and use of Bulk Cement PG3/1	Authorised 26/08/93

LDC Reference	Premises Grid Reference Process Notes ,	Grid Reference	Process	Notes
EPA11/1/93	Boney Hay Concrete Company Limited, Chorley Road, Chase Terrace, Staffordshire. WS7 8PG	SK0498-1058	Storage and use of Bulk Cement PG3/1(95)	Authorised 25/06/93 **Revoked 25/05/94**
PPC12-13/D/93	Dale Joinery (Lichfield) Limited, Europa Way, Lichfield, Staffordshire. WS14 9TY	SK1377-0960	Manufacture and Treatment of Timber Goods PG6/2, PG6/3 & PG1/12	Authorised 28/09/93 **Revoked 21/6/10**
EPA14/1/93	S .I. V. Coatings Limited, Unit 0 Riverside Industrial Estate, Atherstone Street, Fazeley, Tamworth, Staffordshire. B78 3RW	SK2079-0197	Manufacture and Storage of Powder Coating material	Authorised 28/09/93 **Revoked 06/07/99**
PPC15/D/93	Foseco (FS) Limited, Coleshill Road, Tamworth, Staffordshire. B78 3RW	SK1988-0148	Manufacture of Heavy Clay and Refractory Goods PG3/2	Authorised 28/10/93
EPA16/1/93	Foseco (FS) Limited, Coleshill Road, Tamworth, Staffordshire. B78 3RW	SK1988-0148	Storage and use of Powdered Coal PG3/5(95)	(EPA16 consolidated with EPA15) **Taken out in 1991**
PPC17/D/93	Fosroc Limited, Coleshill Road, Tamworth, Staffordshire. B78 3TL	SK1988-0148	Storage and use of Bulk Cement PG3/1	Authorised 28/10/93
PPC18/D/93	Tamworth Accident Centre, Units D-E Riverside Industrial Estate, Atherstone Street, Fazeley, Tamworth, Staffordshire. B78 3RW	SK2078-0190	The Re-spraying of Road Vehicles	Authorised 27/10/93
EPA19/1/93	Olaf l Johnston Limited, Cannock Road, Chase Terrace, Burntwood. WS7 8JS	SK0438-0927	The Application of Sprayed Coatings	Authorised 18/11/93 **Revoked 19/03/97**
EPA20/1/93	Olaf l Johnston Limited, Cannock Road, Chase Terrace, Burntwood. WS7 8JS	SK0438-0927	Sawing and Associated Timber processes	Authorised 18/11/93 **Revoked 19/03/97**
EPA21/1/93	Olaf l Johnston Limited, Cannock Road, Chase Terrace, Burntwood. WS7 8JS	SK0438-0927	The Burning of Wood Waste	Authorised 18/11/93 **Revoked 19/03/97**
EPA22/1/93	Burntwood Accident Centre Limited, Electric House, New Road, Burntwood, Staffordshire WS7 0AZ	SK0581-0886	The Respraying of Road Vehicles	Authorised 28/10/93 **Revoked 2001**

LDC Reference	Premises Grid Reference Process Notes ,	Grid Reference	Process	Notes
EPA23/1/93	Ash and Lacy Pressings Limited, Lynn Lane, Shenstone, Lichfield, Staffordshire. WS14 0EB	SK1025-0469	The use of Organic Solvents	Authorised 26/11/93 **Revoked 12/06/98**
EPA24/1/93	Hepworth Building Products Limited, (Lichfield Site) Eastern Avenue, Lichfield, Staffordshire, WS13 7SD	SK1216-1152	The mixing, milling and blending of natural rubbers containing Carbon Black	Authorised 23/11/93 **Revoked 07/07/99**
EPA25/1/93	Armitage Shanks Bathrooms, Plastics Division, No. 2 Lodge, Boathouse Lane, Armitage, Nr. Rugeley, Staffordshire WS15 4BT	SK0819-1618	Di-isocyanate process in the manufacture of baths	Authorised 30/07/93 **Revoked 09/08/00**
PPC26/C/93	Metal Products (Arden) Limited, Prospect Road, Burntwood, WS7 0AE	SK0576-0883	The use of Organic Solvents	Authorised 23/11/93
EPA27/1/94	Trent Valley Engineering (Rugeley), Blithbury Road, Rugeley, Staffordshire, WS15 3HH	SK0503-1896	The use of Organic Solvents	Authorised 21/01/94 **Revoked 26/05/94**
EPA28/1/94	Armitage Shanks Bathrooms, Plastics Division, No. 2 Lodge, Boathouse Lane, Armitage, Staffordshire WS15 4BT	SK0819-1618	Use of Volatile Organic Compounds	Authorised 18/01/94 **Revoked 19/03/96**
EPA29/1/93	Dale Joinery Limited, Europa Way, Lichfield, Staffordshire. WS14 9TY	SK1377-0960	Wood Coating processes	Authorised 10/12/93 **Revoked 06/07/99**
EPA30/1/94	Fletcher International Sportsboats Limited, Plant Lane, Chase Terrace, Staffordshire WS7 8BG	SK0378-0930	Di-isocyanate process	Authorised 28/01/94 **Revoked 21/3/03**
EPA31/1/94	Fletcher International Sportsboats Limited, Plant Lane, Chase Terrace, Staffordshire WS7 8BG	SK037. 8-0930	Use of Volatile Organic Compounds	Authorised 28/01/94 **Revoked 21/3/03**
PPC32/C/94	Mobile Plant - operated by Dunton Plant Limited, Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Authorised 27/04/94
EPA33/2/94	Delco Remy UK Limited, Gorse Lane, Fradley, Lichfield, Staffordshire WS14 9HQ	SK1424-1359	Use of Volatile Organic Compounds	Authorised 27/10/94 **Revoked 8/12/04**
EPA34/1/94	Just Screeds, Robins Road, Chasetown Industrial Estate, Chase Terrace, Burntwood, Staffordshire WS7 8FX	SK0405-0897	Use of bulk cement	Authorised 27/10/94 **Revoked 05/12/96**

LDC Reference	Premises Grid Reference Process Notes ,	Grid Reference	Process	Notes
PPC35/C/94	Mobile Plant - operated by Dunton Plant Limited, Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Authorised 29/07/94
PPC36/C/94	Mobile Plant - operated by Dunton Plant Limited, Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Authorised 29/07/94
EPA37/1/95	Dale Joinery Limited, Staircase Department, Units 4a, 4b & 4d Ring Road, Chase Park Industrial Estate, Chasetown, Staffordshire	SK0399-0928	Manufacture of timber products	Authorised 30/01/95 **Revoked 27/8/03**
PPC38/C/94	Mobile Plant - operated by Dunton Plant Limited, Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile crushing and screening processes	Authorised 27/10/94
EPA39	IMI Norgren Limited, Valves Division, P. O. Box 22, Eastern Avenue, Lichfield, Staffordshire WS13 6SB	SK1283-1054	Use of Volatile Organic Compounds	**Application withdrawn**
EPA40/1/95	IMI Norgren Limited, Fittings Division, P. O. Box 22, Eastern Avenue, Lichfield, Staffordshire WS13 6SB	SK1283-1054	Acid process for the surface treatment of metals	Authorised 29/09/95 **Revoked 31/05/96**
PPC41/D/95	Steve Thompson Cars Limited, Eastern Avenue, Lichfield, Staffordshire, WS13 7SA	SK1233-1119	Respraying of Road Vehicles	Authorised 16/11/95 **Revoked 20/8/10**
EPA42/1/95	Lichfield Motors Limited, Birmingham Road, Lichfield, Staffordshire, WS14 9QZ	SK1150-0762	Respraying of Road Vehicles	Authorised 03/11/95 **Revoked 25/06/98**
EPA43/A/03	Fosroc Limited, Coleshill Road, Fazeley, Tamworth, Staffordshire, B78 9TL	SK1988-0148	Bitumen process	Authorised 11/12/03 **Revoked 21/11/05**
EPA44/1/97	Armitage Shanks Limited, Baths Division, Armitage, Rugeley, Staffordshire. WS15 4BT	SK0819-1618	Manufacture of fibre reinforced plastics	Authorised 13/08/97 **Revoked 01/10/99**
EPA45/B/99	Morrison Petrol Filling Station, Beacon Street, Lichfield, Staffordshire. WS13 7BG	SK1090-1010	Unloading of Petrol into Storage at Service Stations	Authorised 30/03/99
EPA46/B/99	Morrison Petrol Filling Station, High Street, Burntwood, Staffordshire. WS7 8XP	SK0422-0903	Unloading of Petrol into Storage at Service Stations	Authorised 30/03/99
PPC47/B/98	Mobile Plant - operated by Trelanmex Limited, Unit 2 Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Authorised 08/07/98

LDC Reference	Premises Grid Reference Process Notes ,	Grid Reference	Process	Notes
EPA48/A/99	Tesco Stores Limited, Church Street, Lichfield, Staffordshire. WS13 6DZ	SK1216-0974	Unloading of Petrol into Storage at Service Stations	Authorised 30/03/99
EPA49/A/99	Drayton Filling Station, Atherstone Street, Fazeley, Tamworth, Staffordshire. B78 3RN	SK2087-0185	Unloading of Petrol into Storage at Service Stations	Authorised 30/03/99
EPA50/A/99	Reliant Cars Limited, Plant Lane, Burntwood, Staffordshire. WS7 8GB	SK0378-0930	Spraying of Road Vehicles	Authorised 16/12/99 **Revoked 15/03/01**
EPA51/A/99	(Texaco) Muckley Corner Service Station, Watling Street, Lichfield, Staffordshire WS14 0BH	SK0811-0656	Unloading of Petrol into Storage at Service Stations	Authorised 30/03/99
EPA52/B/98	(Malthouse Retail Ltd) Springhill Service Station, 150 Cannock Road, Burntwood, Staffordshire WS7 0BQ	SK0549-0914	Unloading of Petrol into Storage at Service Stations	Authorised 30/03/99
EPA53/B/99	(Texaco) Eastern Avenue Service Station, Lichfield, Staffordshire WS13 7SA	SK1235-1115	Unloading of Petrol into Storage at Service Stations	Authorised 30/03/99
EPA54/A/99	(Shell) London Road Service Station, Lichfield, Staffordshire WS14 9EQ	SK1212-0831	Unloading of Petrol into Storage at Service Stations	Authorised 30/03/99
EPA55/A/99	Midlands Co-op Superstore, 1 Boley Park Centre, Ryknield Street, Lichfield, Staffordshire WS14 9XU	SK1319-0918	Unloading of Petrol into Storage at Service Stations	Authorised 31/03/99
EPA56/A/99	(Total) Handsacre Service Station, Lichfield Road, Handsacre, Staffordshire WS7 8XP	SK0907-1590	Unloading of Petrol into Storage at Service Stations	Authorised 31/03/99 **Revoked 29/10/03**
EPA57/B/99	(RONTEC Watford Ltd) Fradley Service Area (South), Rykneld Street, Fradley, Staffordshire WS13 8RD	SK1643-1328	Unloading of Petrol into Storage at Service Stations	Authorised 31/03/99

LDC Reference	Premises Grid Reference Process Notes ,	Grid Reference	Process	Notes
EPA58/B/99	(RONTEC Watford Ltd) Stonnall Service Station, Chester Road, Stonnall, nr. Walsall, West Midlands WS9 9HS	SK0715-0292	Unloading of Petrol into Storage at Service Stations	Authorised 31/03/99
EPA59/A/99	Fazeley Car Centre, Watling Street, Fazeley, Tamworth, Staffordshire B78 3QA	SK2120-0170	Unloading of Petrol into Storage at Service Stations	Authorised 31/03/99
EPA60/A/00	Sommer Allibert Automotive (UK) Limited, Common Lane, Fradley Business Park, Fradley, Lichfield, Staffordshire WS13 8NQ	SK1503-1236	Coating of Metal And Plastic	Authorised 29/03/00 **Revoked 5/8/03**
EPA61/A/00	Integra Products, Eastern Avenue, Lichfield, Staffordshire WS13 7SB	SK1228-1134	Coating of Metal And Plastic	Authorised 16/08/00 **Revoked March 2002**
PPC62/B/00	Maier UK Limited, Chasewater Heath Industrial Area, Attwood Road, Burntwood, Staffordshire WS7 8GJ	SK0349-0914	Coating of Metal And Plastic	Authorised 12/10/00
PPC63/E/01	Mobile Plant - operated by Jager Associates Limited, Unit 2 Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Authorised 25/01/01 Transfer from Trelenmex Ltd 5/8/09
PPC64/B/01	Hanson Premix, Weeford Quarry, Canwell, Sutton Coldfield, West Midlands B75 5SX	SK4134-3019	Storage and use of Bulk Cement PG3/1	Authorised 24/10/01
EPA65/A/03	Fletcher International Sportsboats Limited, Plant Lane, Chase Terrace, Staffordshire WS7 8BG	SK0378-0930	Fibre Reinforced Plastics Process	Authorised 6/1/03 **Revoked 21/3/03**
EPA66/A/01	(RONTEC Watford Ltd) Limited, Fradley North Service Station, Fradley, Lichfield, Staffordshire WS13 8RD	SK1574-1247	Unloading of Petrol into Storage at Service Stations	Authorised 09/11/01
PPC67/B/02	Lafarge Aggregates Ltd, Croxall Road, Alrewas, Burton-on-Trent, DE13 7DL.		Storage and use of Bulk Cement PG3/1	Authorised 1/05/02
EPA68/A/02	(Total PFS) JT Leaversley (Alrewas) Ltd, A38 Ryknild Street (Service Road, Alrewas, Burton-on-Trent, DE13 7AB		Unloading of Petrol into Storage at Service Stations	Authorised 24/06/02

LDC Reference	Premises Grid Reference Process Notes ,	Grid Reference	Process	Notes
69	No issue			Nothing allocated to this ref
EPA70/A/02	Star Garage, Lichfield Road, Burntwood, WS7 0HQ		Unloading of Petrol into Storage at Service Stations	Authorised 25/06/02 **Revoked 12/7/06**
EPA71/A/02	Acorn Service Station, Birmingham Road, Lichfield, WS14 9QZ		Unloading of Petrol into Storage at Service Stations	Authorised 28/06/02 **Revoked 9/3/04**
EPA72/A/02	Wishing Well Garage, Brereton Hill, Rugeley, WS15 4LA		Unloading of Petrol into Storage at Service Stations	Authorised 24/07/02
PPC73/B/02	SAI Automotive Fradley Ltd, t/a Faurecia, Common Lane, Fradley Business Park, Fradley, WS13 8NQ		Adhesive coating	Authorised 17/09/02 **Revoked 28/3/07**
PPC74/B/03	Mobile Plant - operated by Trelanmex Limited, Unit 2 Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Permitted 8/7/03 **Revoked 2/9/09**
PPC75/E/03	Mobile Plant - operated by Jager Associates Limited, Unit 2 Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Permitted 13/10/03 Transferred from Trelenmex Ltd 5/8/09
PPC76/A/03	Mobile Plant – TM Fabrication & Welding Services, Town End Farm, Hamstall Ridware, Nr. Rugeley, Staffs, WS15 3RX		Mobile Crushing and Screening Process	Permitted 21/1/04
PPC77/A/04	SAI Automotive Fradley Ltd, t/a Faurecia, Common Lane, Fradley Business Park, Fradley, WS13 8NQ		VOC coating process (with reduction scheme)	Permitted 11/11/04
PPC78/A/05	Holdford Contracts (Staffs) Ltd, Crabtree Farm, Park Lane, Stockwell Heath, Rugeley, WS15 3LX		Cement storage	Permitted 22/3/05 **Revoked 20/3/07**
PPC79/A/05	Holdford Contracts (Staffs) Ltd, Crabtree Farm, Park Lane, Stockwell Heath, Rugeley, WS15 3LX		Mobile Screen	Permitted 22/3/05 **Revoked 20/3/07**
PPC80/A/05	Filon Products Ltd, Unit 3, Ring Road, Zone 2, Burntwood Business Park, Burntwood, Staffs, WS7 3JQ		Resin Polymerisation Process	Permitted 26/9/05

LDC Reference	Premises Grid Reference Process Notes ,	Grid Reference	Process	Notes
PCC81/A/06	SAI Automotive Fradley Ltd, t/a Faurecia, Common Lane, Fradley Business Park, Fradley, WS13 8NQ		Di-isocyanate process	Permitted 23/3/06
PPC82/A/06	Alrewas AGI, Overley Lane, Lichfield		Odorisation of natural gas	Permitted 6/12/06 **Ceased 5/4/10 due to 2010 regs**
PPC83/A/07	Ash & Lacy Pressings Ltd, Lynn Lane, Shenstone, Ws14 0EB		Powder Coating	Permitted 26/3/07 **Revoked 30/11/10**
PPC84/A/07	Boney Hay Mortar Plant, Chorley Road, Burntwood, WS7 2PF		Batching of ready mixed mortars PG3/1	Permitted 5/3/07 **Surrendered 13/5/08**
PPC85/A/07	Wm Morrison Supermarkets Plc, High Street, Chasetown, Burntwood, Staffs, WS7 8XP		Dry cleaners	Permitted 29/10/07
PPC86/A/07	Johnson Cleaners UK Ltd, 18 Market Street, Lichfield, WS13 6LH		Dry cleaners	Permitted 29/10/07
PPC87/A/08	Autosmart International Ltd, Lynn Lane, Shenstone, WS14 0DH		Manf coating material	Permitted 28/5/08
PPC88/A/10	SRS Aggregates Ltd, Norton House, Norton Canes Business Park, Norton Green Lane, Norton Canes, Staffs, WS11 9PS		Mobile crusher	Permitted 1/12/10
PPC89/A/11	Geeves Dry Cleaners, 61/62 Thornhill Rd, Streetly, B'ham, B74 3EN		Dry Cleaners	Permitted 13/5/11
PPC90/A/12	SRS Aggregates Ltd, Norton House, Norton Canes Business Park, Norton Green Lane, Norton Canes, Staffs, WS11 9PS		Mobile crusher	Permitted 17/1/12
EPA/OB1	Peter Boynton Limited, Cannock Road, Chase Terrace, Burntwood, Staffordshire WS7 8JT	SK0424-0938	Operation of a Waste Oil Burner	Authorised 20/05/94 **Revoked 19/03/96**

Appendix C: NO_2 Diffusion Tube Results, 2011

Table C.1 Raw Results of Nitrogen Dioxide Diffusion Tubes 2011

Site Ref	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Annual Mean ($\mu g/m^3$)	Bias-adjusted Mean ($\mu g/m^3$)	Data Capture (%)
A38(1)	55.8	45.8	54.5	46.2	36.8	47.2	44.3	45.3	46.2	43.4	39	47.6	46.0	**40.5**	100.0
A38(2)	53.3	57.5	56.2	47.3	33.3	37.2	34.7	32.2	38.6	47	-	29.4	42.4	37.3	91.7
A38(2)-1	NM	NM	NM	NM	NM	NM	NM	33.4	38.9	44.3	-	32.6	37.3	32.8	33.3
A38-2A	NM	NM	NM	NM	NM	NM	NM	52	46.4	53.1	54.3	39.4	49.0	**43.2**	41.7
A38-2B	NM	NM	NM	NM	NM	NM	NM	39.7	48.1	60.2	56.1	45.3	49.9	**43.9**	41.7
A38(3)	47.4	45.3	56.9	43.5	-	31.7	39.3	29.2	25	40.5	44.1	18.5	38.3	33.7	91.7
A38-4A	59.5	48.2	-	42.5	32.8	39.6	52	40.9	42.6	53.1	67.1	43	47.4	**41.7**	91.7
A38-4B	64.2	49	50.4	43.7	35.5	-	54.2	44.4	44	53	50.6	49	48.9	**43.0**	91.7
A38-4	70.8	58.2	67.3	52.3	37.2	55.6	55.8	51.3	54.3	57.2	58.8	51.1	55.8	**49.1**	100.0
A38-4(1)	76.7	27	68.1	62.6	-	-	57.1	48.7	51.4	55.6	65	46.2	55.8	**49.1**	83.3
A38-5A	68.3	45.1	56.1	39.1	35.3	46.4	46.1	45.2	44.5	46.8	47.8	38.5	46.6	**41.0**	100.0
A38-5B	61.2	46.5	58.6	41.2	35.9	42.4	43.2	39.3	38.2	48.3	48.6	40.1	45.3	39.9	100.0
A38-6A	58.2	40.6	45	37.2	30.4	37.4	32.9	31.3	36.9	38.8	38.1	39.1	38.8	34.2	100.0
A38-6B	52.6	39.4	34.1	37.8	30.4	36.7	33.3	34	42.9	39.3	29.3	37	37.2	32.8	100.0

Site Ref	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Annual Mean (µg/m^3)	Bias-adjusted Mean (µg/m^3)	Data Capture (%)
A5(1)	53.9	-	50.8	37.8	37.2	49.6	35.8	47.1	41.5	50.7	57.8	40.7	45.7	**40.2**	91.7
A5(1A)	51.3	50.9	50.5	42.2	-	-	37	41.1	46.7	54.9	51.8	40.1	46.7	**41.1**	83.3
A5(2A)	56.9	53.9	48.4	-	33.6	42.1	35.1	37.9	48.5	50.9	50.3	30.2	44.3	39.0	91.7
A5(2B)	71.2	-	70.1	54.3	35	44.8	49.3	39.5	36	47.1	48.2	38.4	48.5	**42.7**	91.7
A5(3)	46.6	37.9	-	67.1	22	25.1	28.6	23.9	25.6	39.1	39.9	26.3	34.7	30.6	91.7
B	30.2	25.8	26.2	20.2	14.1	14.4	14.8	-	-	23.2	29.3	19.6	21.8	19.2	83.3
L	27.2	11.8	27.9	18.5	15.1	15	16.5	12.2	18.3	25.7	32	19.3	20.0	17.6	100.0
MUC(1)	60	-	-	55.7	39	50.6	50.6	42.8	43.1	51.4	44.3	40.9	47.8	**42.1**	83.3
MUC(1A)	59	51.8	-	55.7	37.3	48.4	55.4	45.8	43.6	48.8	48.7	41.1	48.7	**42.8**	91.7
MUC(1B)	57.8	-	-	59.4	42.8	54.9	51.2	45.2	44.9	57.4	61.3	44.9	52.0	**45.7**	83.3
MUC(1C)	55.4	56.3	-	56.6	41.4	50.6	53.1	44.8	47.9	103.9	56.5	47.3	55.8	**49.1**	91.7
MUC(2)	57.6	43.6	64.2	48.5	34.7	39.3	44.3	42.8	32.5	41.9	46.2	38	44.5	39.1	100.0
MUC(3)	74.9	61.4	81.5	61.3	52.3	64.8	71.8	57	52	62.2	51.9	45.7	61.4	**54.0**	100.0
MUC(4)	59.7	53.1	72.3	52.8	35.3	37.4	46.1	39.7	31	49.6	59.3	30.6	47.2	**41.6**	100.0
MUC(5)	78.1	71.8	79.4	-	-	-	53	48.2	53.7	61.2	73.2	46.5	62.8	**55.3**	75.0
MUC(6)	54.8	49.7	49.1	43.3	34	40.6	37.2	34.3	45	50.1	49.1	45.4	44.4	39.1	100.0

NM: Not monitored. Emboldened figures indicate an exceedence of the annual mean NO_2 objective.

Appendix D: Relevant Receptor Calculations

Table D.1: Façade distance calculation for Site A5(1A)

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.

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Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	1	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 $\mu g/m^3$)?	(Note 2)	22.4	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	41.1	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	34.3	$\mu g/m^3$

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.

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Table D.2: Façade distance calculation for Site A5(2B)

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.

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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)	6	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	22.4	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	42.7	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	37.5	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.

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Table D.3: Façade distance calculation for Site A38-4 and A38-4(1)

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.

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Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	5.65	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 $\mu g/m^3$)?	(Note 2)	22.1	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	49.1	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	40.9	$\mu g/m^3$

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.

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Table D.4: Façade distance calculation for Site A38-4A and A38-4B

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.

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Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	6.85	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 $\mu g/m^3$)?	(Note 2)	22.1	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	42.4	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	37.2	$\mu g/m^3$

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.

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Table D.5: Façade distance calculation for Site A38-5A and A38-5B

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.

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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)	22.1	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	40.4	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	31.8	$\mu g/m^3$

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.

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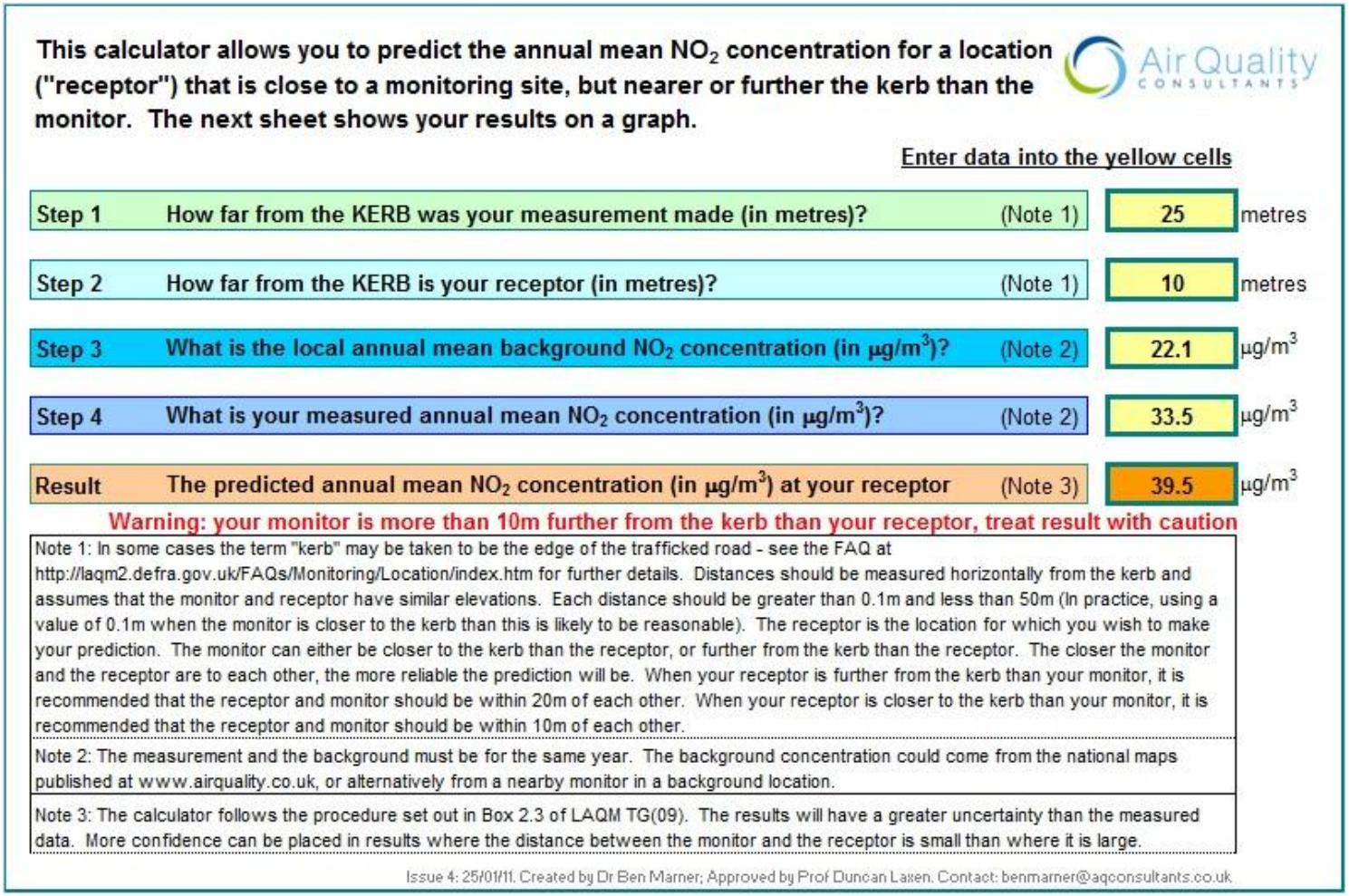
Table D.6: Façade distance calculation for Site A38-6A and A38-6B



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.

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Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	25	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	10	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	22.1	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	33.5	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	39.5	µg/m^3

Warning: your monitor is more than 10m further from the kerb than your receptor, 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.

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Table D.7: Façade distance calculation for Site MUC(3)

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.

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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)	10	metres
Step 3	**What is the local annual mean background NO_2 concentration (in µg/m^3)?**	(Note 2)	22.4	µg/m^3
Step 4	**What is your measured annual mean NO_2 concentration (in µg/m^3)?**	(Note 2)	54	µg/m^3
Result	**The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor**	(Note 3)	47.5	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.

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Table D.8: Façade distance calculation for Site MUC(4)

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.

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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)	2	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	22.4	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	41.6	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	45.3	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.

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Table D.9: Façade distance calculation for Site MUC(5)

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.

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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)	5	metres
Step 3	What is the local annual mean background NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	22.4	$\mu g/m^3$
Step 4	What is your measured annual mean NO_2 concentration (in $\mu g/m^3$)?	(Note 2)	55.3	$\mu g/m^3$
Result	The predicted annual mean NO_2 concentration (in $\mu g/m^3$) at your receptor	(Note 3)	48.2	$\mu g/m^3$

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.

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Appendix E: Biomass Nomograms

Figure E.1: Nomogram for Nitrogen Oxide Emissions (annual mean)

Figure 5.20: nitrogen dioxides emissions to give an annual mean ground-level nitrogen dioxides concentration of 1 µg/m³

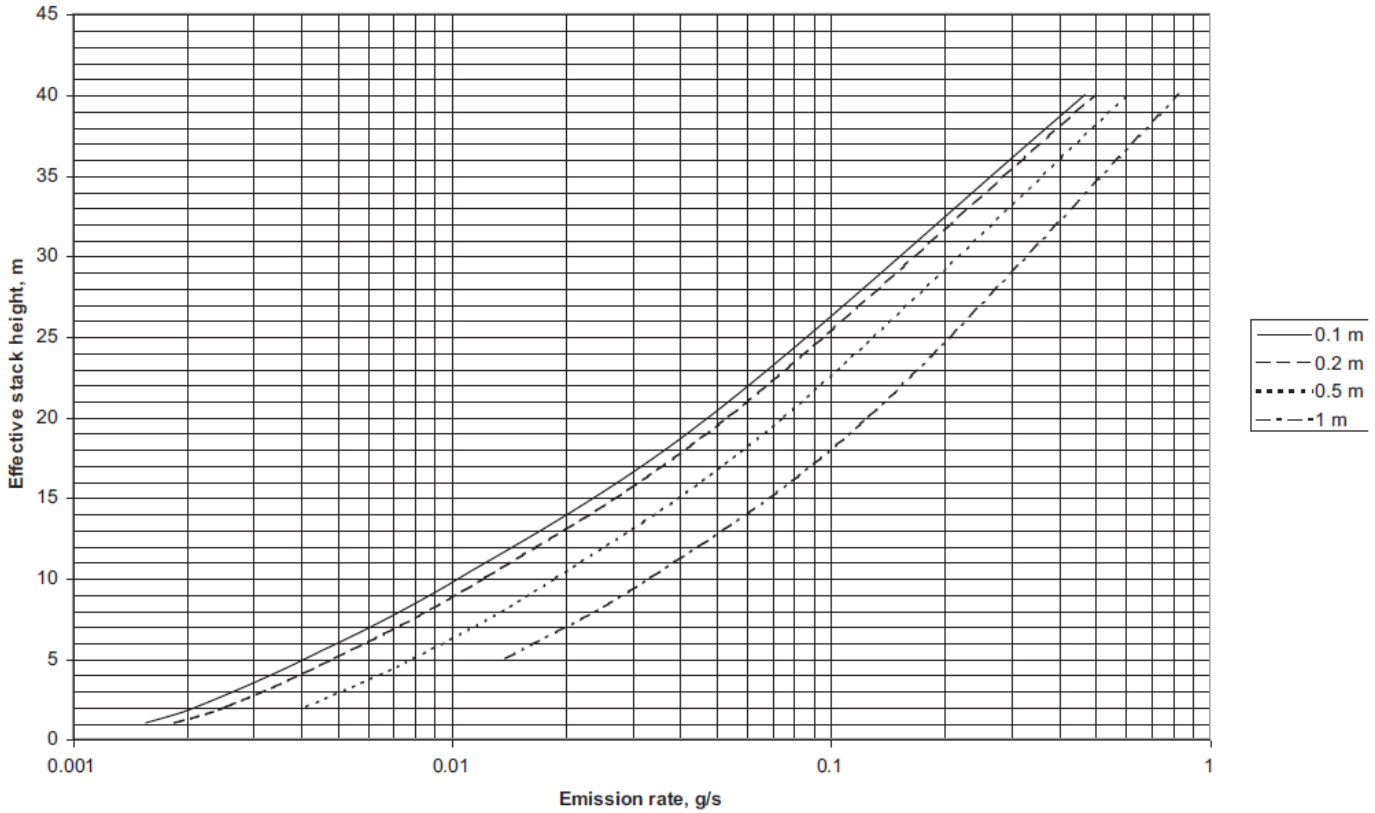

Figure E.2: Nomogram for Nitrogen Oxide Emissions (1-hour mean)

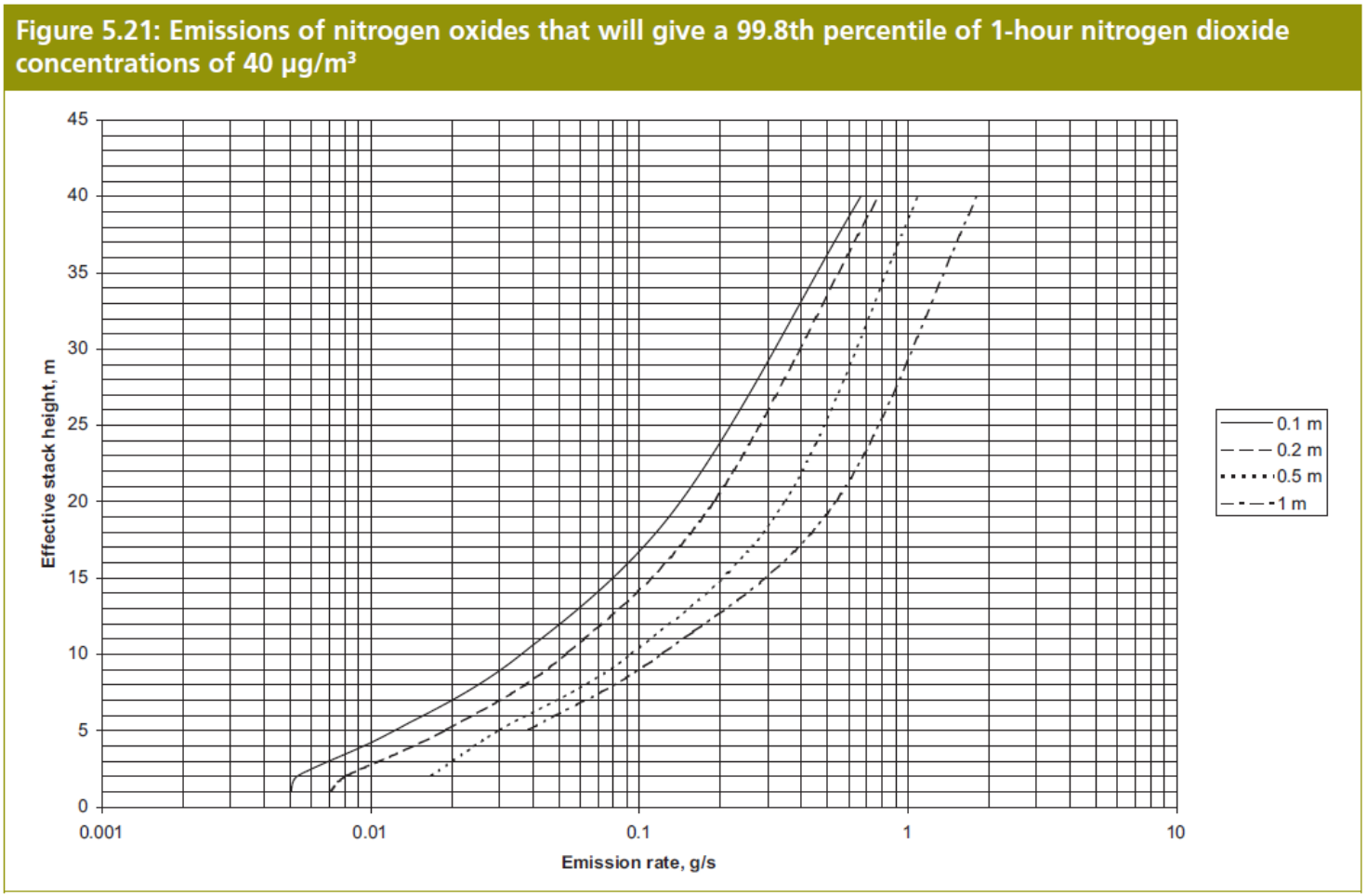

Figure E.3: Nomogram for Particulate Matter Emissions

Figure 5.19: Particulate Matter emissions to give a 90th percentile of 24-hour mean ground-level PM_{10} concentrations of 1 µg/m³