Lichfield District Council - England

2009 Air Quality Updating and Screening Assessment for *Lichfield District Council*

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

August 2009

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2009 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 (LDC) by Faber Maunsell 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 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 Alrewas.

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 Borough. Therefore, a Detailed Assessment will not be required for any of these key pollutants.

Realignment of the road junction at Pipehill was assessed and it was concluded that breaches of the air quality objectives would be unlikely at relevant locations around the junction. The A38 at Swinfen was identified as having undergone a significant change in traffic flow meeting the criteria for assessment. However, modelling predictions suggest that air quality objectives are unlikely to be exceeded at this location and a Detailed Assessment will not be required.

The proposed actions of LDC are to implement a continuous monitoring programme of NO_2 concentrations at Muckley Corner followed by a Further Assessment with a view to amending the existing AQMA Order covering this area. LDC also proposes to undertake additional monitoring and a Detailed Assessment of NO_2 of the A38 at Canwell to determine whether there are any exceedences of the annual mean NO_2 objective at locations of relevant exposure.

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1 Introduction

1.1 Description of Local Authority Area

Lichfield District Council (LDC) is located to the north of the West Midlands conurbation of Birmingham. There are a number of major link roads that pass through the region, including the M6 Toll, A38 and A5. Consequently, road traffic is the predominant source of air pollution in the area. The two main urban areas within LDC are Burntwood and Lichfield

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.

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM **in England** are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1.1. This table shows the objectives in units of micrograms per cubic metre μg/m^3 (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 Local Air Quality Management 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 (USA) in 2003[1] and concluded that a Detailed Assessment should be carried out for nitrogen dioxide (NO_2) due to the recognised likelihood of exceedences of the relevant air quality objectives at locations near to the A5 and A38.

The Detailed Assessment (2004)[2] predicted exceedences of the annual mean NO_2 objective of 40 µg/m^3 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 be undertaken 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 report 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 as a precaution.

In 2006 the Council entered the Third Round of Review and Assessment and produced a USA[4]. This incorporated 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 requirement to proceed to a Detailed Assessment.

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.

A map depicting the spatial extent of the Muckley Corner AQMA is presented in Appendix 1.

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

Continuous Monitoring in Lichfield

There are no permanent continuous monitoring locations in operation in the District. 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[5] of NO_2 and PM_{10}. Details of the site are given in Table 2.1 below. Maps depicting the monitoring locations are also provided (Figures 2.1 to 2.4).

Table 2.1 Details of Automatic Monitoring Sites

Site Name	Site Type	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)*	Worst-case Location?
		X	Y					
Muckley Corner CM[A]	Roadside	408198	306516	NO_2, PM_{10}	N	N (10)	5	N

Note: [A] the site was operational for a period of nine months between 10/01/2007 and 12/09/2007. The monitor was active prior to the declaration of the AQMA.

The continuous monitoring and 2007 Detailed Assessment[5] concluded that the annual air quality objective for NO_2 was being exceeded at Muckley Corner, whilst PM_{10} concentrations were below the annual mean and 24-hour mean objectives. Based on these conclusions it was decided to decommission the automatic monitoring site, with monitoring of NO_2 concentrations continuing through the use of diffusion tubes.

Continuous Monitoring QA/QC

The period of monitoring during 2007 was conducted by AEA on behalf of LDC. Details of the QA/QC procedures were described in the 2007 Detailed Assessment[5].

2.1.2 Non-Automatic Monitoring

NO_2 Diffusion Tube Monitoring

LDC uses diffusion tubes at 21 locations throughout the District to monitor NO_2 concentrations. The details of the monitoring locations are summarised in Table 2.2 and Figures 2.1 to 2.4. The 2005 Detailed Assessment reported measured exceedences of the annual mean NO_2 air quality objective at MUC(1), the façade of the Muckley Corner Hotel at ground-floor exposure height. LDC confirmed that there was no relevant exposure on the ground floor but that there were residential properties at first floor height. MUC(1A), MUC(1B) and MUC(1C) were located to investigate NO_2 concentrations at first floor height of the hotel.

Table 2.2 Details of Non-Automatic Monitoring Sites

Site Name	Location	Site Type	Grid Ref		In AQMA?	Relevant Exposure? *(Y/N with distance (m) to relevant exposure)*	Distance to kerb of nearest road *(N/A if not applicable)*	Worst-case Location ?
			X	Y				
A38(1)	Alrewas	R	417101	314180	N	N	1	Y
A38(2)	Fradley	R	416295	313186	N	N (10)	5	Y
A38(3)	Lichfield	R	412891	306817	N	N	2	Y
A38(4)	Canwell	R	413967	300844	N	N (30)	8	Y
A38(4B)	Canwell	R	413975	300894	N	N (14)	5	Y
A5(1)	Muckley Corner	R	407208	306513	N	N	4	Y
A5(1A)	Muckley Corner	R	407895	306516	N	N (6)	1	Y
A5(2A)	Muckley Corner	R	408893	306549	N	N (12)	5	Y
A5(2B)	Muckley Corner	R	408667	306500	N	N (6)	2	Y
A5(3)	Lichfield	R	412063	305379	N	N (13)	10	Y
A5(4)	Hints	R	416038	305379	N	N (13)	15	Y
B	Burntwood	UB	405086	309344	N	N	N/A	Y
L	Lichfield	UB	410544	310760	N	N	N/A	Y
M6T(1)	Hilton Nr M6 Toll Eastbound	R	408284	305994	N	N (60)	37	Y
M6T(2)	Summerhill Nr M6 Toll Eastbound	R	407690	305911	N	N (30)	37	Y
MUC(1)	Muckley Corner Hotel Ground Floor	R	408164	306513	Y	N	5	Y
MUC(1A)	Muckley Corner Hotel First Floor	R	408164	306513	Y	Y	5	Y
MUC(1B)	Muckley Corner Hotel First Floor	R	408164	306513	Y	Y	5	Y
MUC(1C)	Muckley Corner Hotel First Floor	R	408164	306513	Y	Y	5	Y
MUC(2)	Muckley Corner A5 Westbound	R	408165	306487	Y	N (9)	5	Y
MUC(3)	Muckley Corner A461 Southbound	R	408097	306468	Y	N (10)	5	Y
MUC(4)	Muckley Corner A5 Westbound	R	408029	306501	Y	N (2)	4	Y
MUC(5)	Muckley Corner A5 Eastbound	R	408030	306516	Y	N (5)	2	Y
MUC(6)	Muckley Corner A461 Southbound	R	408161	306556	Y	N (5)	2	Y

Note: Site Types – R = Roadside; UB = Urban Background.

NO_2 Diffusion Tube Monitoring QA/QC

The diffusion tubes used by LDC were supplied and analysed by Staffordshire Scientific Services. The tubes were prepared using a 50% 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. In the latest WASP Summary of Laboratory Performance reports covering Rounds 97 to 101 and Rounds 98 to 102, Staffordshire Scientific Services achieved a rating of 'Acceptable' against the updated RPI Criteria.

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 03/09). During the period of continuous monitoring in 2007, LDC co-located three tubes alongside the continuous monitoring station. However, due to the

short-term nature of the continuous monitoring it was considered more appropriate and reliable to derive bias adjustment factors from the national database. The bias factors used in this assessment are summarised below in Table 2.3.

Table 2.3: Bias Adjustment Factors Used to Correct Diffusion Tube Data

Year	Preparation Method	Number of Studies	Bias Factor
2004	50% TEA in Water	5	0.96
2005	50% TEA in Water	3	1.05
2006	50% TEA in Water	4	1.03
2007	50% TEA in Water	6	0.97
2008[A]	50% TEA in Water	7	1.03

Note: Bias factors obtained from Spreadsheet version 03/09.
[A] From the Spreadsheet the 2008 factor was 1.08 based on 5 studies. Personal communication with AEA provided a revised factor of 1.03 following the inclusion of the results of two additional co-location studies.

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 January and September 2007 reported a mean NO_2 concentration during this period of 48.0 µg/m^3. Data capture was 86.8% during the measurement period or 58.3% considering 2007 as a whole.

A seasonal adjustment factor was calculated to estimate the annual mean NO_2 concentration at Muckley Corner 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 Table 2.4). The mean Annual Mean / Period Mean ratio was 1.14. The seasonally adjusted annual mean NO_2 concentration at Muckley Corner in 2007 was therefore 54.9 µg/m^3 (Table 2.5), which exceeds the annual mean NO_2 objective of 40 µg/m^3.

Due to relatively low data capture and the need to apply a seasonal adjustment factor, the result for annual mean NO_2 should be viewed with caution. However, it should also be noted that even without the application of the seasonal adjustment factor, the monitoring data suggest that the annual mean NO_2 concentration at Muckley Corner exceeded the annual mean NO_2 objective.

There were no reported exceedences of the 1-hour mean standard of 200 µg/m^3 and therefore the 1-hour mean objective was achieved (Table 2.6).

Table 2.4: Calculation of Seasonal Adjustment Factor for Nitrogen Dioxide

Site	NO_2 Concentration (µg/m^3)		Ratio
	Annual Mean	Period Mean	
Coventry Memorial Park	18.9	17.6	1.07
Leominster	12.6	11.1	1.14
Market Harborough	11.6	9.7	1.19
Northampton	21.3	18.3	1.17
		Mean Ratio	**1.14**

Table 2.5 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site Name	Within AQMA?	Data Capture		Period Mean (µg/m^3)	Seasonally Adjusted Annual Mean 2007 (µg/m^3)
		Period	2007		
Muckley Corner CM – 1	N	86.8%	58.3%	**48.0**	**54.9**

Table 2.6 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with 1-hour Mean Objective

Site Name	Within AQMA?	Data Capture		Number of Exceedences of hourly mean (200 µg/m^3)
		Period	2007	
Muckley Corner CM – 1	N	86.8%	58.3%	0

Diffusion Tube Monitoring Data

Results of the diffusion tube surveys undertaken by LDC since 2004 are presented in Tables 2.7 and 2.8. Unless otherwise indicated, all results have been adjusted for bias. The derivation of bias factors was described in Section 2.1.2. The raw diffusion tube data from 2008 can be found in Appendix 3.

Annual mean NO_2 concentrations in excess of the objective of 40 µg/m^3 are highlighted in **bold**. Data capture for 2008 was very good with all sites achieving greater than 90%. Sixteen tubes measured NO_2 concentrations greater than 40 µg/m^3 in 2008. The highest annual mean concentration occurred at MUC(3) with a concentration of 63.4 µg/m^3. This tube also reported the highest annual mean NO_2 concentration of the survey during 2006 and 2007.

The tubes located at Muckley Corner {MUC (1), MUC(1A), (1B) and (1C), and MUC(2) to MUC(6)} all exceeded the annual mean objective for NO_2 during 2008. These locations recorded exceedences in 2006 and, with the exception of MUC(6), in 2007 also. 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.

The results for 2008 continue the general trend that has been apparent in NO_2 concentrations in the District since 2004. The monitoring results indicate annual mean concentrations at the Muckley Corner sites MUC(1) to MUC(6) increased between 2004 and 2006 before levelling off in 2007 and 2008. Five sites have exceeded the annual mean NO_2 objective of 40 µg/m^3 in every year since 2004. These are:

- A38(4) and A38(4B), located adjacent to the A38 at Canwell;
- A5(2B), located approximately 500 metres to the east of Muckley Corner interchange; and
- MUC(1) and MUC(3), located within the existing AQMA at Muckley Corner.

A38(4), A38(4B) and A5(2B) are outside the present AQMA boundary.

The other sites that recorded exceedences of the annual mean NO_2 objective were A38(1), A38(4), A38(4B), A5(1), A5(1B), A5(2A) and A5(2B). None of these sites are at positions representing relevant exposure. Following the procedure in Box 2.3 of TG(09) the NO_2 concentrations at the nearest relevant exposure have been calculated and are given in Table 2.9. There are no relevant receptors within 200 metres of A38(1) or A5(1) and so the calculation has not been performed for these locations.

Following adjustment for distance from the road, annual mean NO_2 concentrations at locations of relevant exposure are predicted to be above the annual mean NO_2 objective at locations represented by sites A38(4) and A38(4B); the predicted concentrations are 43.1 µg/m^3 and 44.7 µg/m^3 respectively (Table 2.9). It is therefore recommended that additional monitoring and modelling is carried out as

part of a Detailed Assessment to determine whether the annual mean NO_2 objective is likely to be exceeded at these locations.

The estimated concentrations at locations of relevant exposure represented by sites A5(1A), A5(2A) and A5(2B) are below the annual mean objective, but close to it. It is recommended that additional monitoring is performed in the vicinity of these sites, ideally at locations of relevant exposure, to investigate NO_2 concentrations in more detail. It is noted that these monitoring locations are in close proximity to the existing AQMA around Muckley Corner. It is recommended that the results of additional monitoring at sites A5(1A), A5(2A) and A5(2B) be incorporated into the Further Assessment that LDC is undertaking for the Muckley Corner AQMA.

Table 2.7 Results of Nitrogen Dioxide Diffusion Tubes, 2008

Site Name	Location	Within AQMA?	Data Capture	Annual mean concentrations (µg/m^3) Bias Adjusted[B, C]
A38(1)	Alrewas	N	100%	**44.3**
A38(2)	Fradley	N	91.7%	39.3
A38(3)	Lichfield	N	100%	36.5
A38(4)	Canwell	N	100%	**48.8**
A38(4B)	Canwell	N	91.7%	**55.8**
A5(1)	Muckley Corner	N	91.7%	**43.5**
A5(1A)	Muckley Corner	N	100%	**46.5**
A5(2A)	Muckley Corner	N	91.7%	**42.5**
A5(2B)	Muckley Corner	N	100%	**48.3**
A5(3)	Lichfield	N	91.7%	30.4
A5(4)	Hints	N	100%	19.9
B	Burntwood	N	91.7%	22.2
L	Lichfield	N	100%	19.7
M6T(1)	Hilton Nr M6 Toll Eastbound	N	100%	24.0
M6T(2)	Summerhill Nr M6 Toll Eastbound	N	100%	30.0
M6T(2A)	Summerhill Nr M6 Toll Eastbound	N	100%	40.3[A]
M6T(2B)	Summerhill Nr M6 Toll Eastbound	N	100%	41.5[A]
M6T(2C)	Summerhill Nr M6 Toll Eastbound	N	100%	40.1[A]
MUC(1)	Muckley Corner Hotel Ground Floor	Y	91.7%	**54.1**
MUC(1A)	Muckley Corner Hotel First Floor	Y	100%	**50.2**
MUC(1B)	Muckley Corner Hotel First Floor	Y	100%	**57.8**
MUC(1C)	Muckley Corner Hotel First Floor	Y	100%	**53.0**
MUC(2)	Muckley Corner A5 Westbound	Y	100%	**40.1**
MUC(3)	Muckley Corner A461 Southbound	Y	100%	**63.4**
MUC(4)	Muckley Corner A5 Westbound	Y	100%	**47.7**
MUC(5)	Muckley Corner A5 Eastbound	Y	100%	**56.4**
MUC(6)	Muckley Corner A461 Southbound	Y	100%	**41.0**

Notes: [A] Commenced monitoring October 2008. M6T (2A – C) use the 20% TEA preparation method and are co-located with M6T (2) to compare the results obtained by the different preparation methods. Results from tubes M6T (2A – C) are NOT bias-adjusted due to use of 20% TEA preparation method. Due to the short period of data collection and the change in preparation method the results from M6T (2A – C) have not been considered further in this assessment.
[B] Bias adjustment factor for 2008 = 1.03.
[C] Numbers in brackets are estimated concentrations at nearest relevant exposure (see supporting text).

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Table 2.8 Results of Nitrogen Dioxide Diffusion Tubes, 2004 - 2008

Site Name	Location	Within AQMA?	Annual mean concentrations (µg/m^3) Bias Adjusted[B]				
			2004	2005	2006	2007	2008
A38(1)	Alrewas	N	37.5	39.6	**43.8**	**42.5**	**44.3**
A38(2)	Fradley	N	31.9	35.3	**41.5**	28.9	39.3
A38(3)	Lichfield	N	29.4	35.0	**41.3**	33.4	36.5
A38(4)	Canwell	N	**44.6**	**41.1**	**42.6**	**46.6**	**48.8**
A38(4B)	Canwell	N	**49.2**	**48.3**	**54.4**	**53.2**	**55.8**
A5(1)	Muckley Corner	N	37.9	34.1	**43.3**	35.1	**43.5**
A5(1A)	Muckley Corner	N	34.2	36.2	**42.6**	38.3	**46.5**
A5(2A)	Muckley Corner	N	39.5	39.3	**41.4**	33.3	**42.5**
A5(2B)	Muckley Corner	N	**41.4**	**46.7**	**45.8**	**49.5**	**48.3**
A5(3)	Lichfield	N	27.5	29.2	32.7	30.4	30.4
A5(4)	Hints	N	26.3	25	31.4	21.9	19.9
B	Burntwood	N	20.0	19.7	23.0	19.6	22.2
L	Lichfield	N	18.8	21.1	23.1	17.3	19.7
M6T(1)	Hilton Nr M6 Toll Eastbound	N	22.4	24	25.0	23.4	24.0
M6T(2)	Summerhill Nr M6 Toll Eastbound	N	27.2	28.5	31.7	26.1	30.0
M6T(2A)			N/A	N/A	N/A	N/A	40.3
M6T(2B)			N/A	N/A	N/A	N/A	41.5
M6T(2C)			N/A	N/A	N/A	N/A	40.1
MUC(1)	Muckley Corner Hotel Ground Floor	Y	**42.0**	**46.9**	**50.2**	**46.7**	**54.1**
MUC(1A)	Muckley Corner Hotel First Floor	Y	N/A	**43.8**[C]	**55.3**	**47.4**	**50.2**
MUC(1B)	Muckley Corner Hotel First Floor	Y	N/A		**52.6**	**53.2**	**57.8**
MUC(1C)	Muckley Corner Hotel First Floor	Y	N/A		**58.0**	**50.3**	**53.0**
MUC(2)	Muckley Corner A5 Westbound	Y	34.8	39.5	39.6	**45.6**	**40.1**
MUC(3)	Muckley Corner A461 Southbound	Y	**42.9**	**53**	**65.9**	**58.1**	**63.4**
MUC(4)	Muckley Corner A5 Westbound	Y	35.1	**40.7**	**46.7**	**42.8**	**47.7**
MUC(5)	Muckley Corner A5 Eastbound	Y	37.2	**45.4**	**56.8**	**50.6**	**56.4**
MUC(6)	Muckley Corner A461 Southbound	Y	30.0	34.2	**42.9**	35.1	**41.0**

Notes: [A] Tubes co-located alongside continuous NO_X Analyser at Muckley Corner. 2004 result is the mean of triplicate tubes.
[B] Bias adjustment factors used: see Table 2.3.
[C] Result is the mean of triplicate tube measurement and is the mean of six months of data, seasonally adjusted.

Table 2.9: Estimated Annual Mean NO_2 Concentrations at Locations of Relevant Exposure

Site Name	2008 Annual mean concentration (µg/m^3) Bias Adjusted	2008 Estimated Background NO_2 Concentration (µg/m^3)[A]	Distance of Tube from Kerb (m)	Distance of Nearest Relevant Exposure from Kerb (m)	2008 Estimated Annual Mean NO_2 Concentration at Location of Relevant Exposure (µg/m^3)
A38(1)	**44.3**	15.3	1	N/A	N/A
A38(4)	**48.8**	19.5	8	14	**43.1**
A38(4B)	**55.8**	19.5	5	14	**44.7**
A5(1)	**43.5**	20.8	4	N/A	N/A
A5(1A)	**46.5**	20.8	1	5	38.2
A5(2A)	**42.5**	20.8	5	12	36.8
A5(2B)	**48.3**	20.8	2	8	39.4

2.2.2 PM_{10}

Continuous monitoring of PM_{10} was carried out at Muckley Corner alongside the measurement of NO_2 during 2007 for a period of approximately nine months. The results are summarised in Table 2.11 below. The calculation of a seasonal adjustment factor was necessary and was conducted using the same method as for NO_2. The details are given in Table 2.10.

The mean PM_{10} concentration during the monitoring period was 18.0 µg/m^3 and the seasonally adjusted estimated annual mean for 2007 was 18.1 µg/m^3. The monitoring results and conclusions of the 2007 Detailed Assessment[5] reinforced the findings of previous monitoring and indicated that the annual mean objective for PM_{10} of 40 µg/m^3 was not being exceeded and was unlikely to be exceeded in future years at Muckley Corner. Furthermore, the annual mean objective was unlikely to be breached at any location in the Lichfield District. Consequently, the continuous PM_{10} monitoring ceased in September 2007 and no further monitoring has been undertaken.

Table 2.12 shows details of the PM_{10} monitoring in relation to the 24-hour mean exceedences objective. During the nine month period in 2007 there were eight instances of 24-hour mean PM_{10} concentrations exceeding 50 µg/m^3. This is within the permitted 35 exceedences per year allowed to comply with the objective. Despite the limited time period covered by the continuous PM_{10} monitoring an exceedence of the 24-hour mean objective is considered unlikely within the Lichfield District.

Table 2.10: Calculation of Seasonal Adjustment Factor for PM_{10}

Site	PM_{10} Concentration (µg/m^3)		Ratio
	Annual Mean	Period Mean	
Birmingham Tyburn	24.9	24.3	1.02
Coventry Memorial Park	18.4	17.8	1.04
Leamington Spa	21.2	21.9	0.97
		Mean Ratio	**1.01**

Table 2.11 Results of Automatic Monitoring for Nitrogen Dioxide: Comparison with Annual Mean Objective

Site Name	Within AQMA?	Data Capture		Period Mean (µg/m^3)	Seasonally Adjusted Annual Mean 2007 (µg/m^3)
		Period	2007		
Muckley Corner CM – 1	Y	88.0%	59.0%	18.0	18.1

Table 2.12 Results of PM_{10} Automatic Monitoring: Comparison with 24-hour Mean Objective

Site Name	Within AQMA?	Data Capture		Number of Exceedences of hourly mean (50 µg/m^3)
		Period	2007	
Muckley Corner CM – 1	Y	88.0%	59.0%	8

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

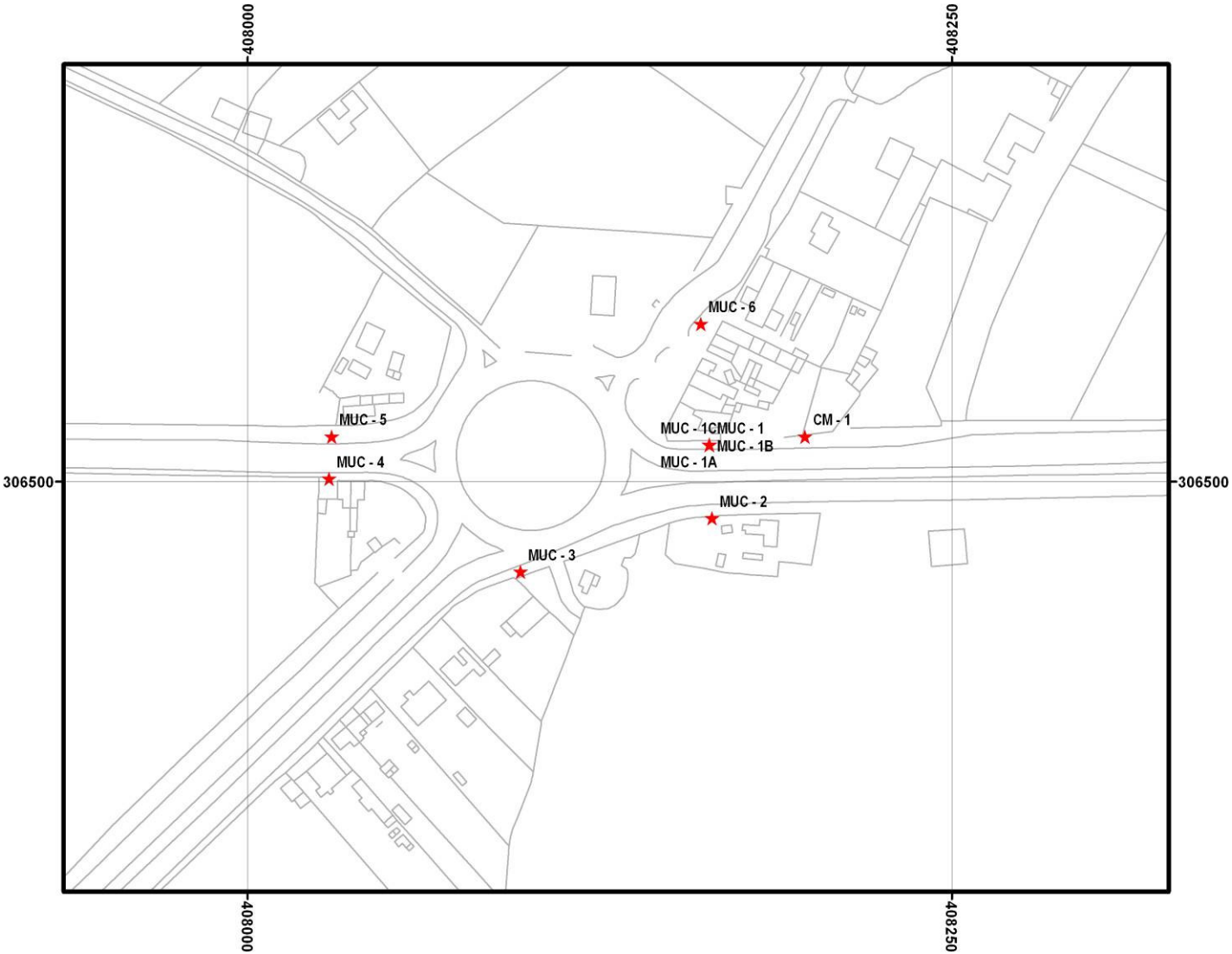


Figure 2.2: Other Monitoring Locations Around Muckley Corner

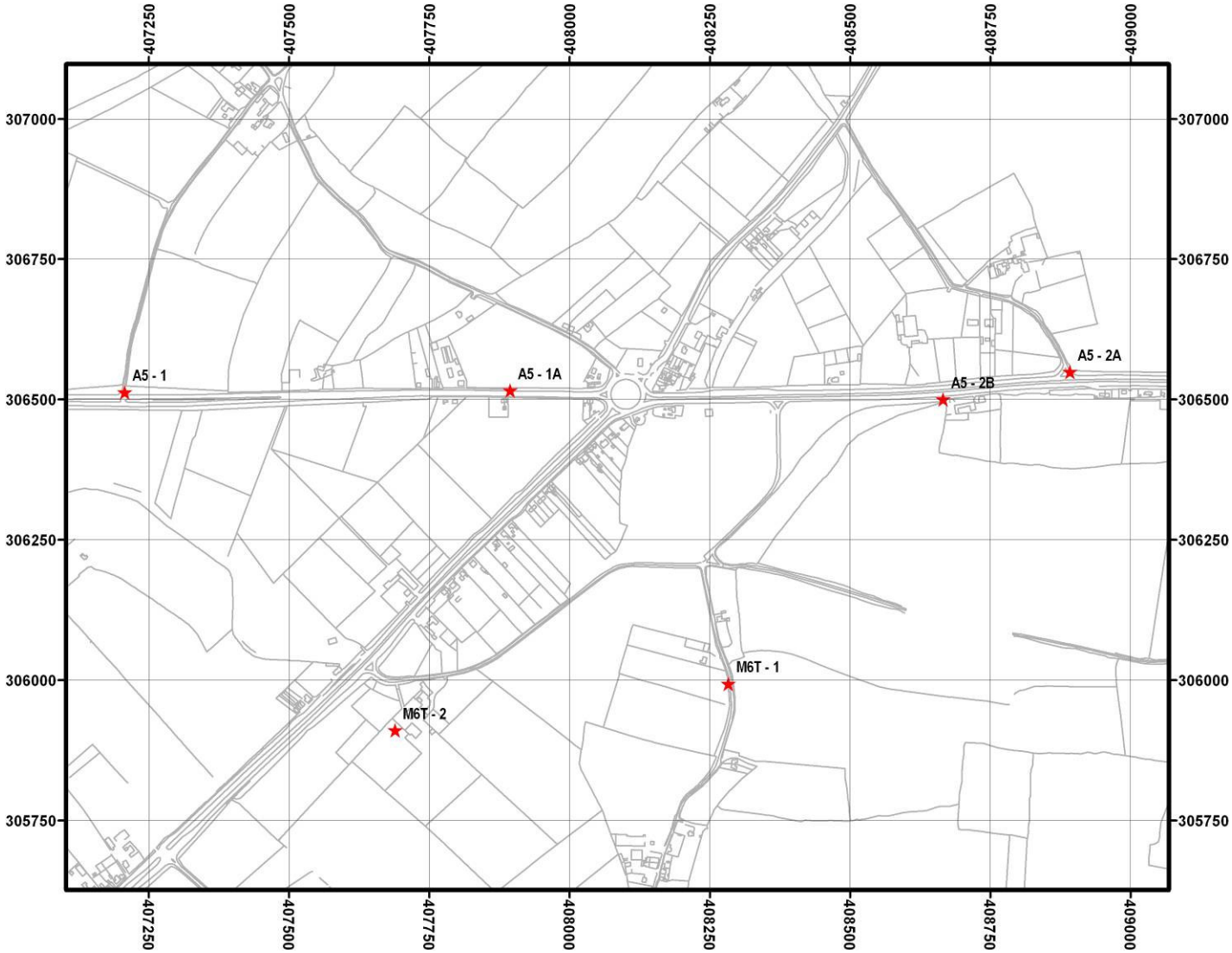


Figure 2.3: Other Monitoring Locations in the Lichfield District

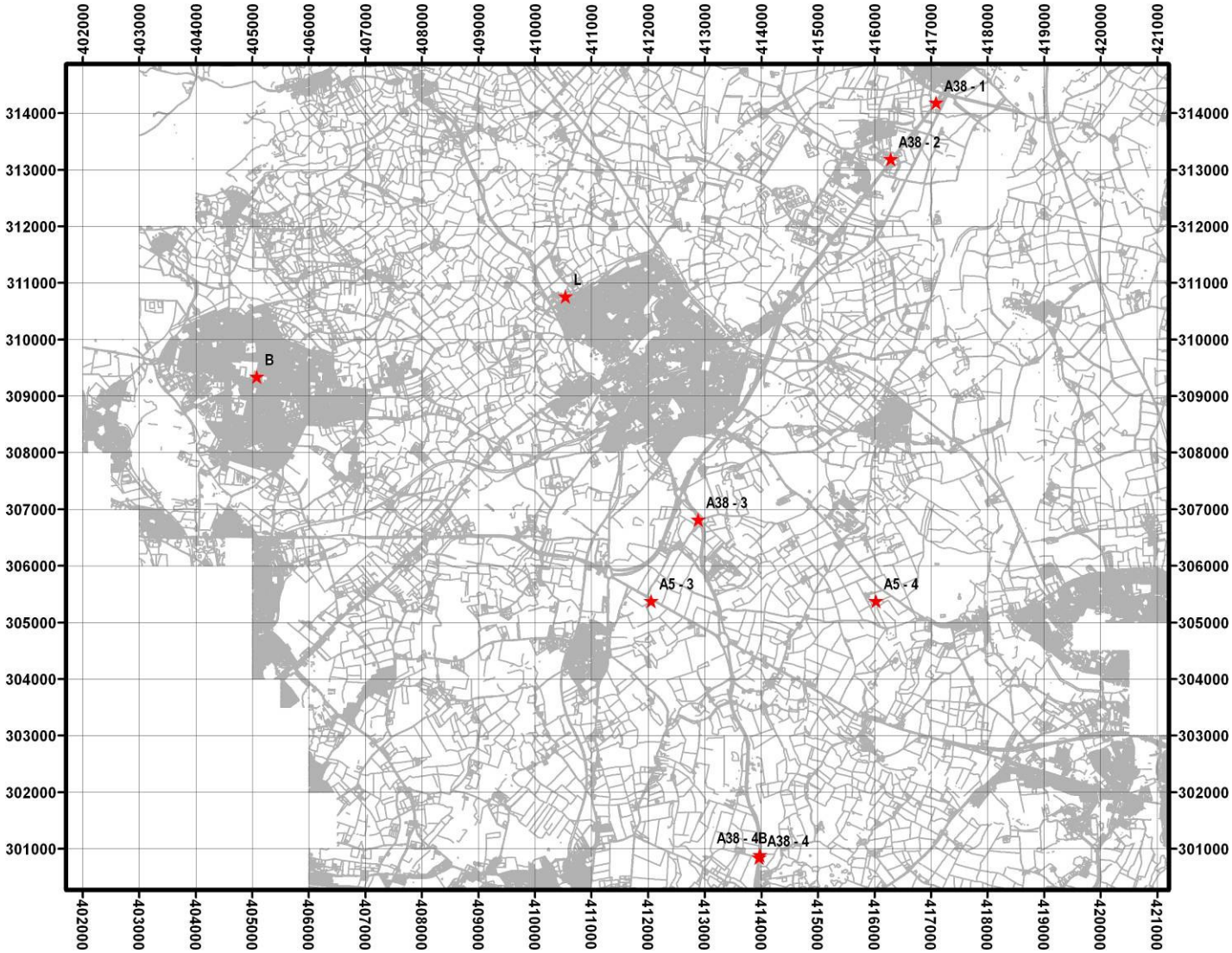


Figure 2.4 Diffusion Tube Locations at Canwell

3 Road Traffic Sources

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. Despite the changes to the assessment criteria in TG(09) LDC have not identified any locations requiring assessment.

LDC 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 2006 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 2006 USA and so there is no need to proceed further with this part of the assessment.

LDC 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 Staffordshire County Council Highways Data Team there are no new or newly identified roads where the proportion of HGVs and/or buses is greater than 20% (see Appendix 4) or where there is relevant exposure within 10 metres of such a road.

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

3.4 Junctions

Plans have been put forward for the improvement of the A461 Walsall Road / A5190 Lichfield Road / Fosseway Lane junction at Pipehill near Lichfield. The proposal is aimed at relieving traffic congestion between Burntwood and Lichfield.

The most recent traffic data suggests that the combined flow around the junction is 28666 vehicles per day (Table 3.1). The calculation was performed in line with TG(09) Guidance. No data was available for the Fosseway Lane arm of the junction. Local knowledge suggests that vehicle movements along the Fosseway Lane arm of the intersection are insignificant in comparison to the other links and so was excluded from the calculation. Consequently, the total flow of the remaining arms was divided by 3/2 to obtain the Combined Flow.

Table 3.1 Traffic Data for Road Links Surrounding A461 Walsall Road / A5190 Lichfield Road / Fosseway Lane Junction at Pipehill, 2008 Figures

Link Name	AADT (veh/day)	HDV (%)	Vehicle Speed (kph)
A5190 Lichfield Road	14040	4	40
A461 Walsall Road (NE of junction)	19916	4	40
A461 Walsall Road (SW of junction)	9043	6	40
Fosseway Lane	n/a	n/a	n/a
Total	42999	**Combined Flow**	28666

According to the approach set out in Section A.4 of Box 5.3 of TG(09), the junction must be considered in the present assessment as it has a Combined Flow of more than 10000 vehicles per day. There are two residential properties close to the junction (Boythorpe is situated approximately 20 metres north of the junction and 6 Walsall Road is located within 10 metres of the A461 Walsall Road, approximately 60 metres to the north east of the junction).

Table 3.2 Predicted Pollutant Concentrations at Relevant Locations Around Pipehill Junction

Receptor	Annual Mean Concentration µg/m^3		No. Days of 24-hour PM_{10} Exceedences
	NO_2	PM_{10}	
6 Walsall Road	27.5	20.8	4
Boythorpe	28.5	21.1	5

Note: No continuous monitor or diffusion tube location against which to verify the modelled concentrations

The DMRB Screening Model was used to predict the current NO_2 and PM_{10} annual mean concentrations and the number of PM_{10} 24-hour exceedences of 50 µg/m^3 at relevant locations close to the junction. No model verification of the results has been performed at this location due to the absence of any nearby continuous monitoring locations or diffusion tube sites. Consequently, the modelled concentrations should be treated with caution.

The DMRB Screening Model predicted that the annual mean NO_2 concentration at the relevant locations would be up to 28.5 µg/m^3 and that the number of 24-hour PM_{10} exceedences would be 5 days (Table 3.2). It is concluded that air quality objectives are unlikely to be exceeded at any relevant location surrounding the junction and therefore it will not be necessary to proceed to a Detailed Assessment for this location.

LDC has assessed new/newly identified junctions meeting the criteria in Section A.4 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

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

Construction work on the Lichfield Southern Bypass commenced in the summer of 2008 and was due to be completed in December 2008. However, the road is yet to open and work is ongoing. It is anticipated that the opening of the Lichfield Southern Bypass will serve to reduce traffic flows through Lichfield, although the air quality benefits are not likely to be felt immediately. Further details can be found in the 2008 Air Quality Progress Report[6].

LDC confirms that there are no new/proposed roads.

3.6 Roads with Significantly Changed Traffic Flows

Updated traffic data provided by Staffordshire County Council's Highway Data Team (Appendix 4) has identified one road link that has undergone a significant change in traffic flow since the previous round of Review and Assessment. The traffic data suggest that the AADT along the A38 at Swinfen between the roundabout connecting the A38, A5206 and the A5148 and the roundabout joining the A38, A5 and M6 Toll (Junction T4) has increased from 29000 vehicles per day in 2005 to more than 38000 vehicles per day in 2008 – an increase of 33%.

The annual mean NO_2 concentration in the area during 2008 was 36.5 µg/m^3 (Site Name A38 (3); see Section 2.2). In 2006, the annual mean NO_2 concentration was 41.3 µg/m^3 which suggests the annual mean NO_2 objective of 40 µg/m^3 may be at risk of being exceeded.

The Design Manual for Roads and Bridges (DMRB) Screening Model was used to predict annual mean NO_2 and PM_{10} concentrations and the number of 24-hour PM_{10} exceedences at The Lodge, Swinfen (the closest identified residential property to the roadside). The model output was verified against the measured NO_2 concentration recorded by the diffusion tube at site A38 (3). A verification factor of 0.97 was obtained and so it was decided not to apply the factor to the modelled output such that the results given are slightly worst-case. The results are summarised in Table 3.3. Details of the calculations are presented in Appendix 5.

Table 3.3: Predicted Pollutant Concentrations and Exceedences at The Lodge, Swinfen

Location	Predicted Annual Mean Concentration (µg/m^3)		No. Days 24-hour PM_{10} Exceedences
	NO_2	PM_{10}	
The Lodge, Swinfen	32.2	20.5	4.0

The DMRB Screening Model predicted an annual mean NO_2 concentration of 32.2 µg/m^3 at The Lodge and the number of days of PM_{10} exceedences to be 4, therefore it is unlikely that the relevant air quality objectives will be exceeded at relevant locations within the vicinity of the A38 at Swinfen and there will be no requirement to proceed to a Detailed Assessment.

LDC has assessed all roads within the District that have experienced significantly changed traffic flows according to the criteria outlined in Section A.6 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

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.

LDC 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.

LDC confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

LDC 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.

LDC 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.

LDC 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[4] were outlined in the 2008 Progress Report[6].

Part A1 Permit applications are summarised in Table 5.1. Two former quarries applied for and have been granted Landfill Part A1 Permits; Whitemoor Haye Landfill Site was granted a permit in March 2007, whilst Cranebrook Quarry at Muckley Corner was granted a permit in March 2009 and a draft permit circulated. As these are potential sources of fugitive or uncontrolled emissions they are considered in Section 7 of this report.

After 1st January 2007, some activities that fall within the animal production and intensive farming sector, such as intensive pig and poultry units, were required to hold Part A1 permits. Two farms in the Lichfield District applied for Part A1 permits, Fairfield Farm, Shenstone and Mease Meadow Farm, Edingale. The latter was granted a permit in October 2007.

Table 5.1 Part A1 Permit Applications Since Previous Round of Review and Assessment

LDC Ref	Premises	Process	Notes
Cranebrook Quarry, Muckley Corner, Lichfield	Landfill (Inert Waste)	Small	Draft Permit Issued Mar 2009
Whitemoor Haye Landfill Site, Barley Green Lane, Nr Alrewas	Landfill (Inert Waste)	Large	Permit Issued Mar 2007
Fairfield Farm, Raikes Lane, Shenstone	Animal Production and Intensive Farming	Poultry Farm	Application Submitted Apr 2007
Mease Meadow Farm, Lullington Road, Edingale	Animal Production and Intensive Farming	Pig Production	Permit Issued Oct 2007

LDC has received no applications for Part A2 Permits since the previous round of Review and Assessment. There are no new Part A2 industrial processes in the Lichfield District.

Table 5.2 summarises Part B Permit revocations by LDC since the previous round of Review and Assessment; Part B Permit Authorisations are shown in Table 5.3. A list of all Part B processes is presented in Appendix 2. Since the previous USA, the permits of six installations in the District have been revoked. A total of six Part B permits have been approved. However, none of the new Part B processes are likely to emit significant quantities of the pollutants of relevance to this assessment.

Lichfield District Council - England

Table 5.2: LAPC/LAPPC Part B Permits Revoked 2006 – 2008

LDC Ref	Premises	Process	Notes
PPC1/D/93	RMC Ready-mix Limited, Moneymore Farm, London Road, Weeford, Nr. Lichfield, West Midlands.	Storage and use of Bulk Cement PG3/1	Authorised 27/05/93 Surrendered 14/11/07
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
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
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
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
PPC84/A/07	Boney Hay Mortar Plant, Chorley Road, Burntwood, WS7 2PF	Batching of ready mixed mortars PG3/1	Authorised 05/03/07 Surrendered 13/5/08

Table 5.3: LAPC/LAPPC Part B Permits/Authorisations 2006 – 2008

LDC Ref	Premises	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
PPC83/A/07	Ash & Lacy Pressings Ltd, Lynn Lane, Shenstone, Ws14 0EB	Powder Coating	Permitted 26/3/07
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	Manufacture of coating material	Permitted 28/5/08

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.

LDC 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.

LDC 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.

LDC 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.

LDC confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

As indicated in the introduction to Section 5 LDC has received an application for a Part A1 Permit for the Fairfield Farm Poultry Farm at Raikes Lane, Shenstone. At present the application is pending and there is no information relating to the number of birds. There is no relevant exposure within 100 metres of the facility and LDC have no reason to believe that the facility will lead to the air quality objectives for PM_{10} being exceeded. Consequently, there is no need to consider this source further at this stage.

LDC confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

There are no installations where Biomass Combustion currently takes place in the Lichfield District and therefore Biomass Combustion pollutant sources do not require further consideration.

LDC confirms that there are no biomass combustion plants in the Local Authority area.

6.2 Biomass Combustion – Combined Impacts

There are no areas within LDC where biomass combustion occurs for commercial or domestic purposes. The combined impact of Biomass Combustion on Local Air Quality does not require further assessment.

LDC confirms that there are no biomass combustion plants in the Local Authority area.

6.3 Domestic Solid-Fuel Burning

LDC 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, two facilities have applied for and been granted Part A1 permits for activities with the potential to give rise to fugitive or uncontrolled emissions. Details are given in Table 7.1.

Existing operations at Cranebrook Quarry do not generate significant amounts of fugitive dust emissions. There is no relevant exposure within 200 metres of the site and there have been no complaints received by LDC in the past twelve months relating to dust emissions from the quarry. Visual inspection of the site does not indicate significant dust emissions or tracking of material onto public roads.

Whitemoor Haye Landfill site is situated within 200 metres of residential properties and the village of Alrewas is within 400 metres to the west. LDC has received no complaints regarding dust emissions from the site and visual inspection has not indicated significant dust emissions. The granted extension to current activities is unlikely to give rise to additional fugitive dust emissions.

Table 7.1: Part A1 Permits Issued for Activities with the Potential to Give Rise to Fugitive Emissions Since Previous Round of Review and Assessment

LDC Ref	Premises	Process	Notes
Cranebrook Quarry, Muckley Corner, Lichfield	Landfill (Inert Waste)	Small	Draft Permit Issued Mar 2009
Whitemoor Haye Landfill Site, Barley Green Lane, Nr Alrewas	Landfill (Inert Waste)	Large	Permit Issued Mar 2007

LDC have received no complaints relating to dust emissions from any other quarries, landfill sites, construction sites or any other potential sources of PM_{10} in the past twelve months. There has been no introduction of new exposure to existing sources. A number of sources of PM_{10} were assessed in the 2003 USA[7]. It was concluded that exceedences of the air quality objectives for PM_{10} at surrounding locations and receptors was unlikely.

LDC confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area requiring further assessment.

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 breached at sixteen diffusion tube locations in the District during 2008. Nine of the recorded exceedences were at six sites 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 continued to increase and that the annual mean NO_2 objective is still being breached. Furthermore, the highest monitored annual mean NO_2 concentration during 2008 was 63.4 µg/m^3, which suggests that the hourly mean exceedences objective may also be breached at Muckley Corner. It is recommended that additional monitoring should be carried out followed by dispersion modelling to assess the extent of the exceedences and whether the boundaries of the existing AQMA need to be amended and whether the order needs to be extended to include hourly mean NO_2.

Exceedences of the annual mean NO_2 objective occurred at seven monitoring sites outside the boundaries of existing AQMAs. 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 outside the existing AQMA alongside the A38 at Canwell (represented by diffusion tubes A38(4) and A38(4B)). Monitoring results indicated that NO_2 concentrations at these sites have exceeded the annual mean objective every year since 2004 and appear to have increased over time. It is therefore recommended that additional monitoring and modelling is carried out as part of a Detailed Assessment to determine whether the annual mean NO_2 objective is likely to be exceeded at these locations.

Annual mean NO_2 concentrations at three locations alongside the A5 (represented by diffusion tubes A5(1), A5(2A) and A5(2B)) were predicted to be close to exceeding the annual mean NO_2 objective in 2008 at sites of relevant exposure. Despite estimated NO_2 concentrations at these receptors falling just below the objective it is recommended that further monitoring be undertaken, ideally at locations of relevant exposure, to determine whether there are any exceedences of the annual mean NO_2 objective in this area, particularly as annual mean NO_2 concentrations appear to be increasing over time at these locations

8.2 Conclusions from Assessment of Sources

The proposed change to the alignment of the Pipehill Junction was assessed using the Design Manual for Roads and Bridges Screening Model to assess the likelihood of air quality objectives being exceeded at relevant locations in the vicinity. It was concluded that exceedences of the air quality objectives were unlikely and that no further action should be taken.

The A38 at Swinfen was identified as having undergone a significant change in traffic flow. However, an assessment of pollutant concentrations at relevant locations alongside the A38 indicated that air quality objectives were unlikely to be exceeded and there would be no requirement to proceed to a Detailed Assessment.

There are no new industrial sources or introduction of new exposure to industrial sources in relation to any of the key pollutants. All existing sources have been considered in previous rounds of Review and Assessment and have not undergone any changes to their processes resulting in significantly increased pollutant emissions.

No other significant sources of the key pollutants have been identified.

8.3 Proposed Actions

The Updating and Screening Assessment has identified potential exceedences of the annual mean NO_2 objective at Canwell which warrant further investigation. A Detailed Assessment for NO_2 should be carried out to determine whether measured exceedences affect sites of relevant exposure.

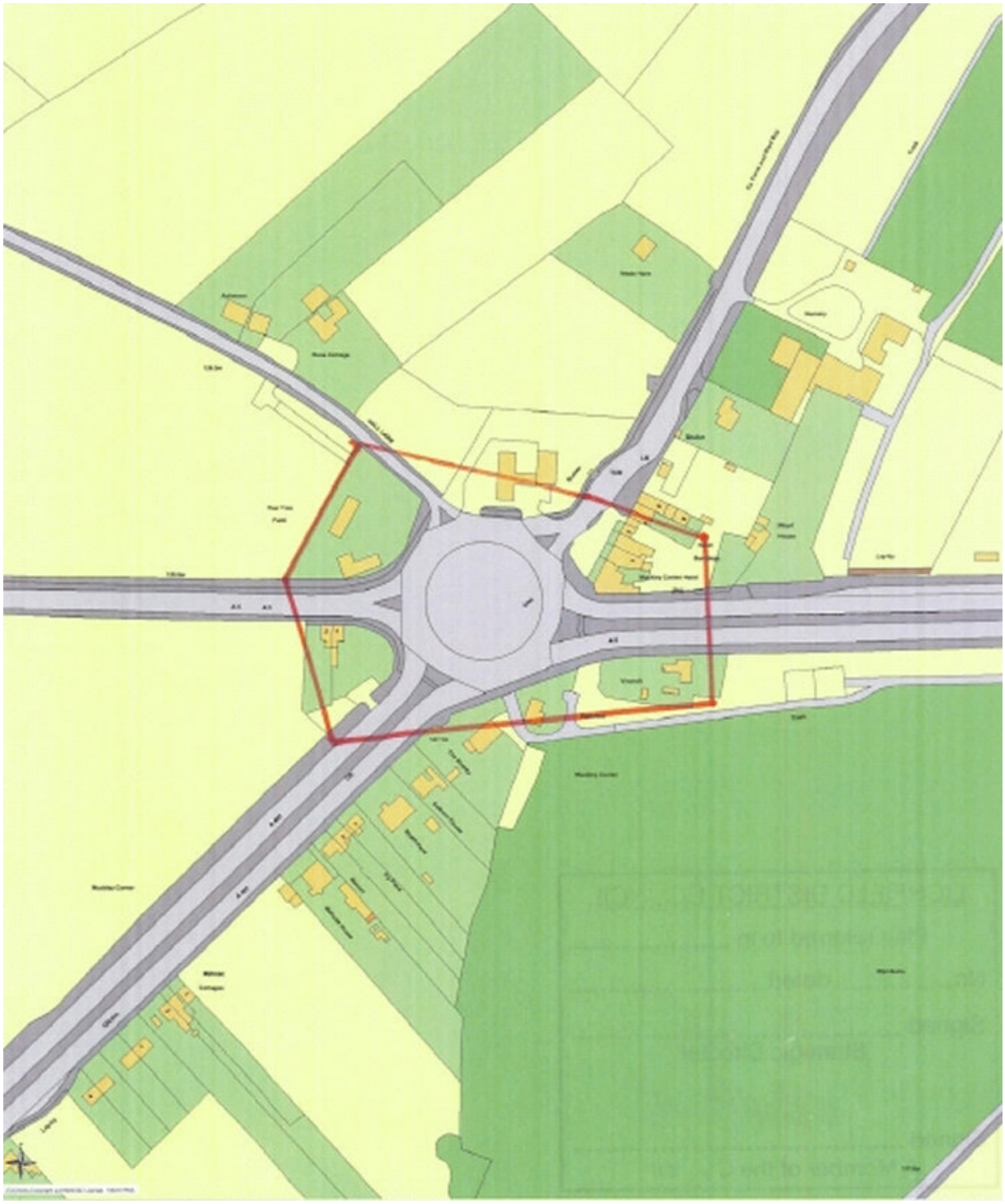
Further monitoring is recommended adjacent to the A5 in the vicinity of diffusion tubes A5(1), A5(2A) and A5(2B) to determine whether there are any exceedences of the annual mean NO_2 objective at locations of relevant exposure in this area.

Diffusion tube monitoring has shown that the annual mean NO_2 objective continues to be breached at monitoring sites within the Muckley Corner AQMA. The trend of recent years of increasing NO_2 concentrations within this area suggests that the present boundary may require amendment. A continuous monitoring programme followed by a Further Assessment should be conducted to investigate the spatial extent of the exceedence. The findings of the Further Assessment will be used in the formulation of an Air Quality Action Plan. This process has already been started.

9 Appendices

9.1 Appendix 1: Muckley Corner AQMA

Figure 9.1 Map of Muckley Corner AQMA



9.2 Appendix 2: LAPC / LAPPC Register

Table 9.1: LAPC / LAPPC Part B Permits, Authorisations and Revocations Within Lichfield District Council

LDC Reference	Premises	Grid Reference	Process	Notes
PPC1/D/93	RMC Ready-mix 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
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
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

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LDC Reference	Premises	Grid Reference	Process	Notes
EPA19/1/93	Olaf I 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 I 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 I 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**
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**
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

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LDC Reference	Premises	Grid Reference	Process	Notes
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
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
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, Ryknild 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	(TotalFinaElf) Fradley Service Area (South), Ryknild Street, Fradley, Staffordshire WS13 8RD	SK1643-1328	Unloading of Petrol into Storage at Service Stations	Authorised 31/03/99
EPA58/B/99	(TotalFinaElf) 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

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LDC Reference	Premises	Grid Reference	Process	Notes
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/B/01	Mobile Plant - operated by Trelanmex Limited, Unit 2 Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Authorised 25/01/01
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	TotalFinaElf UK 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
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
PPC75/B/03	Mobile Plant - operated by Trelanmex Limited, Unit 2 Priory, London Road, Canwell, Sutton Coldfield B75 5SH		Mobile Crushing and Screening Process	Permitted 13/10/03
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**

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LDC Reference	Premises	Grid Reference	Process	Notes
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
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
PPC83/A/07	Ash & Lacy Pressings Ltd, Lynn Lane, Shenstone, Ws14 0EB		Powder Coating	Permitted 26/3/07
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		Manufacture of coating material	Permitted 28/5/08
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**

9.3 Appendix 3: NO_2 Diffusion Tube Results, 2008

Table 9.2: NO_2 Diffusion Tube Results for Lichfield DC, 2008

Site Ref	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean (µg/m^3)	Bias-adjusted Mean (µg/m^3)	Data Capture
A38(1)	50.1	55.5	21.1	26.5	29.6	47.2	40.5	41.9	46.7	47.4	56.2	53.2	43.0	44.3	100%
A38(2)	46.1	42.9	13.1	35	49.3	-	39.2	32.4	45.2	35.1	38.8	42.9	38.2	39.3	91.7%
A38(3)	29.3	41.1	28.3	26.5	55.5	32.2	33.4	25.4	45.7	28.3	34.4	45.4	35.5	36.5	100%
A38(4)	57.3	50.9	50.9	30.5	21.4	39.9	44.4	47.7	49	58.1	62	56.5	47.4	48.8	100%
A38(4B)	64.3	62.5	36.6	-	47.3	61.5	53.5	54.2	55.6	34.1	65.5	61.2	54.2	55.8	91.7%
A5(1)	48.2	40.4	29.8	23.6	40.4	-	45.4	43	51.8	48.2	43.9	50.1	42.3	43.5	91.7%
A5(1A)	45.2	52	17.3	22.5	27.3	46.7	48.7	43.2	56.9	51.2	80.9	49.7	45.1	46.5	100%
A5(2A)	45.3	35.4	25.2	29.1	-	42.6	52.3	46.6	42.7	46.4	39.1	49.1	41.3	42.5	91.7%
A5(2B)	54.5	55.5	13.6	32.8	53.4	43.8	47.9	34.7	57	46.5	59.4	63.9	46.9	48.3	100%
A5(3)	31	38.8	12.2	16.3	32.8	25.7	-	8.2	37.1	29	49.3	44.4	29.5	30.4	91.7%
A5(4)	23.4	27.1	11.2	20.3	17.3	16.8	16.7	15.6	25.5	-	-	-	19.3	19.9	100%
B	27.6	28.7	-	16.1	14.9	13.2	13.1	17.6	23.3	23.8	25.2	33.1	21.5	22.2	91.7%
L	22.7	25.3	12.5	15.2	17.1	12.3	14.6	16.4	23.4	19.7	24.3	25.8	19.1	19.7	100%
M6T(1)	26.7	29.3	13.1	21.5	24	17.9	18.3	17.3	26.5	21.7	27.2	35.6	23.3	24.0	100%
M6T(2)	33.5	32.7	20.1	20	22.3	24.2	25	24.6	31.5	36.1	35	44.4	29.1	30.0	100%
M6T(2a)	-	-	-	-	-	-	-	-	33.4	41.9	42.9	43	40.3	41.5	100%
M6T(2b)	-	-	-	-	-	-	-	-	34.8	45.7	39.8	45.6	41.5	42.7	100%
M6T(2c)	-	-	-	-	-	-	-	-	35.6	40.4	39.1	45.2	40.1	41.3	100%
MUC(1)	52.6	50.2	30.7	39.6	52.6	57.4	53.2	40.2	58.2	-	82.7	60.9	52.6	54.1	91.7%
MUC(1A)	47.2	36	34.3	33.7	54.2	49.5	52.7	41.2	56.9	55	60.8	63.8	48.8	50.2	100%
MUC(1B)	136.2	41.9	35.4	39.8	45.6	61.8	54.3	42.4	54.9	53.6	55.2	52.3	56.1	57.8	100%
MUC(1C)	55.4	43.8	28.8	41.7	54.1	62.3	55.6	51.6	58.1	48.2	59.5	58	51.4	53.0	100%
MUC(2)	39.4	43.4	22.2	27.7	43.4	39.2	41.1	25.9	48.6	42.7	39.8	54.1	39.0	40.1	100%
MUC(3)	59.8	65.4	45.4	46.3	52.1	71.3	65.6	49.2	69.6	68.3	67.7	78.1	61.6	63.4	100%
MUC(4)	33.1	63.5	33.7	41.8	58.4	47.8	46.3	32.5	64.2	37.6	50.6	46.3	46.3	47.7	100%
MUC(5)	63.8	37.7	31.3	28.6	53.5	61.8	67.8	59.9	69.2	56.3	58	69.5	54.8	56.4	100%
MUC(6)	49.4	31.1	28.5	25.6	28.2	34.7	37.1	39.3	44.4	47.9	54.5	56.4	39.8	41.0	100%

9.4 Appendix 4: Traffic Data, 2008

Table 9.3 Traffic Data used in the Updating and Screening Assessment

Grid Reference of Road Link		AADT (Vehicles Per Day)				Year of Most Recent Survey	Percentage Change (2005 to 2008)	HGV % (2008)
X	Y	2003	2004	2005	2008			
406654	315217	17100	15100	14400	13862	2007	-3.7%	7
407213	316382	-	-	-	10379	2007	-	3
403936	318629	-	-	-	10548	2007	-	7
408462	313910	-	-	-	15710	2006	-	6
408298	314013	-	-	-	13782	2005	-	6
419083	316815	-	-	-	27092	2007	-	13
414882	311290	-	-	-	54194	2007	-	14
414912	311311	49500	47700	48500	54194	2007	11.7%	14
414233	310429	-	-	-	11285	2006	-	4
413340	309698	-	-	-	18446	2007	-	5
412897	308335	-	-	-	10425	2006	-	3
412160	308127	-	-	-	10806	2005	-	5
411433	307499	-	-	-	10857	2007	-	3
411311	306641	-	-	-	12072	2006	-	3
412404	307660	-	-	-	10332	2006	-	4
411303	306213	-	-	-	12357	2006	-	3
414708	307225	-	12700	11300	10302	2007	-8.8%	3
410125	310864	-	-	-	19107	2007	-	6
410444	310297	-	-	-	17256	2006	-	4
410389	310602	-	-	-	17617	2006	-	4
410392	310590	-	-	-	10314	2006	-	5
411950	309346	-	-	-	17084	2006	-	4
412664	309736	-	-	-	13571	2008	-	2
414045	309518	-	-	37000	43317	2007	17.1%	15
414199	309961	-	-	-	34953	2007	-	17
411732	305592	-	-	-	17107	2006	-	14
412625	305090	17400	-	17200	19541	2007	13.6%	15
413216	304744	-	-	-	19619	2007	-	14
413209	304771	-	-	-	19462	2007	-	15
412960	305989	-	-	29000	38752	2006	33.6%	12
406580	306505	-	-	-	26891	2007	-	18
401773	309366	-	-	-	10009	2006	-	3
403460	309086	-	-	-	16917	2006	-	4
407354	306505	-	-	-	21934	2007	-	18
411281	304459	-	-	-	15319	2006	-	3
411314	305498	-	-	-	18908	2006	-	3
419085	302863	-	-	-	30942	2007	-	11
419476	302915	-	-	25200	30855	2007	22.4%	10
420070	303023	-	-	-	15471	2007	-	11
420075	303159	-	-	-	27351	2006	-	5
420091	303171	-	-	-	26065	2006	-	5
420154	303372	-	-	-	26857	2006	-	4
420164	303376	-	-	-	25033	2006	-	5
419639	303357	-	-	10500	12064	2006	14.9%	3
420591	302652	-	-	-	10349	2006	-	2
413785	301770	31300	28500	29400	28868	2007	-1.8%	13
415211	299695	-	-	--	18964	2007	-	3
414986	299459	-	-	--	25689	2006	-	3
415203	299705	-	-	-	18381	2007	-	3
415931	300208	18300	167-00	16400	18672	2007	13.9%	3
418747	302442	-	-	-	10429	2006	-	4
417441	301620	-	-	-	17199	2006	-	3
420794	304740	-	-	-	22681	2006	-	2
405098	309212	16300	-	14600	14601	2007	0%	3
409074	312503	-	-	-	15493	2006	-	6
412520	310663	17600	14600	15900	17784	2007	11.8%	5

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Grid Reference of Road Link		AADT (Vehicles Per Day)				Year of Most Recent Survey	Percentage Change (2005 to 2008)	HGV % (2008)
X	Y	2003	2004	2005	2008			
404028	317126	-	-	-	14776	2006	-	6
404825	317134	-	-	-	14985	2006	-	5
408786	308462	-	-	-	14040	2006	-	4
411367	309760	-	-	-	10652	2008	-	2
411397	309468	-	-	-	11540	2008	-	2

Notes: All traffic data provided by Staffordshire County Council Highways Data Team. AADT data for 2008 has been forecast from figures obtained during the most recent traffic survey.

Exclusions:

1. Based on local knowledge and the findings of previous rounds of Review and Assessment, roads with flows between 5000 and 10000 have been excluded as there are no roads within the District where streets are narrow and congested as defined in Section A.1 of Box 5.3 of TG(09).
2. Roads of greater than 10000 vehicles per day AADT assessed during earlier rounds of Review and Assessment.

9.5 Appendix 5: DMRB Calculations

Model Input Data

Table 9.4: Traffic Input Data for DMRB

Road Link	2008 Annual Average Daily Traffic Flows (AADT)	Heavy Goods Vehicle (HGVs) %	Vehicle Speed (kph)
A38 Swinfen	38752	12	80
A5190 Lichfield Road	14040	4	40
A461 Walsall Road (NE of junction)	19916	4	40
A461 Walsall Road (SW of junction)	9043	4	40
Fosseway Lane	n/a	n/a	n/a

Notes: No vehicle speed data was available for DMRB modelling and so the speeds used are based on local knowledge of the roads concerned.

Table 9.5: Receptor Details and Background Pollutant Concentrations Used in DMRB

Receptor	Distance to Road (m)	Background NO_x/µg/m^3	Background NO_2/µg/m^3	Background PM_{10}/µg/m^3
The Lodge, Swinfen	20	23.0	17.1	17.4
6 Walsall Road, Pipehill	10, 60	21.1	15.9	17.4
Boythorpe, Pipehill	17.5, 25	21.1	15.9	17.4

Model Verification

There are no continuous monitoring stations in operation in the District and so model verification for oxides of nitrogen and nitrogen dioxide was performed against the nearest diffusion tube locations to the road links being modelled. No verification was performed for modelled PM_{10} concentrations.

Table 9.6 Model Verification Details

Location	Total Mon NO_2 [1]	Rd Mon NO_X [2]	Rd NO_X [3]	Factor [4]	Adj Rd NO_X [5]	Bckgrd NO_2	Adj Total NO_2 [6]
	Annual mean µg/m^3	Annual mean µg/m^3	Annual mean µg/m^3		Annual mean µg/m^3	Annual mean µg/m^3	Annual mean µg/m^3
Pipehill	No diffusion tube or continuous monitor against which to verify						
The Lodge, Swinfen	36.5	49.1	50.7	0.97	49.1	17.1	31.8

[1] Total Mon NO_2 = monitored concentrations at Ashley Road diffusion tube site.
[2] Rd Mon NO_X = Total Monitored NO_x – Background NO_x (from NO_x to NO_2 calculator)
[3] Rd NO_x = Total Modelled NOx – Background NOx (from DMRB)
[4] Factor = Ratio of Monitored NO_x to Modelled NO_x
[5] Adj Rd NOx = Modelled Rd NOx x verification factor
[6] Adj Total NO_2 = Adj Modelled Rd NO_2 + Background NO_2

10 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 (2008) Lichfield District Council Air Quality Progress Report 2008.
[7] Faber Maunsell (2003), Lichfield District Council Updating and Screening Assessment 2003.