2016 Air Quality Annual Status Report (ASR)

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

July, 2016

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Executive Summary: Air Quality in Our Area

Air Quality in Charnwood

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

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

Data for Loughborough from 2015 indicates that there has been a significant reduction in the concentration of NO_2 levels around the town centre since the opening of the Inner Relief Road in November 2014.

The stretches of High Street and Baxter Gate that border on the newly pedestrianised area have fallen from average figures of 56 and 44µg/m^3 over the 5 years before the road was opened, down to 29 and 26µg/m^3 respectively during the first full year of monitoring (2015) since the road was opened.

A further measurable improvement for residents has also been observed along Barrow Street where concentrations have fallen from 28 to 23µg/m^3 and Ashby Road where concentrations have dropped to 27 from 35µg/m^3

Whilst the initial figures are encouraging and help to support one of the main objectives behind the construction of the road, Officers will continue to monitor and report upon their results.

Monitoring at Syston continues to show that NO_2 levels remain consistently beneath the Air Quality Objectives.

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

On-going partnership work with Mountsorrel Quarry (Tarmac) is continuing, primarily through the integration of the quarry's Dust Management and Monitoring Plan (DMMP). This document is regularly reviewed by Council Officers and the quarry management team. Implementation of the DMMP continues to identify and refine operational activities, with its focus to ensure that any sources of on-site fugitive dust emissions are continually identified and addressed through appropriate mechanisms to reduce impact to the local community.

Whilst PM_{10} levels have markedly lowered since the introduction of the quarry DMMP, it is apparent that residents still experience episodic concentration impact from local activities; we can however support the suggestion that transboundary movement has played a part in a number of the 24-hour exceedances experienced at Mountsorrel

Further information about the work of the Council in respect to Local Air Quality Management can be found on our webpages at:

http://www.charnwood.gov.uk/pages/airpollution

Actions to Improve Air Quality

Significant success has been seen in relation to the 2 major air quality areas of concern for the Council, namely the reduction of NO_2 levels in Loughborough town centre and PM_{10} concentrations at Mountsorrel. It is important to recognise that the beneficial outcomes to public health that are being observed for both of these AQMAs are as a direct result of positive actions having been taken (both physically-engineered i.e. the Inner Relief Road, or through the means of successful collaboration i.e. the DMMP), through their identification, evaluation and the implementation of measures designed to mitigate public exposure.

Local Priorities and Challenges

Over the next year further work will be undertaken to evaluate the concentration of sulphur dioxide (SO_2) in the vicinity of the Great Central Railway (GCR) engine sheds at Loughborough. Recently purchased equipment is expected to give us a better understanding of the current levels in the area, updating our knowledge of the area since the AQMA was declared in 2001 and the corresponding Detailed Assessment published during 2003.

Work will continue to evaluate the benefits of the Loughborough Inner Relief Road scheme, as well as building upon the well-established work already being committed to at Mountsorrel Quarry.

Whilst we are already seeing some of the larger scale infrastructure projects leading to beneficial air quality improvements; challenges are most likely to be seen in ways to evaluate the consequence of the smaller-scale 'softer-option' measures, which by their nature are difficult to quantify their direct contribution. Challenges may also be encountered across those actions that fall to County rather than Borough district responsibility, in that it is especially true of needing to respect and maintain an effective line of communication in relation to progress between Authorities.

How to Get Involved

In order to help local people and visitors to travel easily in and around Charnwood and reach places further afield, all whilst reducing the burden on the environment; more information about the Leicestershire Sustainable Travel Challenge, local buses, cycling paths, car share schemes, local air travel and road traffic and weather conditions can be found on our public transport and sustainable travel website pages at: Public transport and sustainable travel.

Alternatively, follow the direct links below for information on:

- Cycling, pedestrian and other pathways located within Charnwood.
- The Leicestershire Sustainable Travel Challenge
- The 'Chose How You Move' Car share scheme

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1 Local Air Quality Management

This report provides an overview of air quality in Charnwood during 2015. It fulfils the requirements of Local Air Quality Management (LAQM) as set out in Part IV of the Environment Act (1995) and the relevant Policy and Technical Guidance documents.

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. This Annual Status Report (ASR) is an annual requirement showing the strategies employed by Charnwood Borough Council to improve air quality and any progress that has been made.

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

2 Actions to Improve Air Quality

2.1 Air Quality Management Areas

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

A summary of AQMAs declared by Charnwood Borough Council can be found in Table 2.1. Further information related to declared or revoked AQMAs, including maps of AQMA boundaries are available online at:
http://www.charnwood.gov.uk/pages/airpollution

See full list at http://uk-air.defra.gov.uk/aqma/list.

Table 2.1 – Declared Air Quality Management Areas

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
Loughborough AQMA	NO_2 annual mean	L'boro	An area encompassing a number of properties around the town centre.	Charnwood Local Air Quality Management – Final Action Plan http://www.charnwood.gov.uk/files/documents/final_air_quality_action_plan/draftairqualityactionplan.pdf
Syston AQMA	NO_2 annual mean	Syston	Residential properties along Melton Road and Sandford Road	Charnwood Local Air Quality Management – Final Action Plan http://www.charnwood.gov.uk/files/documents/final_air_quality_action_plan/draftairqualitya

AQMA Name	Pollutants and Air Quality Objectives	City / Town	One Line Description	Action Plan
				ctionplan.pdf
Great Central Railway (GCR) AQMA	SO_2 15-minute mean	L'boro	An area encompassing residential properties near The Great Central Railway	Charnwood Local Air Quality Management – Final Action Plan http://www.charnwood.gov.uk/files/documents/final_air_quality_action_plan/draftairqualityactionplan.pdf
Mountsorrel AQMA	PM_{10} 24-hour mean	Mount sorrel	An area encompassing residential properties near Mountsorrel Quarry	Dust Management and Monitoring Plan http://www.charnwood.gov.uk/files/documents/dust_management_and_monitoring_plan/DMMP%20Final%202016.pdf

2.2 Progress and Impact of Measures to address Air Quality in Charnwood

Charnwood Borough Council has taken forward a number of measures during the current reporting year of 2015/16 in pursuit of improving local air quality. Details of all measures completed, in progress or planned are set out in Table 2.2

Key completed measures are:

- The opening of the Loughborough Inner Relief Road (Nov 2014) - leading to an associated reduction in NO_2 levels around the town centre from the first full year of evaluation.

- The re-designing of the Epinal Way junction (Loughborough) - leading to an improvement in traffic flow with an associated reduction in NO_2 level over the first full year of evaluation.
- A review and update of the original 2011 Dust Management and Monitoring Plan (DMMP) for Mountsorrel Quarry. The DMMP continues to evolve and provide a robust methodology for further assessment.

The progress on further measures has been difficult to effectively compile and summarise. Primarily this has been due to the short notification time that was given for submission of this report, which encompasses revised guidance and changed format from previous years, however; much of this information sits with external departments, authorities and partners outside of the control of the author.

Table 2.2 – Progress on Measures to Improve Air Quality

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
1	Loughborough Eastern Gateway Project	Transport Planning and Infrastructure	Other + Public Transport Improvements	Leicestershire County Council	-	-	-	< 40 µg/m^3 (annual mean)	Scheme completed	Completed 2011	Evaluation of NO_2 levels continuing
2	Loughborough Inner Relief Road	Transport Planning and Infrastructure	Other + Bus Route Improvements	Leicestershire County Council	-	-	-	< 40 µg/m^3 (annual mean)	Scheme completed	Completed Nov 2014	Evaluation of NO_2 levels continuing
3	Epinal Way Junction	Traffic Management	UTC, Congestion management, traffic reduction	Leicestershire County Council	-	-	-	< 40 µg/m^3 (annual mean)	Scheme completed	Completed 2014	Evaluation of NO_2 levels continuing
4	Mountsorrel Quarry Dust Management Plan (DMMP)	Environmental Permits	Other	Charnwood Borough Council	-	-	Reduction of PM_{10} Concentration	< 35 exceedance of 50 µg/m^3 per year	Reviewed 2015	-	Evaluation of PM_{10} levels continuing
5	Charnwood Local Plan 2011 to 2028 Core Strategy	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Charnwood Borough Council	-	-	-	-	-	Adopted Nov 2015	Provides guidance and measures to mitigate any air quality impacts
6	New Boiler Plant at CBC	Promoting Low Emission Plant	Public Procurement of stationary combustion sources	Charnwood Borough Council	-	-	-	-	Completed	Installed Aug 2015	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
7	Electric charge points at Beehive Car Park (L'boro)	Promoting Low Emission Transport	Procuring alternative Refuelling infrastructure to promote Low Emission Vehicles, EV recharging, Gas fuel recharging	Street Management at CBC installed equipment with grant funding from Cenex Plugged in Midlands and 'Choose how you move' Leicestershire County Council.	-	-	-	-	Completed	Completed	-
8	Replace street wardens fleet vehicles with 2 electric charge vehicles and 4 Diesels with reduced CO_2 emissions	Promoting Low Emission Transport	Public Vehicle Procurement - Prioritising uptake of low emission vehicles	Charnwood Borough Council (Street Management / Fleets Contract Manager)	-	-	-	-	2 x electric purchased Apr 2015 4 x diesel purchased Aug 2015	Completed	

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
9	Driver Assessments	Vehicle Fleet Efficiency	Driver training and ECO driving aids	Charnwood Borough Council (Cleansing & Open Spaces)	-	-	Reduction in fuel consumption		No training yet, but Tracker allows monitoring of driver style (speeding, acceleration, braking, cornering). All drivers have had warning that speeding will not be tolerated. That had an immediate impact on their performance which must impact on fuel consumption, although too early to measure any discernible difference		
10	Staff car sharing scheme	Alternatives to private vehicle use	Car & lift sharing schemes	Charnwood Borough Council	-	-	Uptake	-		On-going	
11	CO2 banding for staff car parking allowance / permits	Traffic Management	Emission based parking or permit charges	Charnwood Borough Council	-	-		-		On-going	
12	Taxi Testing to comply with VOSA requirements	Vehicle Fleet Efficiency	Testing Vehicle Emissions	Charnwood Borough Council	–	–	Pass / Failure	–		On-going	Yearly test with 6 month interim

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
13	New electronic bus information and shelters in Loughborough	Transport Planning and Infrastructure	Public transport improvements-interchanges stations and services	?	-	-	-	-	Installed	Completed	
14	Improved pedestrian signs in Loughborough	Public Information	Via other mechanisms	?	-	-	-	-	Installed	Completed	
15	Civil Parking Enforcement	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	Charnwood Borough Council	-	-	Enforcement Stats	-	Unknown	On-going	Measure to improve traffic flow and reduce congestion
16	Home working	Promoting Travel Alternatives	Encourage / Facilitate home-working	Charnwood Borough Council	-	-	Uptake	-	Unknown	On-going	
17	Workplace Challenge Scheme	Promoting Travel Alternatives	Promotion of cycling/walking	National but promoted internally by Charnwood Borough Council	-	-	-	-	-	Annual	
18	ULEV (Joint funded study across the County and City for potential scheme for electric charge points and purchase scheme for taxis)	Promoting Low Emission Transport	Taxi emission incentives	Leicestershire County Council	-	-	-	-	CBC evaluation completed	-	Scheme assessed to not be beneficial to CBC due to taxi mileages involved

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
19	Evaluation of fewer parking spaces or higher charges to restrain car access to work or shops	Traffic Management	Workplace Parking Levy, Parking Enforcement on highway	Leicestershire County Council + Charnwood Borough Council			Incorporating the effectiveness of Civil Parking Enforcement (CPE)	-			
20	Investment in cycle route network to reach all parts of Loughborough	Transport Planning and Infrastructure	Cycle network	Leicestershire County Council	Unknown	Unknown	Monitoring of %age increase in cycling at counting points across Loughborough	-	Unknown	Unknown	No update provided by LCC
21	Increasing bus travel through work on Quality Bus Partnership (QBP)	Alternatives to private vehicle use	Other	Leicestershire County Council	Unknown	Unknown	Unknown	-	Unknown	Unknown	No update provided by LCC
22	Birstall 'Park & Ride'	Alternatives to private vehicle use	Bus based Park & Ride	Leicestershire County Council	-	-	Uptake	-	Completed	Opened July 2011	No current uptake figures provided by LCC
23	Increasing travel by train with bus connections to town centre and key destinations	Promoting Travel Alternatives	Promote use of rail and inland waterways	Leicestershire County Council	-	-	-	-	Unknown	Unknown	
24	Personalised Travel Planning and Accessibility Team set up to promote sustainable travel choices	Promoting Travel Alternatives	Personalised Travel Planning	Leicestershire County Council	Unknown	Unknown	Unknown	-	Unknown	Unknown	No update provided by LCC

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Planning Phase	Implementation Phase	Key Performance Indicator	Target Pollution Reduction in the AQMA	Progress to Date	Estimated Completion Date	Comments
25	Network management for roadworks, incidents, and planned events	Traffic Management	Other	Leicestershire County Council	-	-	-	-	-	-	-
26	School Travel Planning	Promoting Travel Alternatives	School Travel Plans	Leicestershire County Council	-	-	Schools with travel plans in place and monitoring the % of journeys to school as the only pupil	-	Unknown	-	No update provided by LCC
27	Providing more consistent and reliable journey times	Traffic Management	UTC, Congestion management, traffic reduction	Leicestershire County Council	-	-	Average vehicle speeds (weekday morning peak)	-	Unknown	-	No update provided by LCC
28	Following completion of Town Centre Improvement Scheme, review TRO arrangements and signal operations at key junctions in / around town	Traffic Management	Other	Leicestershire County Council	-	-	-	-	Unknown	Unknown	No update provided by LCC
29	Programme of network signing improvements (including de-cluttering)	Traffic Management	Other	Leicestershire County Council	-	-	-	-	Unknown	Unknown	No update provided by LCC

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

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

Charnwood Borough Council will be considering some of the following measures (either independently or in combination) as a means to assess $PM_{2.5}$ levels within the Borough:

As no local $PM_{2.5}$ monitoring or modelling data is available, there are several sources of existing information that may assist in evaluating $PM_{2.5}$ at the local level. This includes, but is not limited to:

***National $PM_{2.5}$ Monitoring*.** There are approximately eighty $PM_{2.5}$ monitoring stations within the AURN. Monitoring data from sites located either close to, or within the local authority area, these will provide a good indicator as to likely $PM_{2.5}$ concentrations within the Council area.

***National $PM_{2.5}$ Modelling*.** Defra maintains national background maps, which are provided for each 1km × 1km grid square across the UK. By plotting the $PM_{2.5}$ mapped data for the appropriate base year, $PM_{2.5}$ concentrations can be identified within the local authority area. Although considered quite coarse resolution, such information may prove useful to local authorities in directing actions to areas that are most in need of reductions in $PM_{2.5}$ levels.

***Ratio of PM_{10} to $PM_{2.5}$*.** In the absence of any $PM_{2.5}$ monitoring data, local authorities can use one of the methodologies provided in LAQM.(TG16) Chapter 7 Section 1 (paras 7.107 to 7.111) to provide an indication of $PM_{2.5}$ concentrations.

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

3.1 Summary of Monitoring Undertaken

3.1.1 Automatic Monitoring Sites

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

Charnwood Borough Council undertook automatic (continuous) monitoring at 1 site during 2015. Table A.1 in Appendix A shows the details of this site.

Prolonged equipment failure at a further 3 sites; **Durham Rd (L'boro)**: NO_2, PM_{10}, SO_2; **Baxter Gate (L'boro)**:NO_2 and **Melton Rd (Syston)**: NO2, provided insufficient data capture rates (0%, 64% and 40% respectively) and uncertain accuracy of results for inclusion in this report. Hence there is no data presented for NO_2 hourly mean concentrations.

A decision to decommission the Durham Road station was made during late 2015.

3.1.2 Non-Automatic Monitoring Sites

Charnwood Borough Council undertook non-automatic (passive) monitoring of NO_2 at 48 sites (52 tubes) during 2015. Table A.2 in Appendix A shows the details of the sites.

Further details on Quality Assurance/Quality Control (QA/QC) and bias adjustment for the diffusion tubes are included in Appendix C.

3.2 Individual Pollutants

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

3.2.1 Nitrogen Dioxide (NO_2)

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

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

There were no exceedences of the annual mean air quality objective in 2015.

3.2.2 Particulate Matter (PM_{10})

Charnwood Borough Council continues to monitor PM_{10} levels in the vicinity of Mountsorrel Quarry. Recent monitoring has shown that levels are in compliance with the air quality objectives. Further areas of site improvement and methods for on-site monitoring are detailed within the sites Dust Management and Monitoring Plan, available at: Mountsorrel Quarry Dust Management and Monitoring Plan

Table A.4 in Appendix A compares the ratified and adjusted monitored PM_{10} annual mean concentrations since 2012 with the air quality objective of 40µg/m^3.

Table A.5 in Appendix A compares the ratified continuous monitored PM_{10} daily mean concentrations since 2012 with the air quality objective of 50µg/m^3, not to be exceeded more than 35 times per year.

3.2.3 Particulate Matter ($PM_{2.5}$)

Charnwood Borough Council do not undertake any local monitoring of $PM_{2.5}$

As outlined in section 2.5; consideration will be taken via a number of available indicative data sources as well as local knowledge for us to identify any localised 'hot-spots' that may be, or become, potential areas of concern.

It is important to note however that due to its extremely small size, $PM_{2.5}$ can travel for long distances in the air and it is estimated that as much as 40% to 50% of the levels found in any given area can be from sources outside a local authority's direct boundary [4].

The following provides an estimation of $PM_{2.5}$ using the nationally derived correction factor from recorded PM_{10} observations at the Mountsorrel PM_{10} monitoring site, considered to be the 'worst-case' location for public exposure to dust within the Borough:

The recorded annual mean concentration of PM_{10} at the Mountsorrel site in 2015 was 27.1µg/m^3. The PM2.5 concentration at this location can be estimated as follows:

The recorded annual mean PM10 concentration multiplied by the nationally derived correction factor: 27.1 x 0.7 = 19.0

Estimated annual mean PM2.5 = 19.0µg/m^3

Given the fact that considerable effort is being made to lessen PM_{10} dust emissions from Mountsorrel Quarry over recent years via the DMMP; it would be fair to suggest that whilst not directly measured, it is likely that associated levels of $PM_{2.5}$ from the plant are also seeing discernible reductions.

[4] Fine Particulate Matter ($PM_{2.5}$) in the United Kingdom. Air Quality Expert Group (AQEG) Report. 2012

3.2.4 Sulphur Dioxide (SO_2)

Charnwood Borough Council did not undertake any SO_2 monitoring during 2015.

Recently purchased equipment has been acquired to resume an indicative assessment of concentration levels around the area Great Central Railway AQMA. Monitoring is scheduled to commence later this year.

Appendix A: Monitoring Results

Table A.1 – Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA?	Monitoring Technique	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Inlet Height (m)
CM1	Mountsorrel	Industrial / Other	457355	315396	PM_{10}	Y	Volumetric Gravimetric	~34m	N/A	~1.5

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

(2) N/A if not applicable.

Table A.2 – Details of Non-Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT1	Ratcliffe Rd (L'boro)	Roadside	454087	320392	NO_2	Y	0	~3	N	~3
DT2	Shelthorpe Rd (L'boro)	Roadside	454234	318657	NO_2	N	~8	~3	N	~3
DT3	Forest Rd (L'boro)	Roadside	452833	318776	NO_2	N	0	~6	N	~2.5
DT4	Haydon Rd (L'boro)	Roadside	452314	319620	NO_2	Y	~8	~6	N	~2.5
DT5	Alan Moss Rd / Epinal Way (L'boro)	Roadside	452173	319924	NO_2	Y	0	~15	N	~1.5
DT6	Epinal Way / Ling Rd (L'boro)	Roadside	453678	318194	NO_2	N	0	~9	N	~3

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT7	Leicester Rd (L'boro)	Roadside	454002	319253	NO_2	Y	0	~3	N	~3
DT8	Derby Rd (L'boro)	Roadside	453231	320028	NO_2	Y	~3	~3	N	~3
DT9	Derby Rd / Briscoe Avn (L'boro)	Roadside	452670	320527	NO_2	Y	~3	~4	N	~3
DT10	Durham Rd 1 (L'boro)	Urban Background	452352	320697	NO_2	N	N/A	N/A	N	~3.5
DT11	Durham Rd 2 (L'boro)	Urban Background	452352	320697	NO_2	N	N/A	N/A	N	~3.5
DT12	Durham Rd 3 (L'boro)	Urban Background	452352	320697	NO_2	N	N/A	N/A	N	~3.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT13	Alan Moss Rd / A6 Derby Rd (L'boro)	Roadside	452903	320212	NO_2	Y	0	~8	N	~1.5
DT14	High St (L'boro)	Roadside	453730	319596	NO_2	Y	N/A	~3	N	~3
DT15	Market Place (L'boro)	Urban Centre	453611	319540	NO_2	Y	N/A	N/A	N	~3
DT16	Ashby Rd (L'boro)	Roadside	453189	319709	NO_2	Y	0	~4	N	~3
DT17	Cow Hill Lodge (Shepshed)	Roadside	448876	318307	NO_2	N	0	~10	N	~1.5
DT18	Roseberry St (L'boro)	Roadside	452697	319921	NO_2	N	~13	~3	N	~3

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT19	Melton Rd Town Centre (Syston)	Roadside	462777	311692	NO_2	Y	~3	~3	N	~3
DT20	1123 Melton Rd (Syston)	Roadside	462351	311213	NO_2	Y	0	~6	N	~1.5
DT21	1116 Melton Rd (Syston)	Roadside	462373	311254	NO_2	Y	0	~3	N	~3
DT22	Loughborough Rd (Birstall)	Roadside	459233	309590	NO_2	N	0	~15	N	~1.5
DT23	A6 (Birstall)	Roadside	459178	309890	NO_2	N	~2	~5	N	~3

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT24	21 Humberstone Lane (Thurmaston)	Roadside	460821	308757	NO_2	N	0	~6	N	~1.5
DT25	43 Humberstone Lane (Thurmaston)	Roadside	460861	308824	NO_2	N	0	~5	N	~1.5
DT26	22 Humberstone Lane (Thurmaston)	Roadside	460835	308784	NO_2	N	0	~5	N	~1.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT27	Ashby Rd Central (Shepshed)	Roadside	448121	318257	NO_2	N	~12	~2	N	~3
DT28	Loughborough Rd (Hathern)	Roadside	450260	321922	NO_2	N	~30	~3	N	~3
DT29	Barrow St (L'boro)	Roadside	453901	319488	NO_2	N	0	~10	N	~3
DT30	School St (L'boro)	Roadside	453946	319619	NO_2	N	0	~3	N	~3
DT31	Fennel St (L'boro)	Roadside	453694	319890	NO_2	N	0	~3	N	~3

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT32	High St (Syston)	Roadside	462369	311809	NO_2	Y	0	~4	N	~3
DT33	Syston AQMS 1	Roadside	462540	311428	NO_2	Y	~10	~3	Y	~1.5
DT34	Syston AQMS 2	Roadside	462540	311428	NO_2	Y	~10	~3	Y	~1.5
DT35	Syston AQMS 3	Roadside	462540	311428	NO_2	Y	~10	~3	Y	~1.5
DT36	Baxter Gate AQMS 1	Kerbside	453687	319672	NO_2	Y	N/A	~1	Y	~1.5
DT37	Baxter Gate AQMS 2	Kerbside	453687	319672	NO_2	Y	N/A	~1	Y	~1.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT38	Baxter Gate AQMS 3	Kerbside	453687	319672	NO_2	Y	N/A	~1	Y	~1.5
DT39	Nottingham Rd (L'boro)	Roadside	454154	320116	NO_2	N	N/A	~3	N	~3
DT40	156 Ratcliffe Rd (L'boro)	Roadside	454285	320294	NO_2	N	0	~6	N	~1.5
DT41	156 Meadow Lane (L'boro)	Roadside	453933	320663	NO_2	N	0	~8	N	~1.5
DT42	31 Station Boulevard (L'boro)	Roadside	454142	320593	NO_2	N	0	~9	N	~1.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT43	91 Wharncliffe Rd (L'boro)	Roadside	454250	319682	NO_2	N	0	~4	N	~1.5
DT44	3 Simpson Cl (Syston)	Roadside	461499	310459	NO_2	N	0	~30	N	~1.5
DT45	1 Brackenfield Way (Thurmaston)	Roadside	461994	309975	NO_2	N	0	~8	N	~1.5
DT46	74 Hathern Road (Shepshed)	Roadside	448311	320511	NO_2	N	0	~8	N	~1.5
DT47	7 Shepshed Rd (Hathern)	Roadside	449935	322227	NO_2	N	0	~11	N	~1.5

Site ID	Site Name	Site Type	X OS Grid Ref	Y OS Grid Ref	Pollutants Monitored	In AQMA ?	Distance to Relevant Exposure (m) (1)	Distance to kerb of nearest road (m) (2)	Tube collocated with a Continuous Analyser?	Height (m)
DT48	37 Darwin Crescent (L'boro)	Suburban	450942	321076	NO_2	N	~4	N/A	N	~1.5
DT49	Far St (Wymeswold)	Roadside	460313	323521	NO_2	N	~1	~2	N	~3
DT50	Groby Rd (Anstey)	Roadside	454800	308525	NO_2	N	~1	~3	N	~3
DT51	15 Leicester Rd (Anstey)	Roadside	455167	308549	NO_2	N	0	~4	N	~3
D52	22 Main St (Barkby)	Roadside	463483	309880	NO_2	N	0	~4	N	~3

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

(2) N/A if not applicable.

Table A.3 – Annual Mean NO_2 Monitoring Results

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
DT1	Roadside	Diffusion Tube	100	100	30.8	26.9	29.5	21.6	21.0
DT2	Roadside	Diffusion Tube	100	100	22.5	25.8	36.1	22.3	20.1
DT3	Roadside	Diffusion Tube	100	100	25.4	29.2	32.7	26.6	25.0
DT4	Roadside	Diffusion Tube	100	100	33.9	29.0	32.1	25.2	26.0
DT5	Roadside	Diffusion Tube	100	100	30.2	27.1	28.2	23.4	21.5
DT6	Roadside	Diffusion Tube	92	92	25.3	28.8	30.1	26.1	24.4
DT7	Roadside	Diffusion Tube	100	100	31.8	35.9	**42.7**	34.2	30.6
DT8	Roadside	Diffusion Tube	100	100	31.4	36.8	**40.4**	30.7	28.7
DT9	Roadside	Diffusion Tube	100	100	32.7	30.4	30.9	25.1	23.1
DT10	Urban Background	Diffusion Tube	100	100	25.1	21.9	24.7	18.3	17.8
DT11	Urban Background	Diffusion Tube	100	100	23.8	23.6	23.4	19.2	17.0
DT12	Urban Background	Diffusion Tube	100	100	25.5	23.1	26.1	19.3	16.9
DT13	Roadside	Diffusion Tube	100	100	**40.6**	34.8	33.6	27.8	25.2
DT14	Roadside	Diffusion Tube	100	100	**52.6**	**56.3**	**65.7**	39.1	28.5
DT15	Urban Centre	Diffusion Tube	58	58	21.3	25.2	25.9	21.4	18.4
DT16	Roadside	Diffusion Tube	92	92	31.9	34.2	38.5	30.0	26.7
DT17	Roadside	Diffusion Tube	100	100	33.8	29.2	32.2	24.8	21.3
DT18	Roadside	Diffusion Tube	92	92	24.3	23.7	24.9	17.0	17.9
DT19	Roadside	Diffusion Tube	83	83	30.4	29.3	36.8	27.7	27.2
DT20	Roadside	Diffusion Tube	100	100	26.0	27.5	31.7	24.5	22.9
DT21	Roadside	Diffusion Tube	100	100	29.0	29.0	36.1	28.4	26.4

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) [1]	Valid Data Capture 2015 (%) [2]	NO_2 Annual Mean Concentration ($\mu g/m^3$) [3]				
					2011	2012	2013	2014	2015
DT22	Roadside	Diffusion Tube	100	100	30.9	33.8	39.5	30.5	28.5
DT23	Roadside	Diffusion Tube	100	100	30.6	34.2	37.9	30.9	28.4
DT24	Roadside	Diffusion Tube	100	100	32.5	35.2	**41.4**	32.5	30.9
DT25	Roadside	Diffusion Tube	100	100	30.0	33.4	38.1	30.4	26.0
DT26	Roadside	Diffusion Tube	100	100	25.5	28.9	32.4	26.3	24.1
DT27	Roadside	Diffusion Tube	100	100	32.8	29.5	27.9	25.2	22.7
DT28	Roadside	Diffusion Tube	100	100	28.5	26.7	27.9	23.0	20.8
DT29	Roadside	Diffusion Tube	100	100	24.5	27.7	28.8	23.5	22.6
DT30	Roadside	Diffusion Tube	100	100	21.4	23.3	26.7	20.6	19.9
DT31	Roadside	Diffusion Tube	100	100	25.1	28.4	25.2	29.9	27.4
DT32	Roadside	Diffusion Tube	100	100	26.7	31.9	33.1	25.7	24.7
DT33	Roadside	Diffusion Tube	100	100	31.5	33.6	36.5	30.8	27.6
DT34	Roadside	Diffusion Tube	100	100	30.3	32.5	36.7	29.4	27.1
DT35	Roadside	Diffusion Tube	100	100	30.3	31.5	35.5	28.8	25.7
DT36	Kerbside	Diffusion Tube	100	100	38.6	**43.7**	**46.5**	33.8	26.2
DT37	Kerbside	Diffusion Tube	100	100	37.3	**42.6**	**47.1**	33.7	25.3
DT38	Kerbside	Diffusion Tube	100	100	36.9	**43.6**	**46.7**	32.2	26.1
DT39	Roadside	Diffusion Tube	100	100	39.3	**42.9**	**48.2**	**40.1**	30.7
DT40	Roadside	Diffusion Tube	100	100	25.8	25.5	28.5	22.0	21.1
DT41	Roadside	Diffusion Tube	92	92	26.0	27.7	30.1	25.5	21.5
DT42	Roadside	Diffusion Tube	100	100	-	29.3	29.3	24.0	22.2
DT43	Roadside	Diffusion Tube	100	100	-	28.9	34.4	27.5	24.3
DT44	Roadside	Diffusion Tube	92	92	-	-	-	-	21.8
DT45	Roadside	Diffusion Tube	100	100	-	-	-	-	19.9
DT46	Roadside	Diffusion Tube	100	100	-	-	-	-	18.9
DT47	Roadside	Diffusion Tube	100	100	-	-	-	-	21.1

Site ID	Site Type	Monitoring Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	NO_2 Annual Mean Concentration ($\mu g/m^3$) (3)				
					2011	2012	2013	2014	2015
DT48	Suburban	Diffusion Tube	100	100	-	-	-	-	14.1
DT49	Roadside	Diffusion Tube	100	100	-	-	-	-	27.9
DT50	Roadside	Diffusion Tube	100	100	-	-	-	-	21.9
DT51	Roadside	Diffusion Tube	100	100	-	-	-	-	22.2
DT52	Roadside	Diffusion Tube	92	92	-	-	-	-	18.0

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

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

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

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

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

Table A.4 – Annual Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} Annual Mean Concentration ($\mu g/m^3$) (3)				
				2011	2012	2013	2014	2015
CM1	Industrial / Other	76	76	No Data	22.96	24.10	25.50	27.09

Notes: Exceedances of the PM_{10} annual mean objective of 40$\mu g/m^3$ are shown in **bold.**

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

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

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

Table A.5 – 24-Hour Mean PM_{10} Monitoring Results

Site ID	Site Type	Valid Data Capture for Monitoring Period (%) (1)	Valid Data Capture 2015 (%) (2)	PM_{10} 24-Hour Means > 50µg/m^3 (3)				
				2011	2012	2013	2014	2015
CM1	Industrial / Other	76	76	No Data	16 (42.92)	(44.75)	(49.12)	(49.01)

Notes: Exceedances of the PM_{10} 24-hour mean objective (50µg/m^3 not to be exceeded more than 35 times/year) are shown in **bold.**

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

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

(3) If the period of valid data is less than 90%, the 90.4th percentile of 24-hour means is provided in brackets (see note)

Note: If the 90.4th percentile is greater than 50µg/m3, then this means that if there had been 100% data capture, then there have been greater than 35 exceedances of 50µg/m3 per calendar year.

Appendix B: Full Monthly Diffusion Tube Results for 2015

Table B.1 – NO_2 Monthly Diffusion Tube Results - 2015

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT1	30.82	28.38	27.49	21.95	21.08	14.97	20.40	21.24	25.15	29.21	21.57	23.51	23.81	20.96
DT2	28.31	27.40	27.11	22.80	17.54	16.15	17.13	18.91	24.12	30.67	20.58	23.43	22.85	20.10
DT3	32.04	32.97	30.87	26.48	25.45	24.46	25.01	25.61	28.19	32.82	27.41	28.85	28.35	24.95
DT4	34.01	33.85	31.06	25.84	22.77	23.79	27.52	27.82	29.89	35.34	27.96	35.06	29.58	26.03
DT5	27.43	28.69	25.95	22.20	19.38	18.19	22.45	21.65	25.49	29.79	29.15	23.28	24.47	21.53
DT6	ND	33.09	28.84	26.72	22.22	23.23	22.46	25.16	28.46	37.81	26.82	30.18	27.73	24.40
DT7	31.47	34.63	38.78	33.12	30.04	33.91	34.86	33.56	36.76	50.41	27.63	32.12	34.77	30.60
DT8	35.12	39.19	37.17	29.79	26.92	25.90	25.90	29.76	33.38	47.53	25.91	34.89	32.62	28.71
DT9	30.12	33.77	32.59	22.59	20.39	20.38	21.07	21.30	25.81	32.64	24.86	28.80	26.19	23.05
DT10	24.56	25.96	24.10	19.17	14.85	15.18	14.08	16.32	19.81	28.26	20.26	20.06	20.22	17.70
DT11	22.33	23.71	23.32	19.47	12.58	11.61	13.55	14.04	20.45	29.31	20.82	20.53	19.31	16.99
DT12	25.44	25.22	24.14	20.25	13.56	15.22	12.66	16.18	20.88	17.13	18.77	20.28	19.14	16.85
DT13	33.66	32.43	32.84	28.39	23.22	24.12	24.12	25.43	30.48	36.67	23.81	27.75	28.58	25.15
DT14	33.53	36.93	33.80	32.94	28.02	25.94	31.02	30.38	31.26	36.92	28.31	40.02	32.42	28.53

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT15	ND	ND	24.99	18.90	16.93	15.90	ND	15.63	22.17	31.77	ND	ND	20.90	18.39
DT16	37.40	35.49	31.90	28.64	30.55	27.43	28.01	23.61	30.04	ND	29.18	31.39	30.33	26.69
DT17	25.72	28.21	27.46	23.42	22.19	25.11	24.16	23.56	23.01	31.97	21.60	14.29	24.23	21.32
DT18	26.92	25.02	20.71	17.66	12.85	ND	14.69	14.68	19.02	28.33	21.60	22.58	20.37	17.92
DT19	36.51	34.40	31.78	28.73	ND	20.11	ND	25.13	33.34	39.62	27.94	31.98	30.95	27.24
DT20	35.98	31.47	26.99	27.05	21.59	22.36	21.74	20.93	24.11	30.52	22.41	26.86	26.00	22.88
DT21	35.91	34.25	33.08	27.10	26.35	25.84	25.59	22.76	32.96	37.52	29.16	28.80	29.94	26.35
DT22	36.36	39.88	36.43	28.12	27.39	22.51	30.13	28.87	32.88	38.74	31.28	35.92	32.38	28.49
DT23	36.70	33.91	40.57	34.85	27.89	29.66	32.02	20.16	35.66	49.79	32.63	37.74	34.30	30.18
DT24	38.63	40.11	36.10	32.31	29.35	30.45	29.85	33.85	34.22	43.48	34.55	38.42	35.11	30.90
DT25	37.26	36.30	25.91	31.53	26.65	27.16	29.14	22.15	34.33	18.71	30.91	34.18	29.52	25.98
DT26	32.51	33.07	28.96	25.25	23.44	22.50	22.22	24.42	28.33	33.06	26.01	29.15	27.41	24.12
DT27	42.29	37.42	31.90	36.80	34.78	35.84	32.73	30.32	33.01	50.16	27.31	36.95	35.79	31.50
DT28	36.53	31.83	31.52	28.16	22.14	21.45	25.80	21.06	33.12	40.87	26.62	27.17	28.86	25.39
DT29	30.73	33.61	27.52	24.61	19.68	18.35	21.25	21.84	28.28	32.75	23.20	25.79	25.63	22.56
DT30	29.78	27.92	26.10	18.83	17.14	15.26	19.13	20.93	22.67	26.01	23.88	23.24	22.57	19.87
DT31	28.88	33.94	36.10	32.17	26.19	26.06	27.86	28.21	34.92	43.74	26.23	29.41	31.14	27.41

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT32	36.35	34.83	30.77	26.72	22.40	20.11	23.99	24.52	28.65	32.72	28.53	27.52	28.09	24.72
DT33	36.45	39.62	30.98	27.43	28.47	26.47	27.24	29.50	30.73	35.14	27.46	36.65	31.35	27.58
DT34	35.87	38.41	32.03	27.21	26.42	25.02	28.37	27.55	30.02	36.44	27.83	33.95	30.76	27.07
DT35	37.34	36.39	29.30	26.19	24.16	21.97	27.67	28.05	29.72	31.87	24.62	33.58	29.24	25.73
DT36	26.90	32.54	37.84	31.94	24.10	23.99	21.99	25.2	32.65	45.83	22.99	30.80	29.73	26.16
DT37	20.91	34.81	32.27	33.56	22.39	22.74	23.18	24.55	31.60	48.06	24.79	26.10	28.75	25.30
DT38	31.64	32.24	36.99	30.87	22.95	24.27	22.58	25.27	29.19	45.60	24.97	29.56	29.68	26.12
DT39	48.21	38.72	38.82	30.44	29.16	28.60	30.29	27.89	36.80	44.96	34.97	29.37	34.85	30.67
DT40	28.35	29.06	25.84	22.45	19.77	19.35	18.73	19.70	26.36	34.33	22.23	21.26	23.95	21.08
DT41	31.25	31.75	28.26	24.02	17.41	16.64	ND	19.02	23.47	30.51	19.37	26.89	24.43	21.50
DT42	30.69	31.04	29.75	25.98	21.54	18.93	22.48	20.96	24.79	31.43	22.14	23.58	25.28	22.24
DT43	30.66	33.85	32.17	26.77	20.42	23.20	22.32	21.34	29.68	37.30	23.78	29.98	27.62	24.31
DT44	44.38	ND	31.92	25.52	20.48	17.23	18.78	22.57	22.74	28.49	28.02	11.69	24.71	21.75
DT45	28.53	30.91	25.91	21.56	17.25	16.07	16.83	17.90	21.12	26.57	23.99	25.13	22.65	19.93
DT46	24.54	24.36	23.87	22.96	14.56	16.06	16.42	16.47	24.27	34.81	19.39	19.91	21.47	18.89
DT47	25.23	27.14	26.31	22.97	20.96	19.74	21.87	21.35	24.83	30.45	22.29	23.91	23.92	21.05
DT48	22.77	21.61	19.93	16.07	10.98	9.34	11.38	10.35	14.80	21.20	17.18	17.04	16.05	14.13

Site ID	NO_2 Mean Concentrations ($\mu g/m^3$)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual Mean	
													Raw Data	Bias Adjusted (1)
DT49	24.42	33.40	39.13	34.76	29.38	27.03	28.18	27.95	35.90	49.26	26.87	24.41	31.72	27.92
DT50	31.22	30.19	28.48	27.02	20.39	19.58	19.27	23.93	27.12	33.23	24.33	14.24	24.92	21.93
DT51	42.68	31.09	28.11	23.26	16.61	19.56	19.71	22.04	28.35	35.22	23.78	12.77	25.27	22.23
DT52	29.26	26.16	21.74	18.18	14.35	12.74	14.92	ND	20.87	25.28	20.92	20.21	20.42	17.97

(1) See Appendix C for details on bias adjustment

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

Diffusion Tubes

All NO_2 diffusion tubes are supplied and analysed by Gradko using 20% TEA in water preparation.

Consideration is normally given to the advisory documents on the LAQM Support website when defining and considering whether to use local or national co-location bias adjustment factors.

The following factors are part of our decision for deciding on which factors to use:

- Tube exposure time
- Length of the monitoring study
- QA/QC of the chemiluminescence analyser
- QA/QC of diffusion tubes
- Siting of the co-location study
- Siting of other tubes in the survey

Historically, due to having 3 monitors in the Borough, we chose to apply the most appropriate correction factor against each of the individual tubes i.e. tubes in the south of the Borough are corrected against the Syston station factor, rather than the using the factors from the monitor(s) in the north of the Borough.

However, as data collection % from our automatic monitors has been significantly beneath acceptable values for recent years, we have therefore applied the bias correction factor as per The National Diffusion Tube Bias Adjustment Factor Spreadsheet v06/16 which gives a factor of 0.88 (from 27 studies) for Gradko analysed 20% TEA in water, for all our 2015 samples.

Short-term to Long-term Data adjustment

There were no monitoring sites during 2015 that would have been “short term”.

Therefore no further data adjustment is necessary for seasonal variation

Diffusion Tube – Distance Correction

The raw data for three sites: Ashby Rd Central (Shepshed), Loughborough Rd (Hathern) and A6 (Birstall) have been distance corrected as they are all roadside locations where the tubes are positioned some distance away from the façade of the nearest receptor – in all cases on a roadside lighting column.

Using the "NO_2 with Distance from Roads Calculator" (Issue 4) available from the UK Air Quality Archive, it is possible for us to calculate the distance NO_2 falloff between these kerbside tubes and the nearest receptors, as follows:

Ashby Rd Central (Shepshed)

Using the calculator the concentration at the nearest receptor is shown below to be 22.7µg/m^{-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.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	2	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	14	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	12.3015	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	31.5	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	22.7	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.

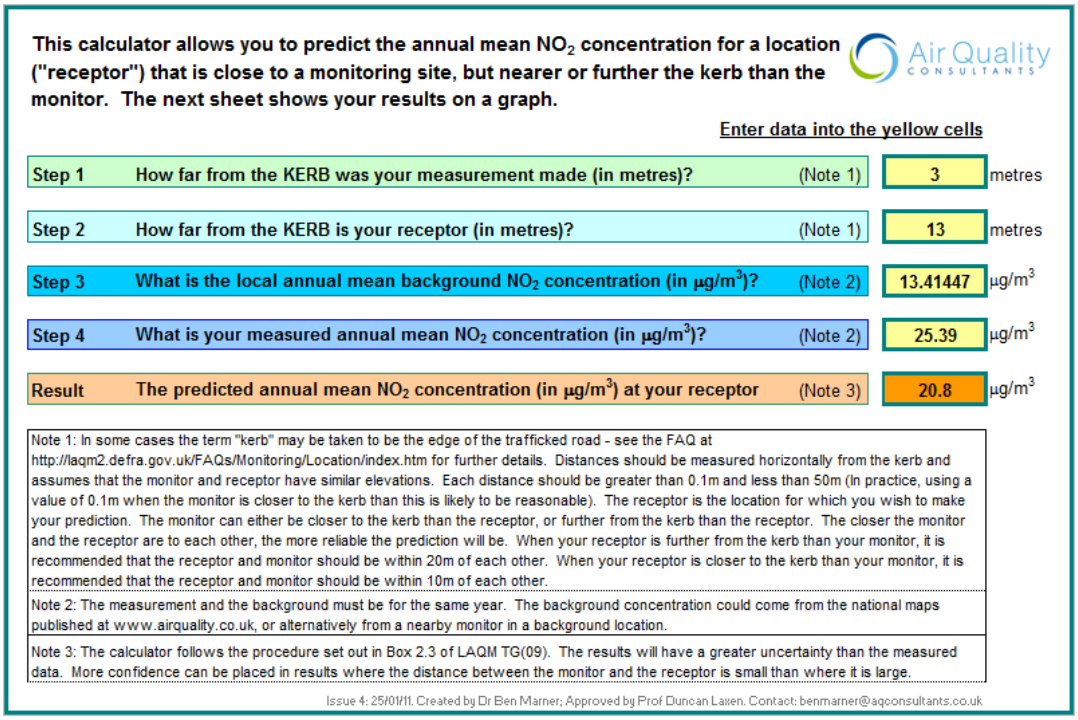
Note 2: The measurement and the background must be for the same year. The background concentration could come from the national maps published at www.airquality.co.uk, or alternatively from a nearby monitor in a background location.

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.

Issue 4: 25/01/11. Created by Dr Ben Marner; Approved by Prof Duncan Laxen. Contact: benmarner@aqconsultants.co.uk

Loughborough Rd (Hathern)

Using the calculator the concentration at the nearest receptor is shown below to be 20.8µg/m^{-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.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	3	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	13	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	13.41447	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	25.39	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	20.8	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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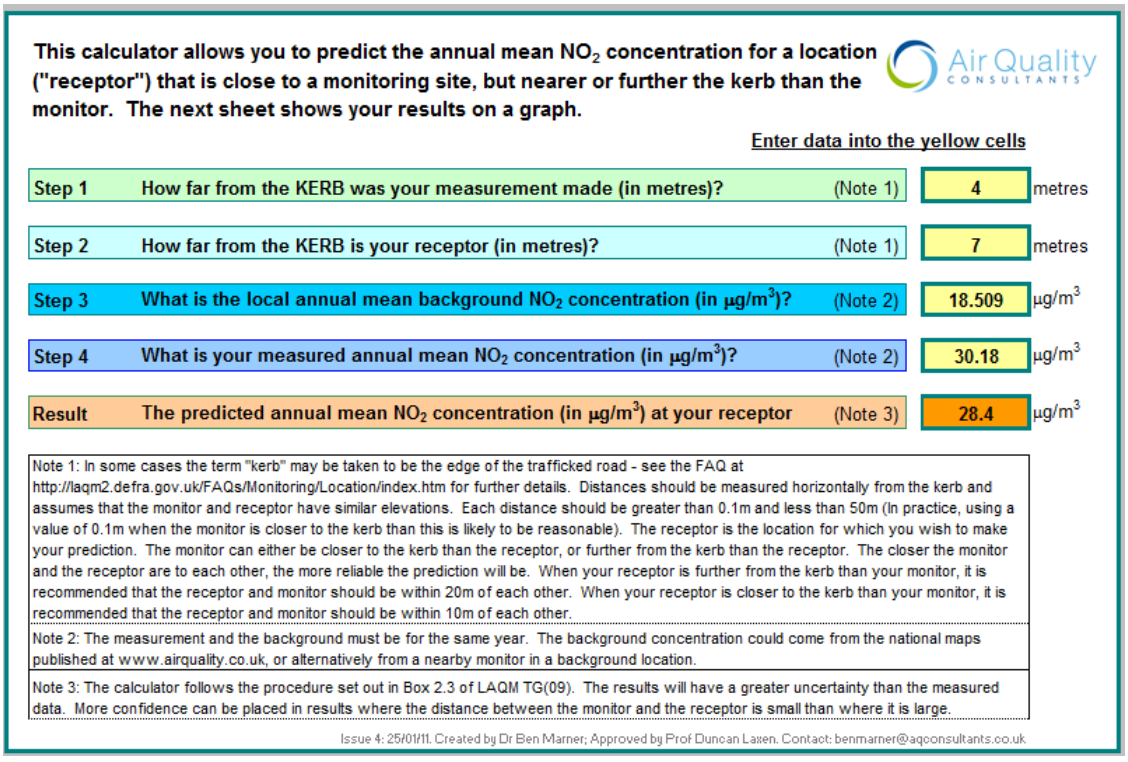
A6 (Birstall)

Using the calculator the concentration at the nearest receptor is shown below to be 28.4µg/m^{-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.

Air Quality CONSULTANTS

Enter data into the yellow cells

Step 1	How far from the KERB was your measurement made (in metres)?	(Note 1)	4	metres
Step 2	How far from the KERB is your receptor (in metres)?	(Note 1)	7	metres
Step 3	What is the local annual mean background NO_2 concentration (in µg/m^3)?	(Note 2)	18.509	µg/m^3
Step 4	What is your measured annual mean NO_2 concentration (in µg/m^3)?	(Note 2)	30.18	µg/m^3
Result	The predicted annual mean NO_2 concentration (in µg/m^3) at your receptor	(Note 3)	28.4	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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QA/QC of diffusion tube monitoring

The independent Workplace Analysis Scheme for Proficiency (WASP), operated by the Health and Safety Laboratory, is yearly assessment against agreed performance criteria that is aimed at the analytical laboratories that supply and analyse the diffusion tubes.

This scheme allows national co-ordination within a quality assurance/quality control (QA/QC) framework

Quarterly performance summaries in the WASP scheme for the laboratory chosen to prepare and analyse diffusion tubes on behalf of Charnwood Borough Council (Gradko), prepared by AEA, are as follows:

WASP Round 124 (Mar 2014 - Nov 2015): Satisfactory

QA/QC of automatic monitoring

The analysers are serviced under schedule via Matt's Monitors.

Daily "automatic" and fortnightly manual calibrations are also undertaken, the later performed by the Local Authority.

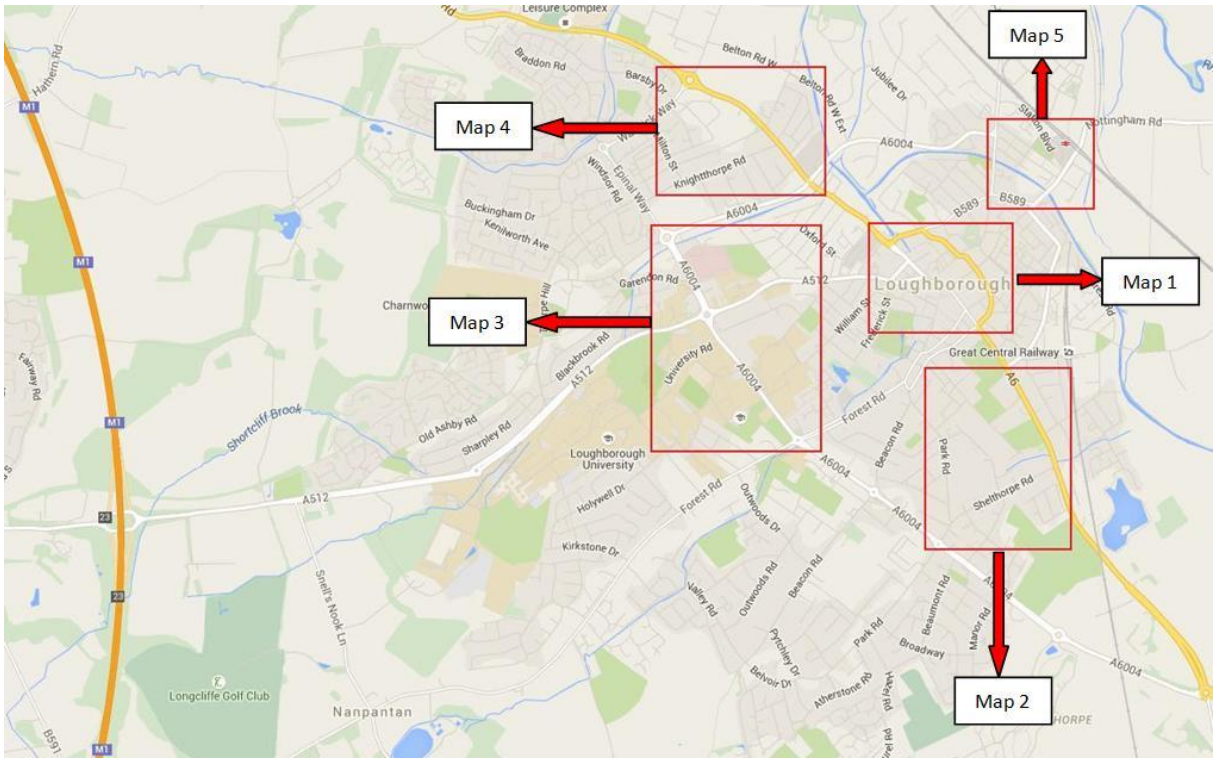
Data validation and ratification procedures follow Technical Guidance LAQM.TG(16)

Appendix D: Map(s) of Monitoring Locations

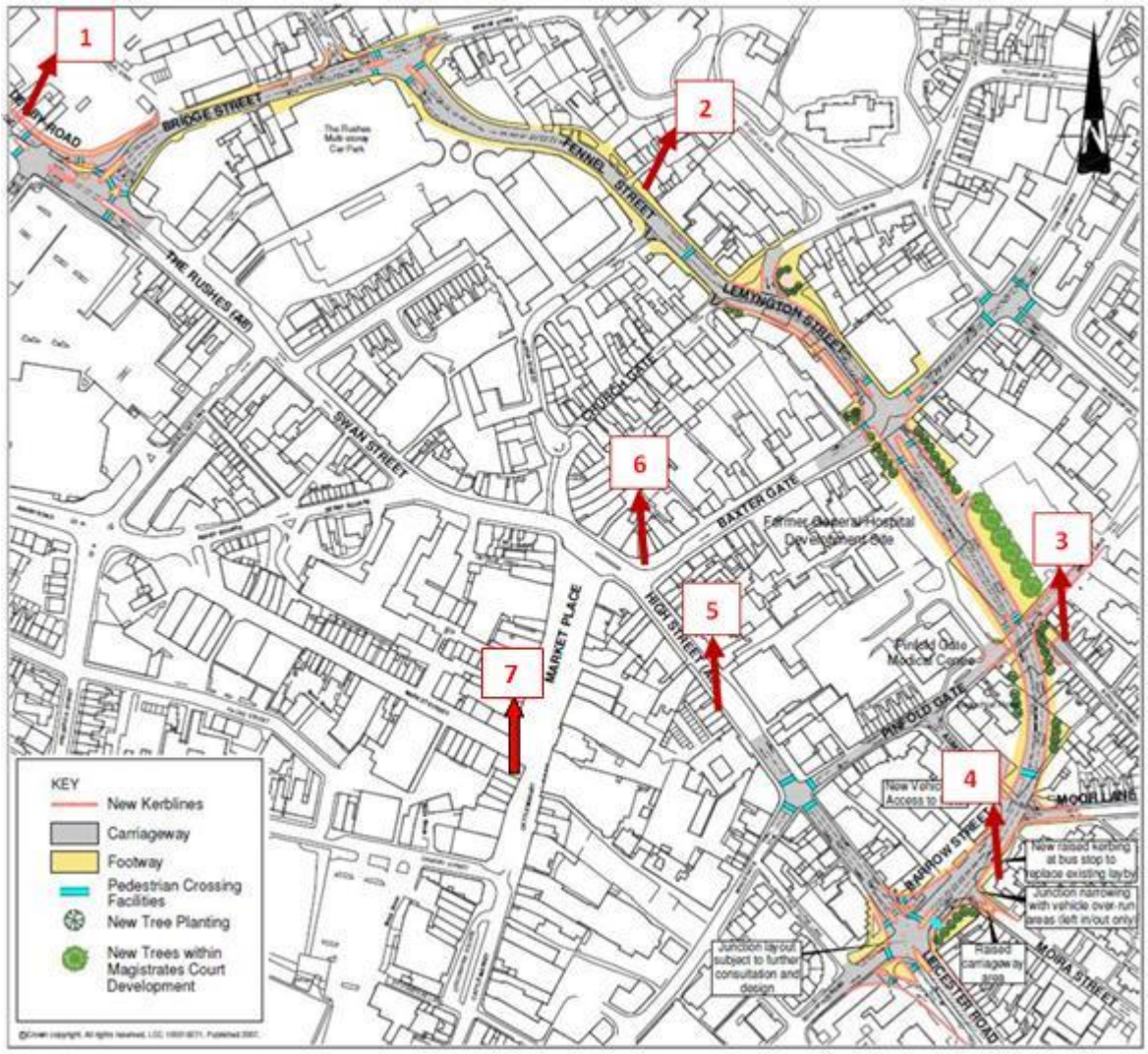
Selected maps of key monitoring areas

The Borough of Charnwood

Loughborough Area:



Map 1: Loughborough Town Centre

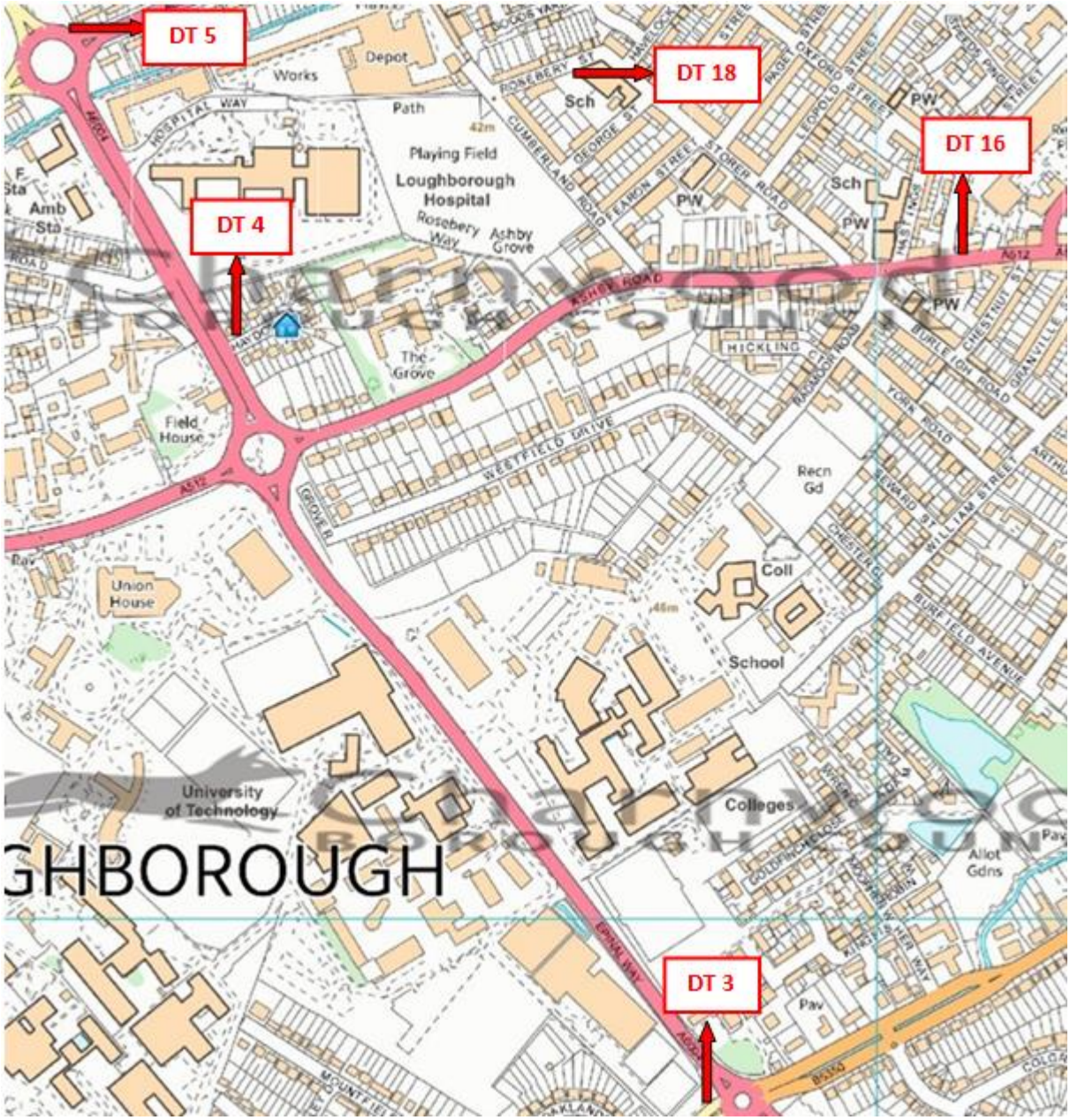


Map Position	Site ID	Site Name	Pollutant
1	DT8	Derby Road	NO_2
2	DT31	Fennel Street	NO_2
3	DT30	School Street	NO_2
4	DT29	Barrow Street	NO_2
5	DT14	High Street	NO_2
6	DT36, DT37, DT38	Baxter Gate AQMS 1, 2, and 3	NO_2

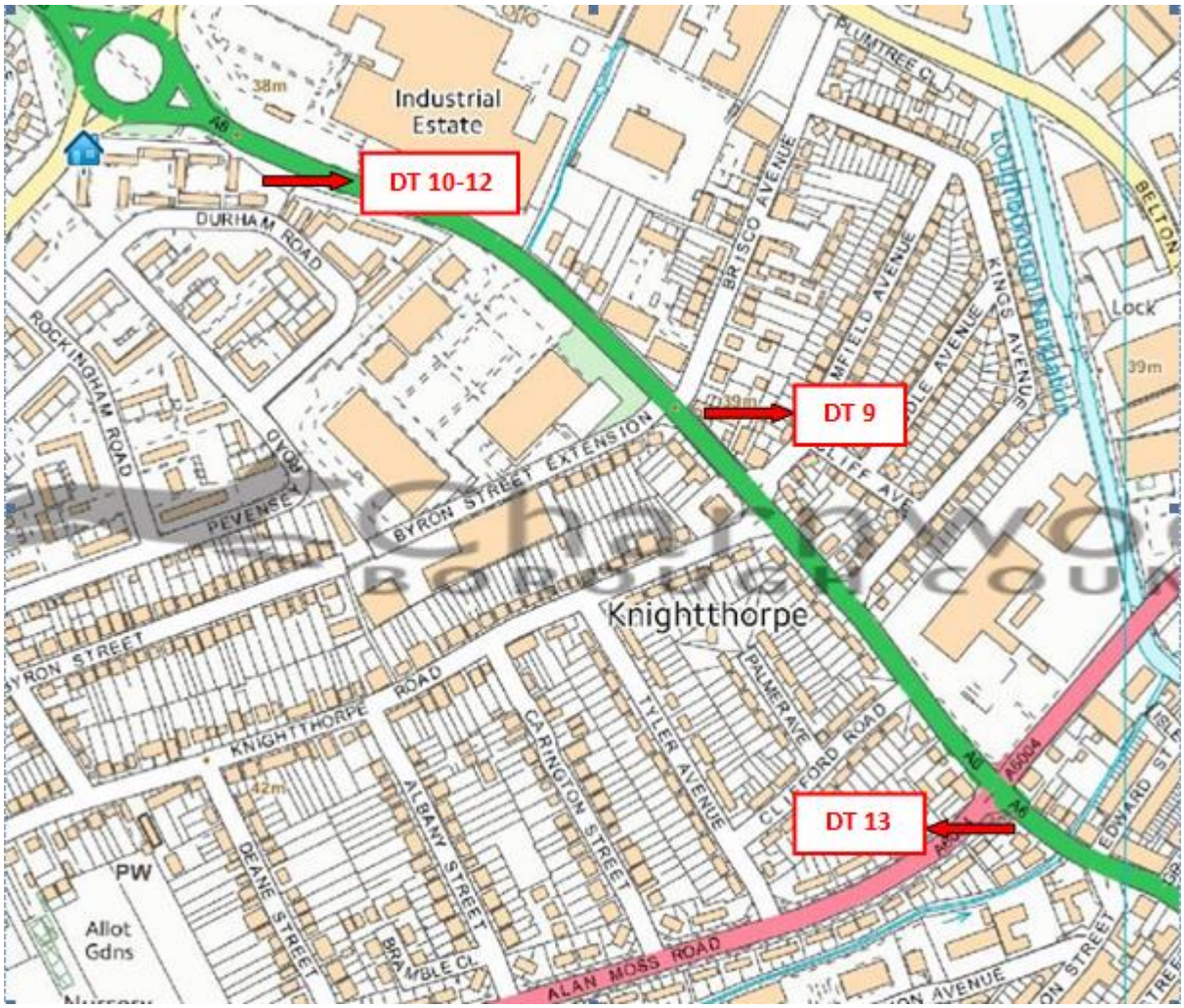
The above map shows the route of the Inner Relief Road which opened in November 2014. Traffic is now routed away from the town centre.

Map 2: Loughborough South

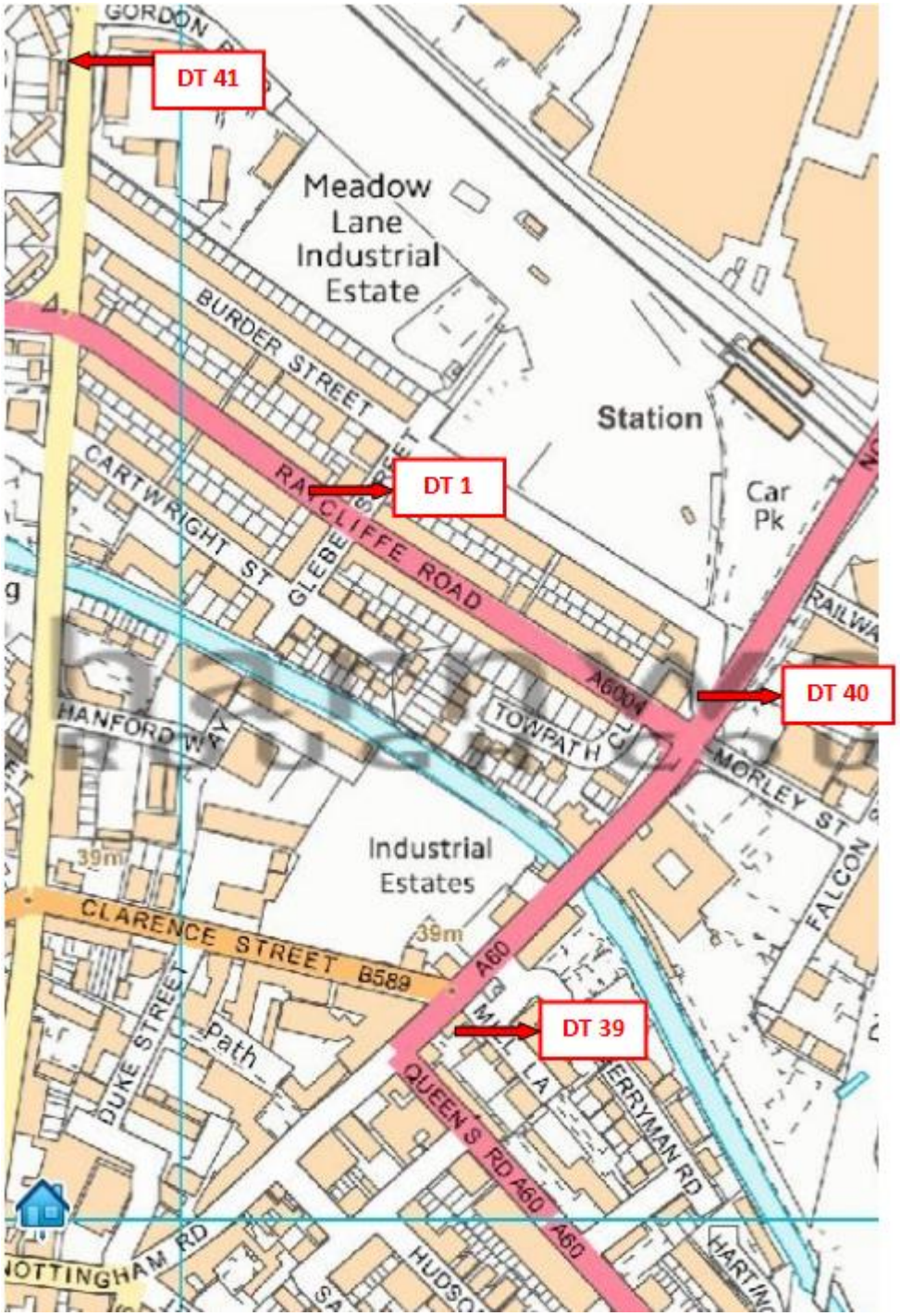
Map 3: Loughborough West



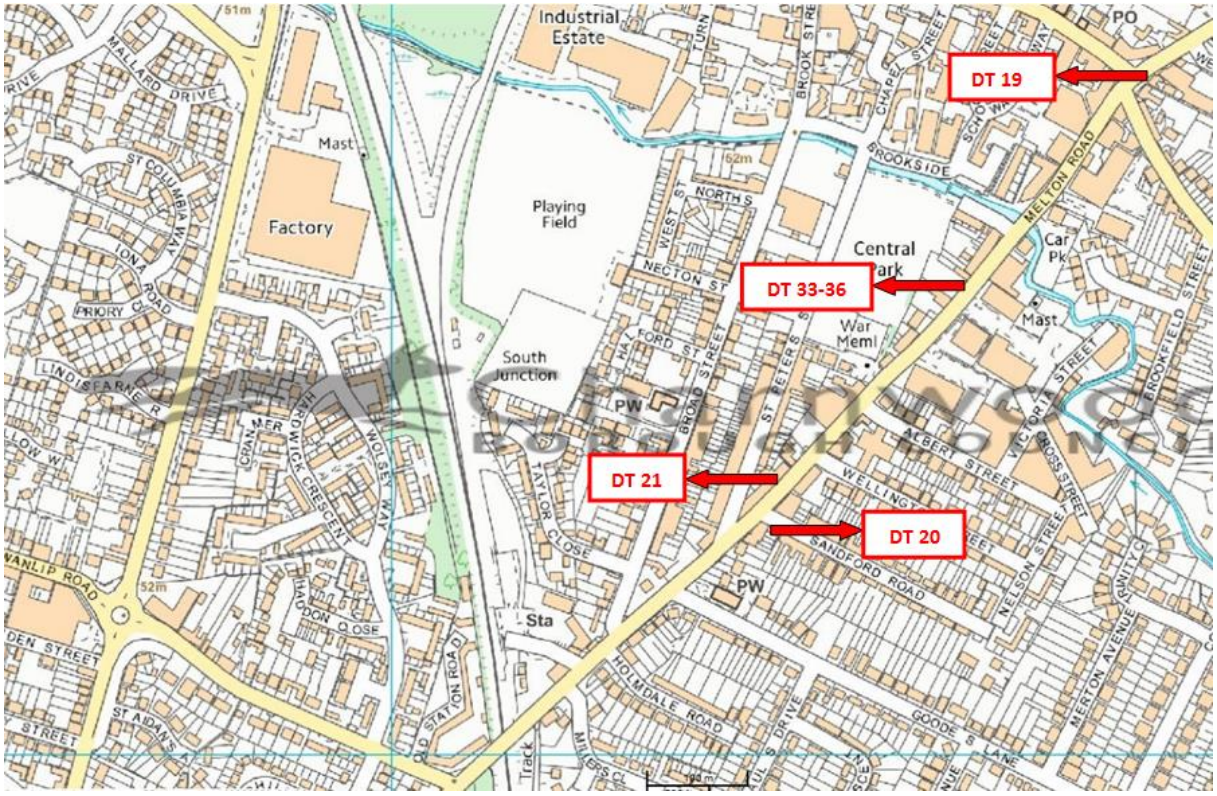
Map 4: Loughborough North



Map 5: Loughborough East

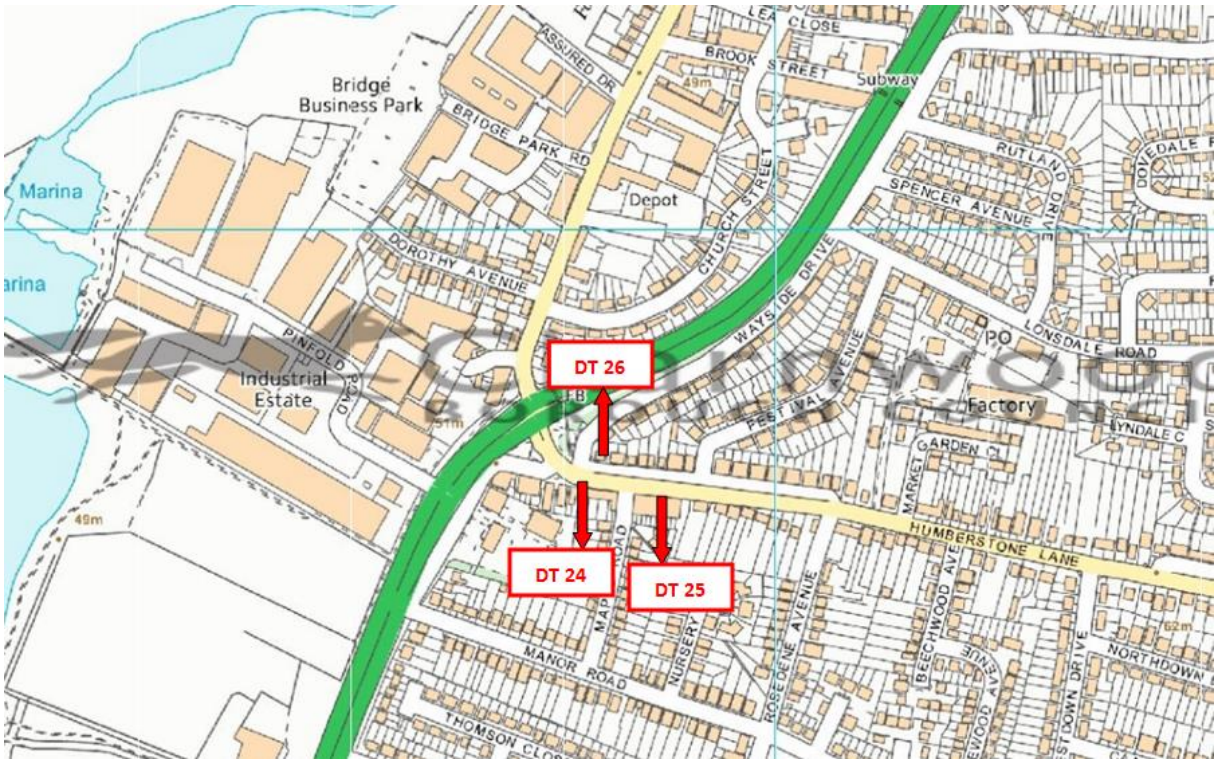


Map 6: Syston

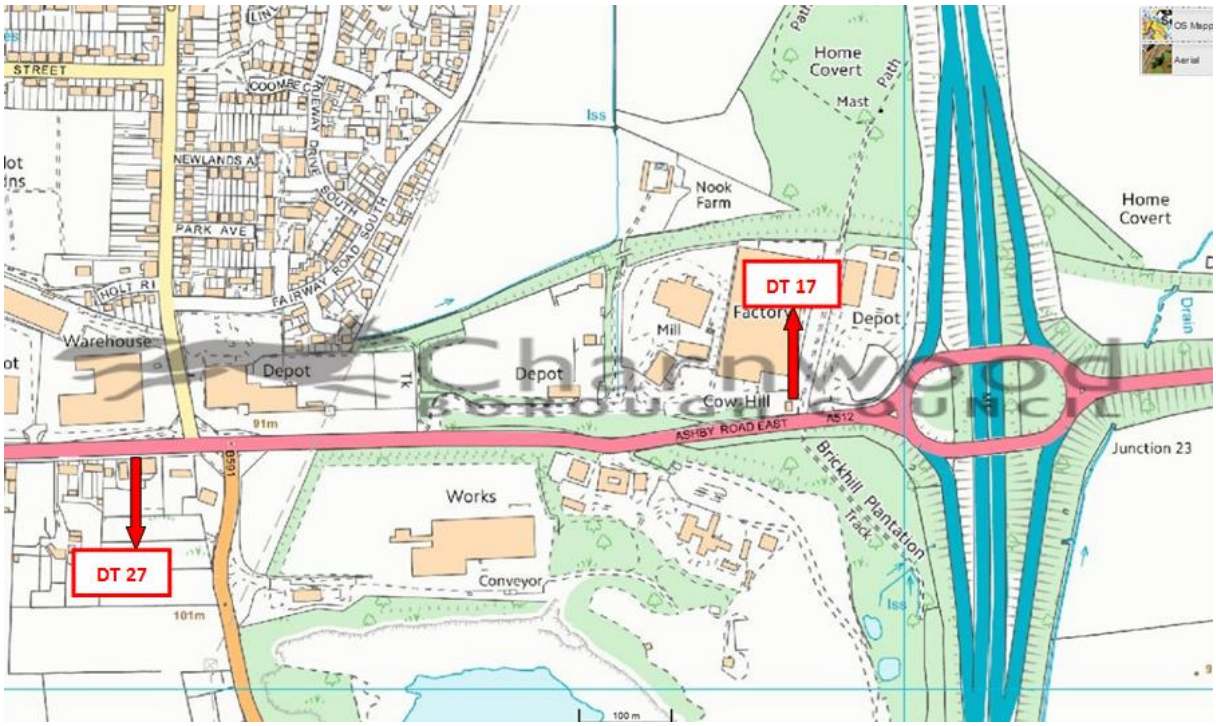


Map 7: Birstall

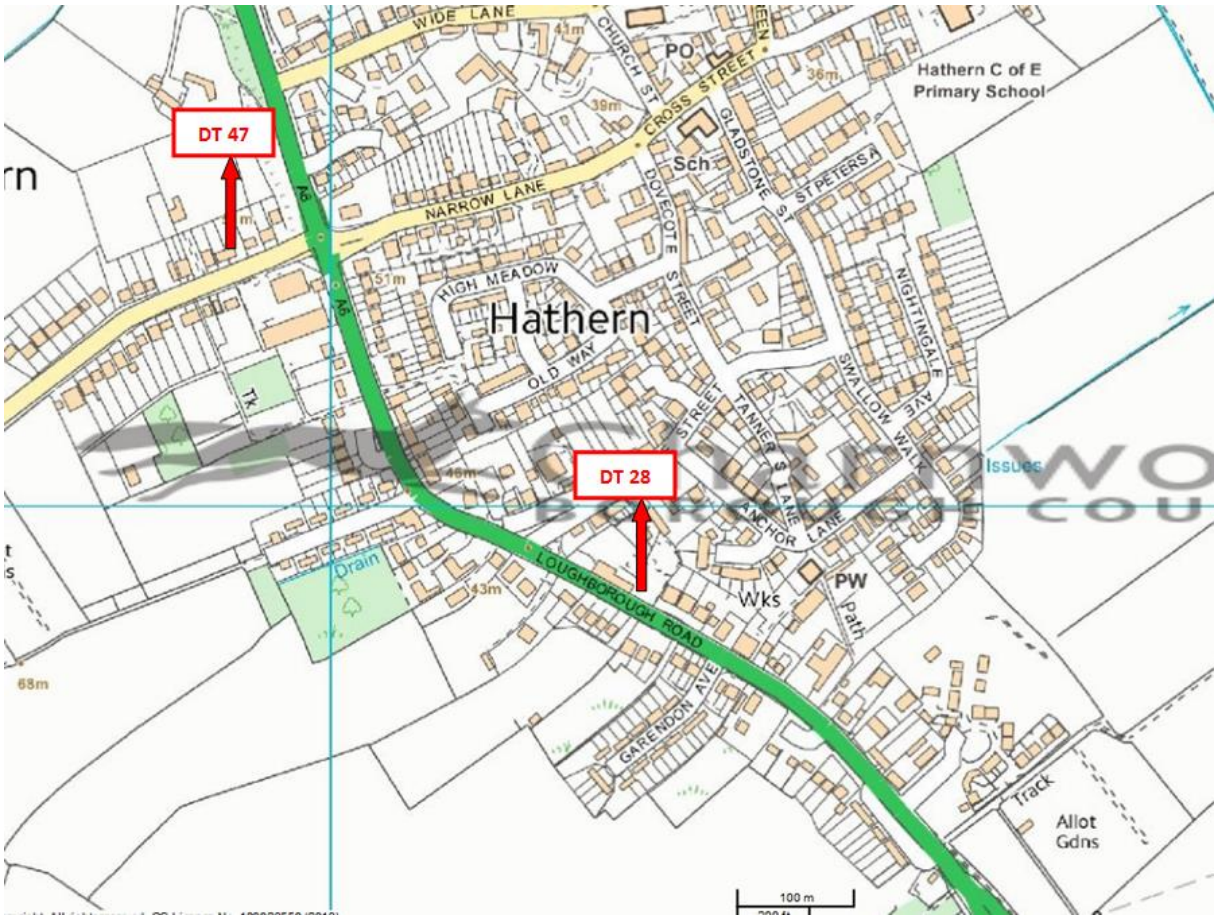
Map 8: Thurmaston



Map 9: Shepshed



Map 10: Hathern



Appendix E: NO_2 Trend Graphs

The following plots show the trends in Annual Mean Nitrogen Concentrations measured at selected Diffusion Tube Monitoring Sites.

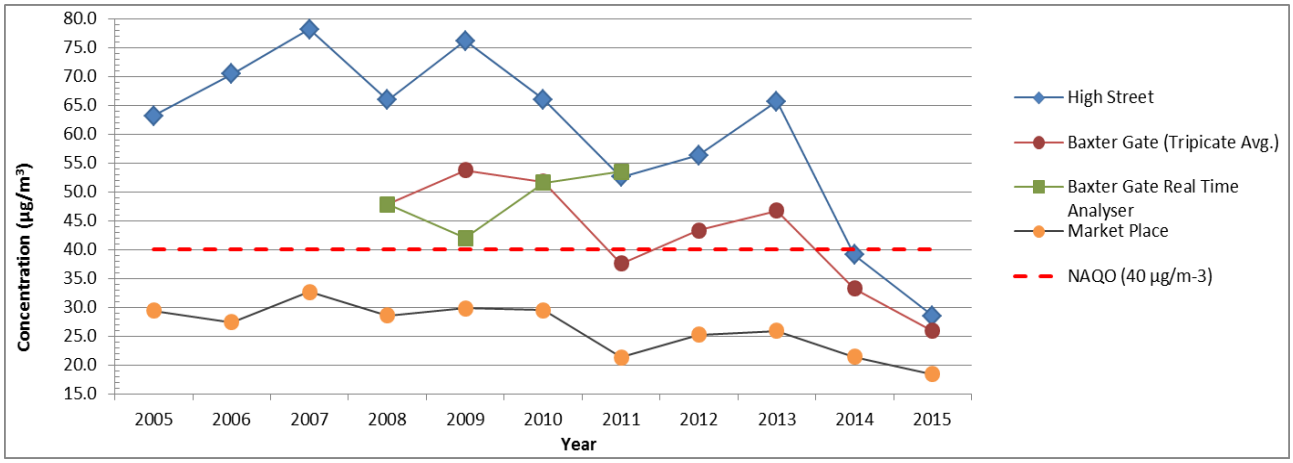


Figure E.1 Plot of NO_2 Concentration against Year for Loughborough Town Centre (i) sites

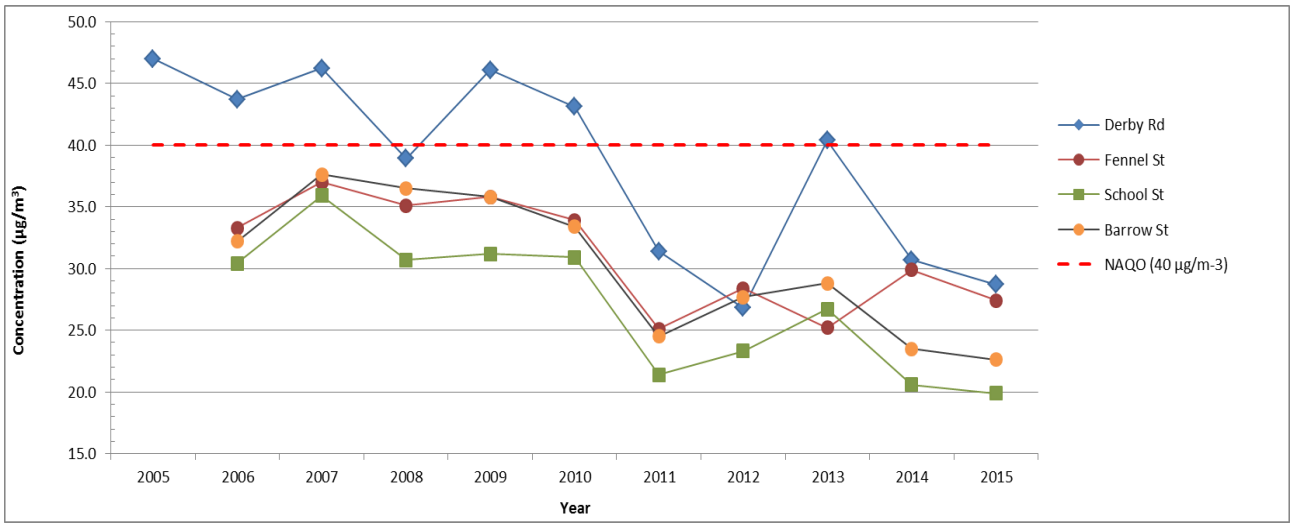


Figure E.2 Plot of NO_2 Concentration against Year for Loughborough Town Centre (ii) sites

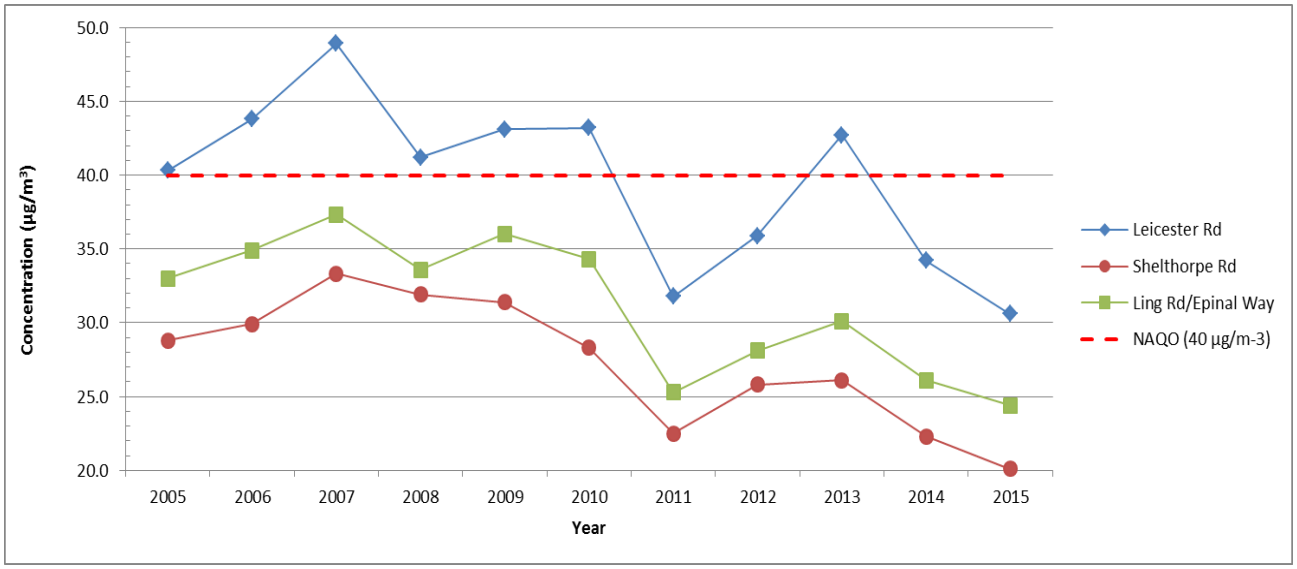


Figure E.3 Plot of NO_2 Concentration against Year for Loughborough South sites

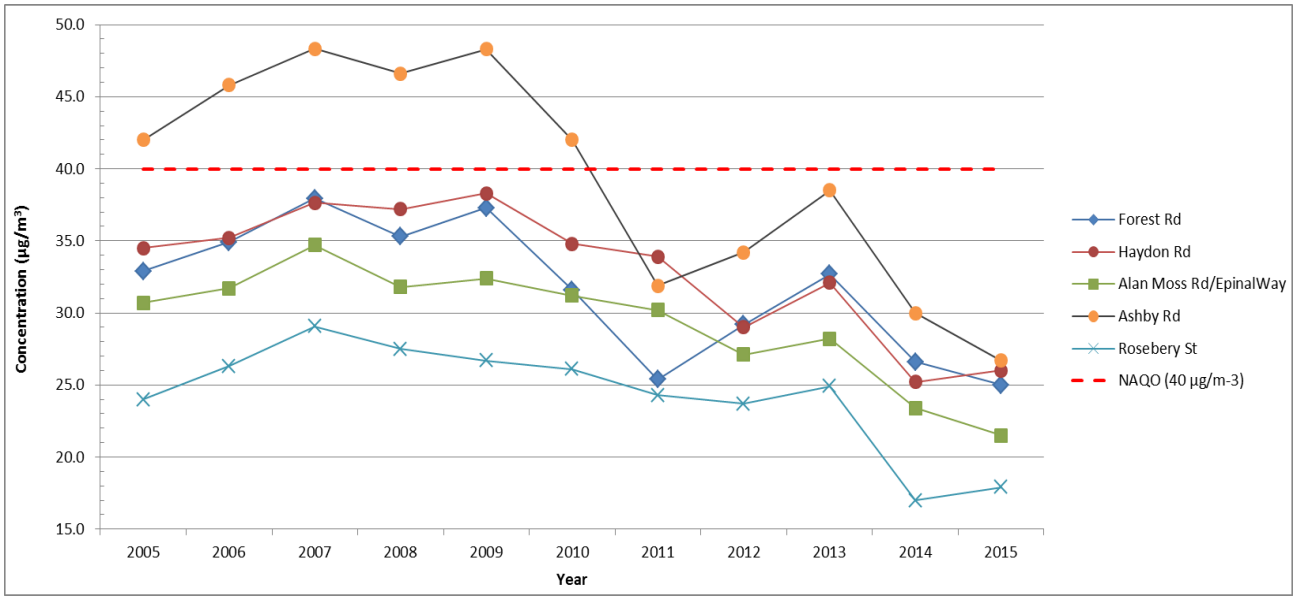


Figure E.4 Plot of NO_2 Concentration against Year for Loughborough West sites

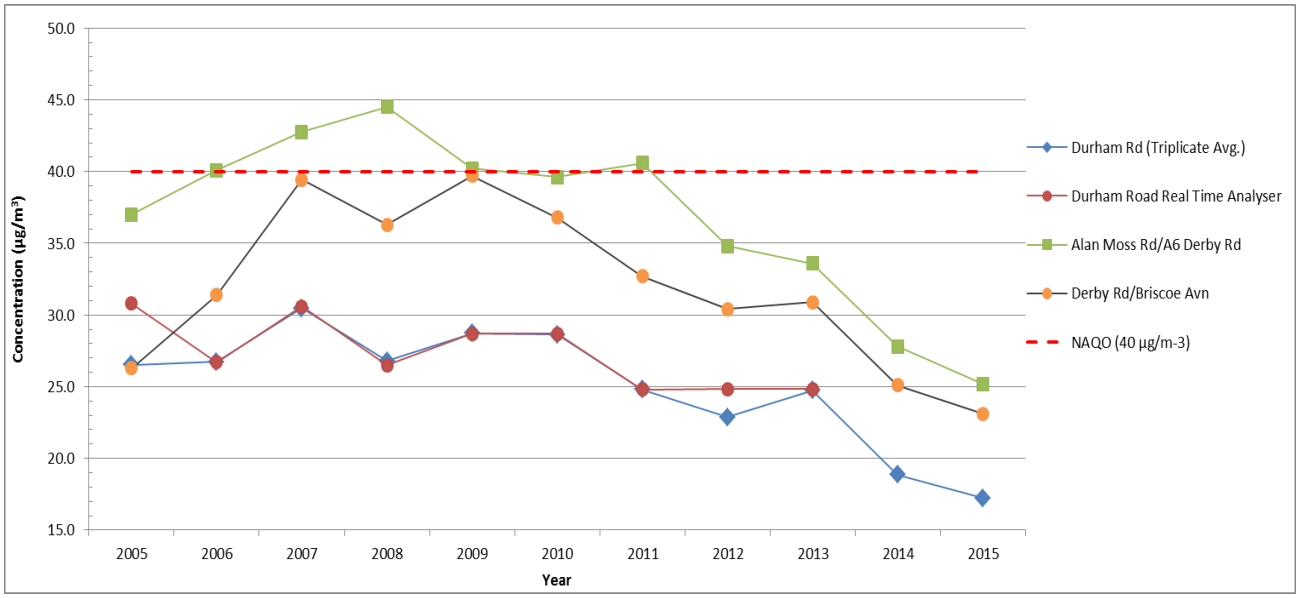


Figure E.5 Plot of NO_2 Concentration against Year for Loughborough North sites

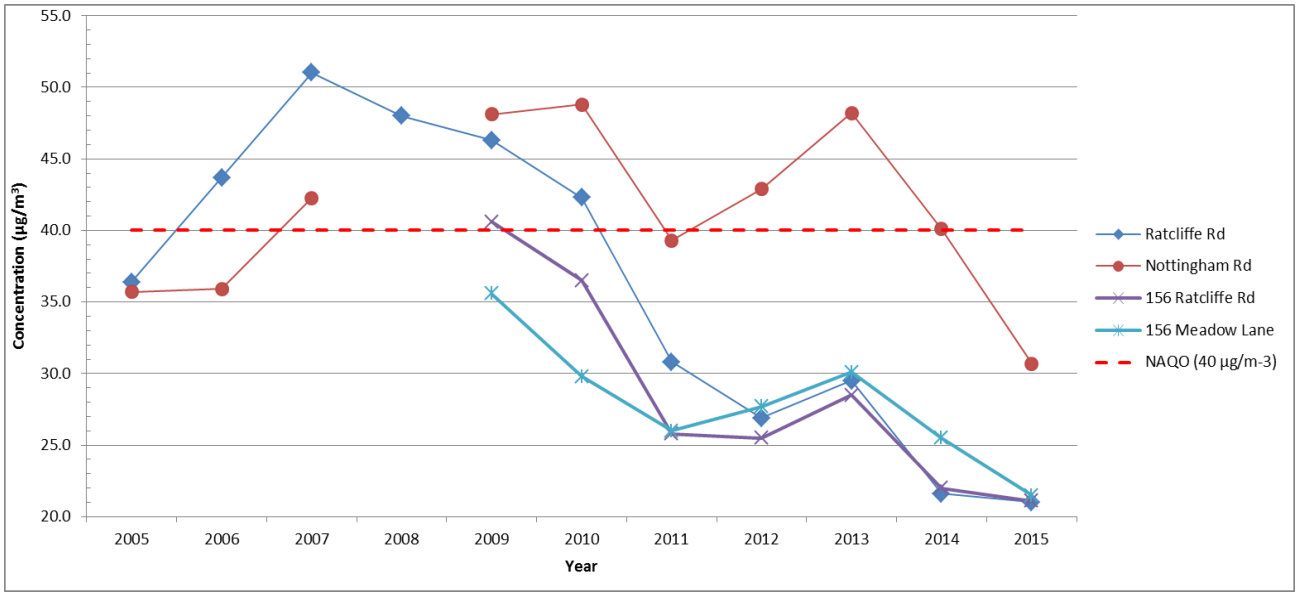


Figure E.6 Plot of NO_2 Concentration against Year for Loughborough East sites

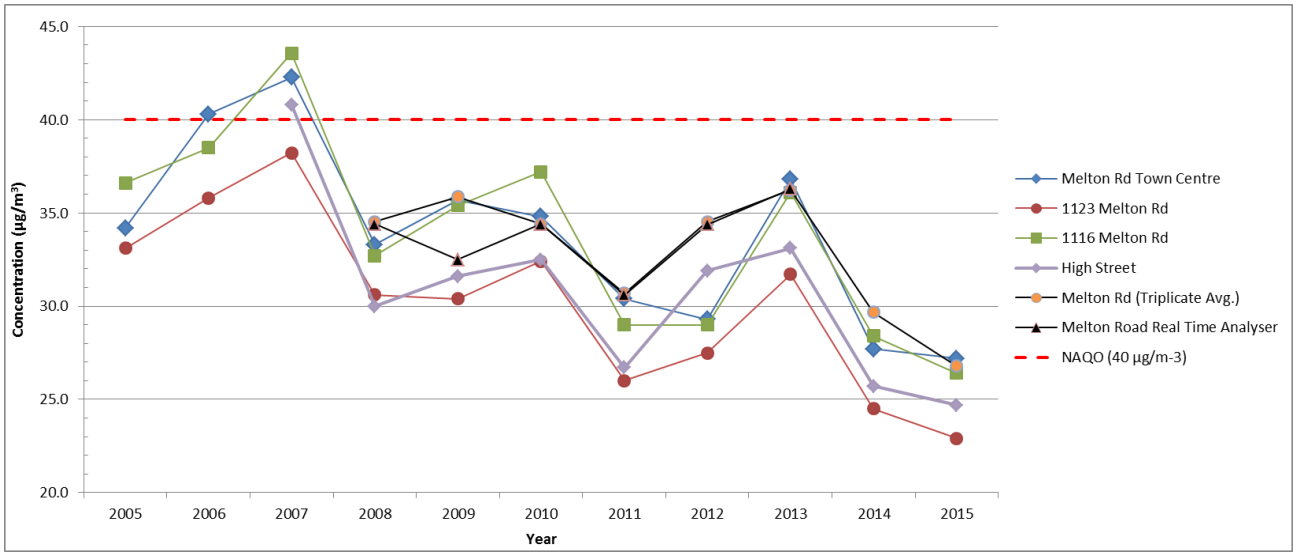


Figure E.7 Plot of NO_2 Concentration against Year for Syston sites

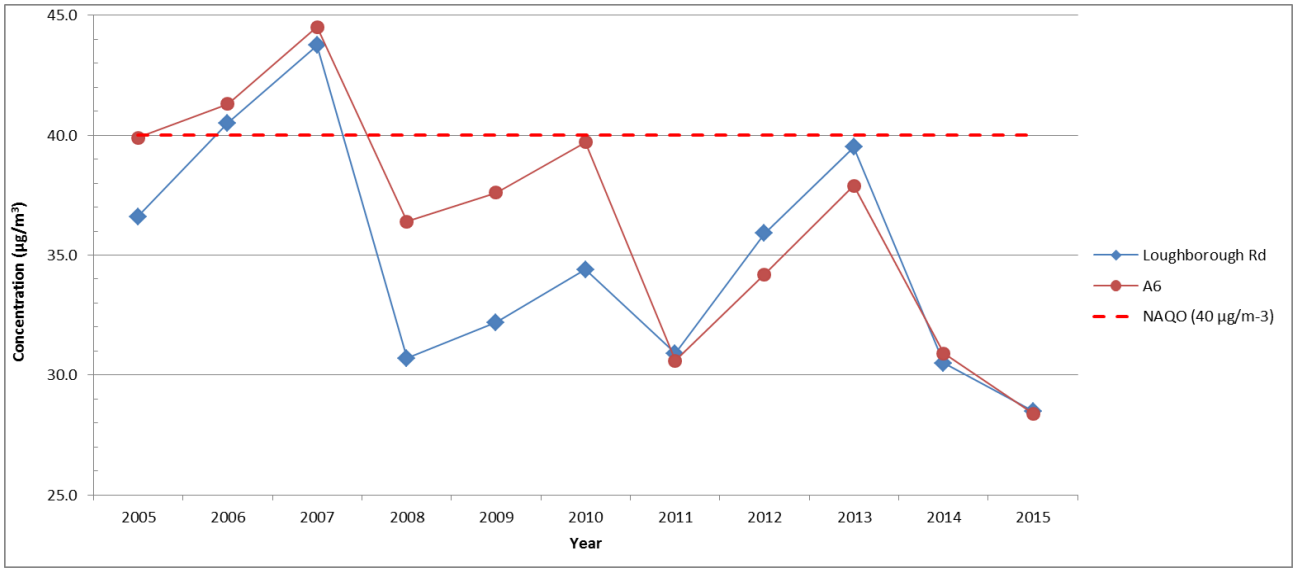


Figure E.8 Plot of NO_2 Concentration against Year for Birstall sites

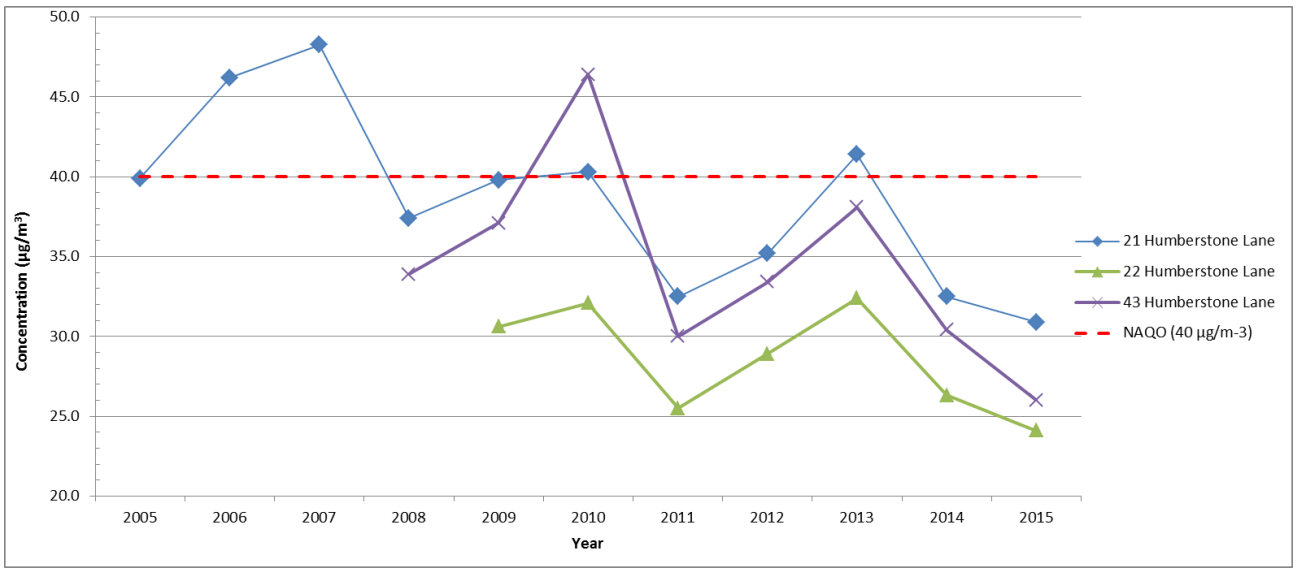


Figure E.9 Plot of NO_2 Concentration against Year for Thurmaston sites

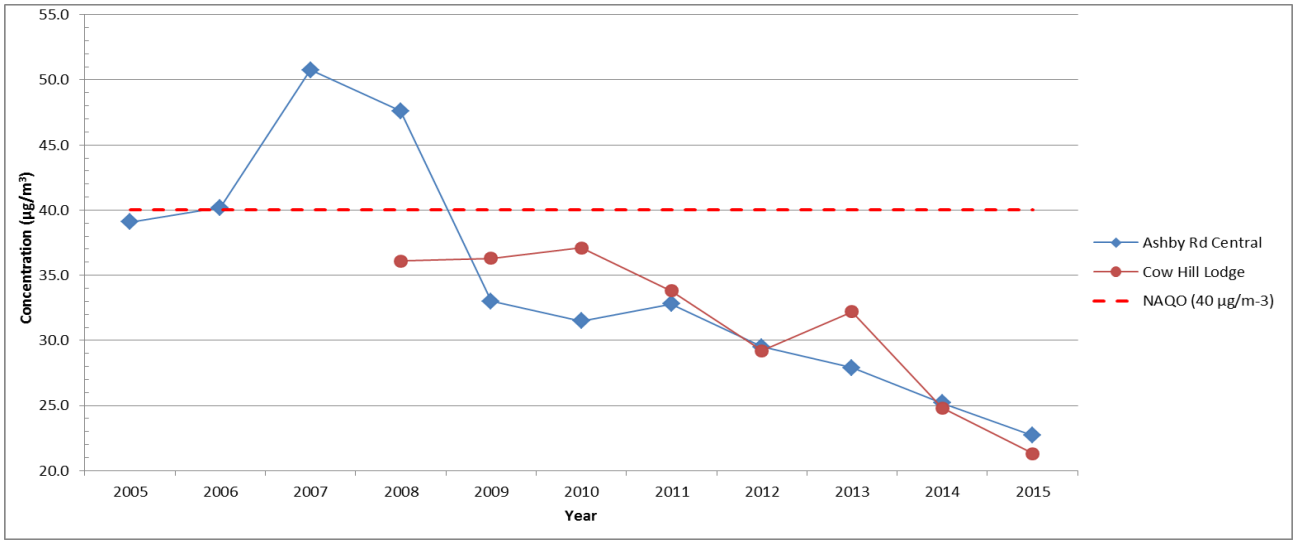


Figure E.10 Plot of NO_2 Concentration against Year for Shepshed sites

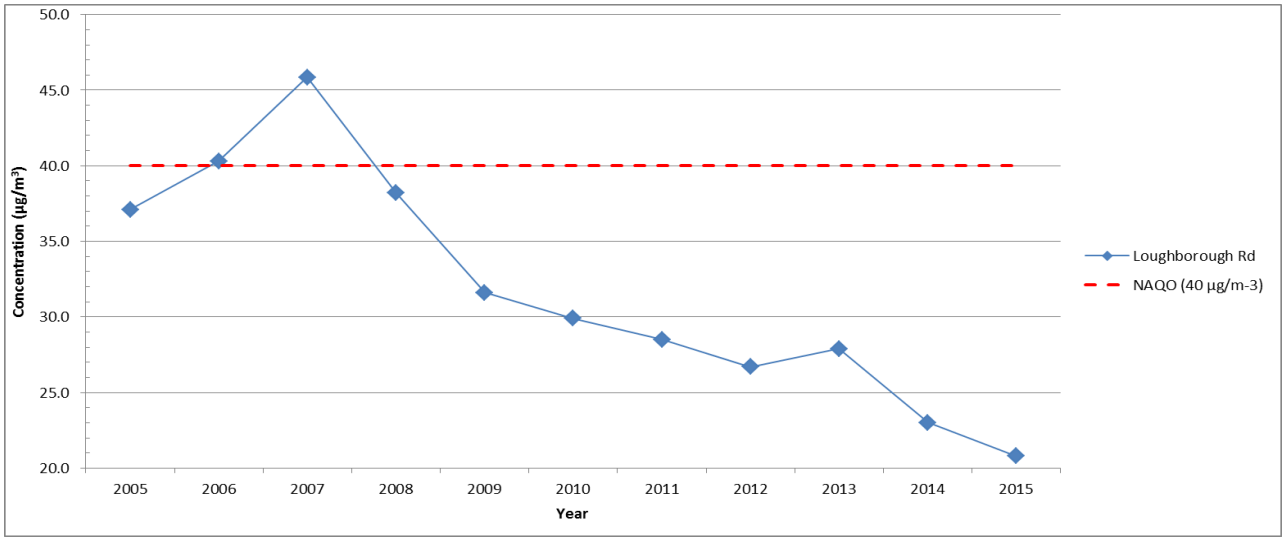


Figure E.11 Plot of NO_2 Concentration against Year for Hathern site

Appendix F: Summary of Air Quality Objectives in England

Table F.1 – Air Quality Objectives in England

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

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

Glossary of Terms

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