2013 Air Quality Further Assessment of Coalville Air Quality Management Area

for

North West Leicestershire District Council

In fulfilment of

Part IV of the Environment Act 1995

Local Air Quality Management

Date: February 2013

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Executive Summary

Section 84(1) of the Environment Act, and Part 3 of the Environment (Northern Ireland) Order 2002, requires authorities to complete a Further Assessment within 12 months of designating an Air Quality Management Area (AQMA). The main purpose of the Further Assessment is to provide authorities with an opportunity to supplement the information they have already gathered from their earlier Review and Assessment work.

Air Quality monitoring at Broomleys Junction was undertaken using diffusion tube and automatic monitoring. No Appropriate traffic data was available for the junction.

Using monitoring it has been established that:

- a large proportion of the AQMA is not exceeding the Annual Mean Air Quality Standard for Nitrogen Dioxide and is unlikely to have an appropriate receptor for the hourly mean air quality standard for NO_2 therefore this area can be revoked.
- One property adjacent to the junction is likely to be exceeding the annual mean air quality standard
- One property adjacent to the junction may be exceeding the annual mean air quality standard
- Two properties within the AQMA adjacent to the junction are unable to be accessed.

It is therefore necessary for North West Leicestershire District Council:

- Undertake a traffic survey of the Broomleys Road | Stephenson way junction
- Following the traffic survey undertake a source apportionment study
- Following traffic study undertake air quality modelling of 21, 27, 34 and 44 Broomleys Road
- Following the results of the air quality modelling and the findings of this report amend the area of the AQMA as appropriate
- Publish an action plan

Table of contents

List of Appendices

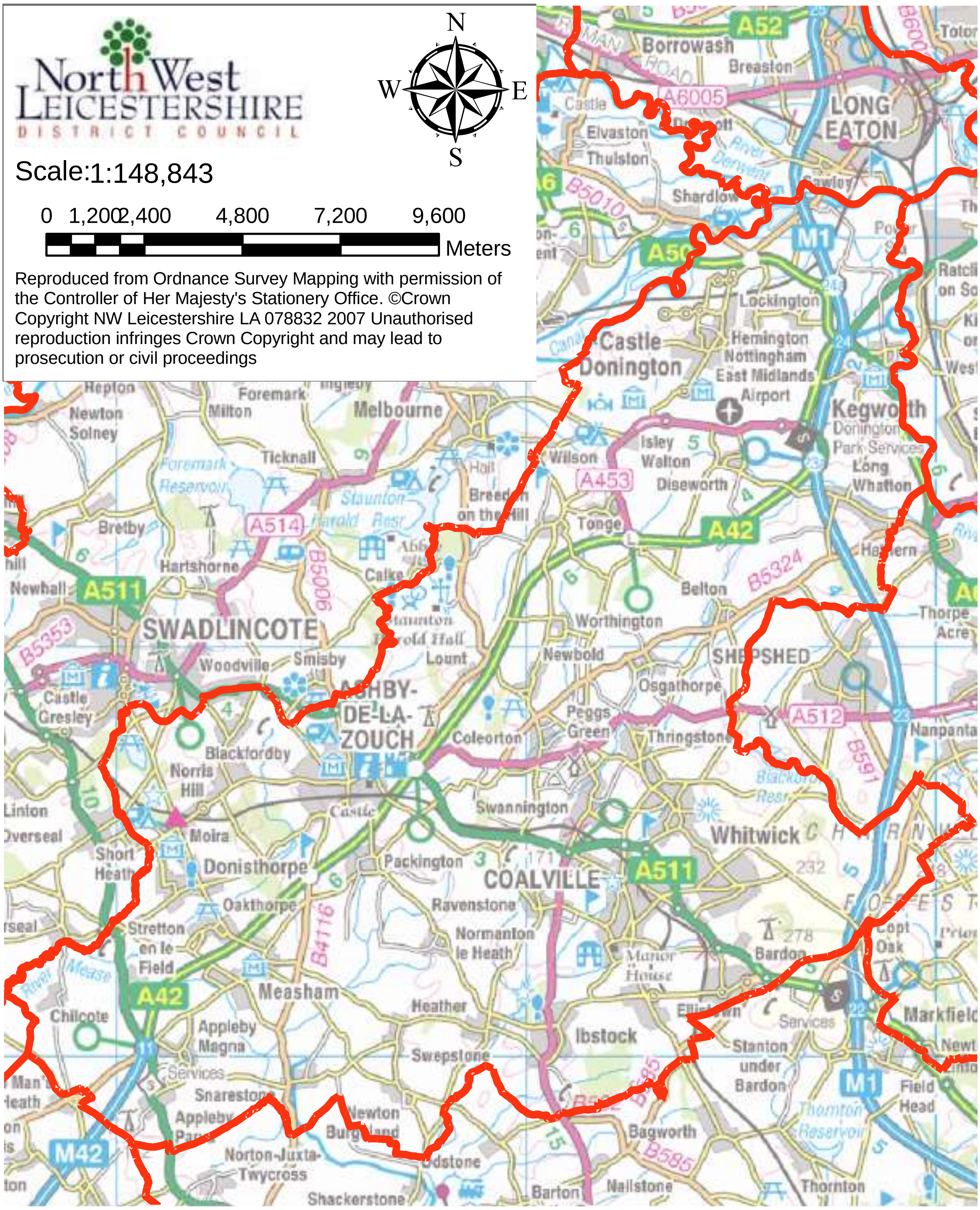
List of Tables

List of Figures

1 Introduction

1.1 Description of Local Authority Area

Figure 1 Map of North West Leicestershire District



North West Leicestershire lies in the East Midlands Region and is both the name and geographical location. The district is situated in the heart of the National Forest and lies between Leicester, Burton-on-Trent, Derby and Nottingham, covering approximately 280Km^2 (approximately 108 square miles). The district is mostly rural with a large extent of industry historically from coal mining, but more recently with Nottingham East Midlands Airport and large quarries.

The Office of National Statistics has estimated the population of the district as 90,800[49] in 2010; the population is mainly distributed in the principle towns of Coalville and Ashby-de-la-Zouch; and the large villages of Castle Donington, Kegworth and Ibstock.

Three established main roads run through the district,

- the M42/A42 between Birmingham and Nottingham,
- the M1,
- and the A511 from Leicester to Burton-on-Trent.

1.2 Purpose of Further Assessment Report

Section 84(1) of the Environment Act, and Part 3 of the Environment (Northern Ireland) Order 2002, requires authorities to complete a Further Assessment within 12 months of designating an Air Quality Management Area (AQMA). The main purpose of the Further Assessment is to provide authorities with an opportunity to supplement the information they have already gathered from their earlier Review and Assessment work.

1.3 Air Quality Objectives

The air quality objectives applicable to Local Air Quality Management (LAQM) in England are set out in the

- The Air Quality (England) Regulations 2000 (SI 2000/0928)[24],
- The Air Quality (England) (Amendment) Regulations 2002 (SI 2002/3043)[25]
- The Air Quality Standards Regulations 2007 (SI 2007/0717)[26]
- The Air Quality Standards Regulations 2010 (SI 2010/1001)[27]

They are shown in Table 1. Table 1 includes the number of permitted exceedences in any given year (where applicable).

Table 1. Air Quality Objectives included in Regulations for the purpose of Local Air Quality Management in England.

Pollutant	**Concentration**	**Measured as**	Date to be achieved by
Benzene	16.25 µgm^{-3}	Running annual mean	31.12.2003
	5.00 µgm^{-3}	Running annual mean	31.12.2010
1,3-Butadiene	2.25 µgm^{-3}	Running annual mean	31.12.2003
Carbon monoxide	10.0 µgm^{-3}	Running 8-hour mean	31.12.2003
Lead	0.5 µgm^{-3}3	Annual mean	31.12.2004
	0.25 µgm^{-3}	Annual mean	31.12.2008
Nitrogen dioxide	200 µgm^{-3} not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 µgm^{-3}	Annual mean	31.12.2005
Particles PM_{10} (gravimetric)	50 µgm^{-3}, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004
	40 µgm^{-3}	Annual mean	31.12.2004
Particles $PM_{2.5}$ (gravimetric) (not currently included in regulations)	25 µgm^{-3} (target)	Annual mean	2020
Sulphur dioxide	350 µgm^{-3}, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µgm^{-3}, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µgm^{-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

Six AQMAs were designated in North West Leicestershire during the first round of review and assessment for the level of nitrogen dioxide concentrations. After Further Assessments it was determined that only two of these locations required AQMA designations and the remaining four were revoked. The Update and Screening Assessment (USA) undertaken in 2006 [1] concluded that these two sites should remain AQMAs and identified three additional locations where Detailed Assessments should be undertaken to determine whether new AQMAs were required for nitrogen dioxide concentrations. The two AQMAs designated during the first round are presented in Figure 2 and Figure 3.

The Detailed Assessment [6] undertaken in September 2007 of the three locations identified as possible areas for AQMAs in the USA 2006 [1], the three locations were High Street/Bondgate in Castle Donington, Broom Leys Road, Coalville and Bardon Road, Coalville, found that exceedences of the nitrogen dioxide objective were occurring in Castle Donington at properties located next to the carriageway along High Street and Bondgate due to traffic emissions. Monitoring at both locations in Coalville identified nitrogen dioxide concentrations that exceeded the mean annual objective during 2005, 2006 and 2007. The Detailed Assessment concludes that AQMAs should be designated at all three locations. As a result of these reports, two additional AQMAs were designated; the first in Castle Donington, presented in Figure 4, and the second covering Broom Leys Road and Bardon Road in Coalville, presented in Figure 5.

The Air Quality Progress Report conducted in April 2008 [7] recommended that a detailed assessment of the village of Copt Oak and the area surrounding East Midlands airport be undertaken to determine if AQMA’s should be determined at these locations.

The Detailed Assessment of Copt Oak published in January 2009 [9] found that an AQMA should be declared and that the area should cross the district boundary to include an area within the borough of Hinckley and Bosworth as shown in Figure 6.

The Detailed assessment of East Midlands airport published in March 2009 [8] concluded that the Air quality objective for NO_2 would not be exceeded within 1000m of the airport as a result of air traffic emissions.

The further assessment of Bardon Road, Coalville published in February 2009 [10] supported the original declaration of the AQMA comprising the four residential properties at Broom Leys Junction and the one hundred and seventy two residential properties on Bardon Road.

The further assessment of High Street Castle Donington published in April 2009 [11] supported the original declaration of the AQMA comprising ninety one residential properties on High Street and Bondgate, Castle Donington.

The update and screening assessment published October 2009 [12] found that a detailed assessment for SO_2 was required in some areas of the district in relation to the burning of solid fuel, to which this report relates. The report also recommended that the M1 AQMA is expanded to include an exceedence of the 1-hour mean objective for NO_2 as the yearly mean has exceeded $60 \mu g m^{-3}$.

The Progress Report published in April 2010 [13] found no significant change in the district.

A Detailed Assessment for SO_2 was conducted in 2010 [14]. This found that solid fuel usage within off-gas areas of the district was insufficient to warrant further investigation.

A Detailed assessment of the M1 AQMA conducted in 2011 [16] found that most of the declared area could be revoked as there is either no relevant receptor or the annual mean air quality standard for NO_2 is not being exceeded.

A Detailed Assessment of the Coalville AQMA conducted in 2011 [15] found that the declared area could be reduced to the declared area of Stephenson Way as the annual mean air quality standard for NO_2 is not being exceeded along Bardon Road.

The 2011 progress report [17] found that Broomleys junction in the Coalville AQMA exceeded the 1-hour mean air quality standard for NO_2 and recommended that a detailed assessment be undertaken.

The progress report also found that the current air quality action plan is insufficient and needs to be updated.

The 2011 detailed assessment of 1-hour Mean Air Quality Standard at Broomleys junction Coalville[18] found that the 1-hour mean air quality standard was being exceeded and the AQMA should be amended.

The 2012 detailed assessment of Castle Donington[20] found that a large proportion of the AQMA was not exceeding the air quality standard and recommended the AQMA be amended.

The 2012 Further assessment of Copt Oak [21] found that a large proportion of the AQMA was not exceeding the Air Quality Standard and recommended the AQMA be amended.

The 2012 Detailed assessment of Kegworth [22] found that it was likely that most of the AQMA was exceeding the Air Quality Standard and recommended a new monitoring location was installed in the north of the AQMA.

Figure 2   Kegworth AQMA (highlighted in blue).

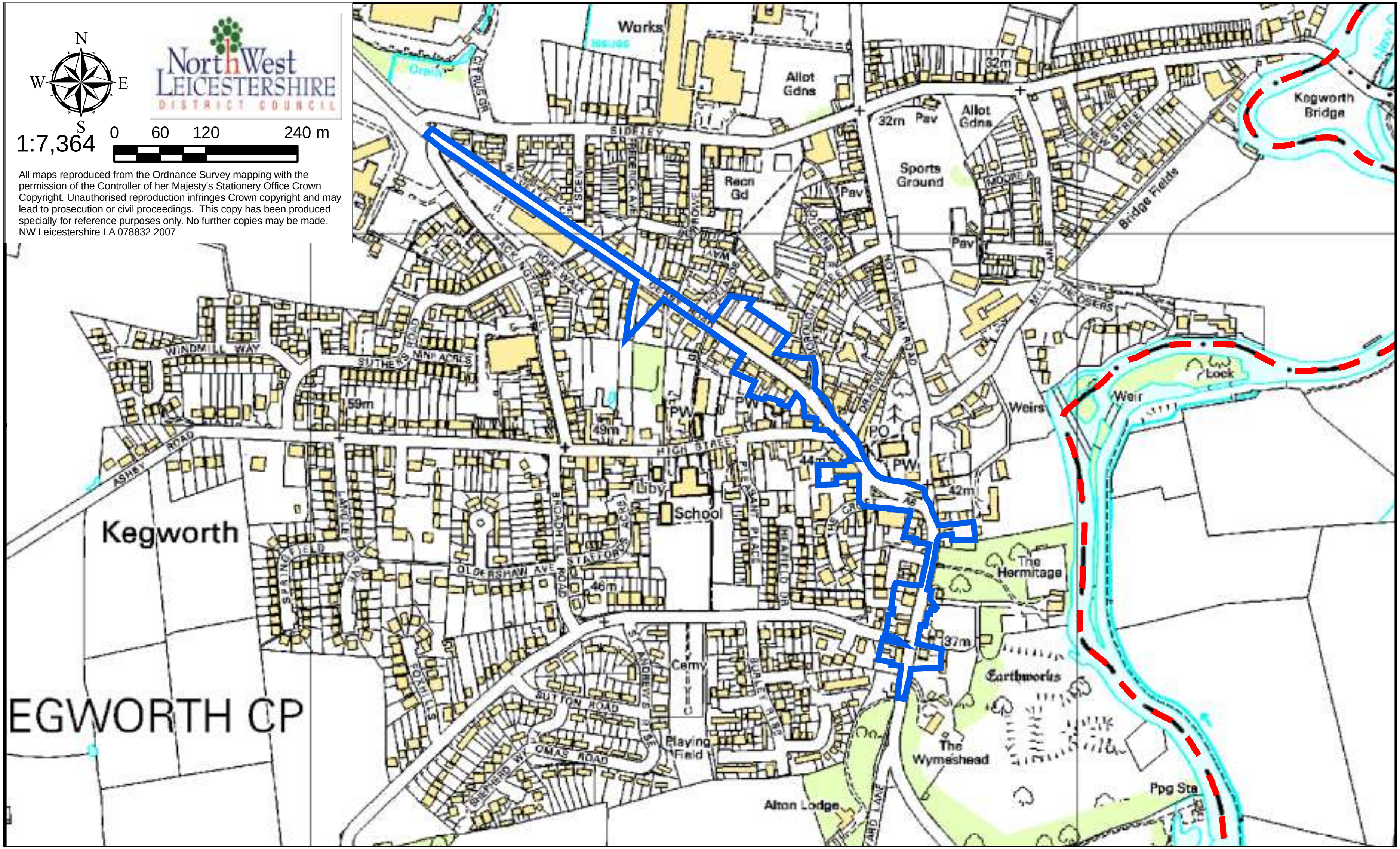


Figure 3   M1 AQMA (Outlined in Dark Blue)

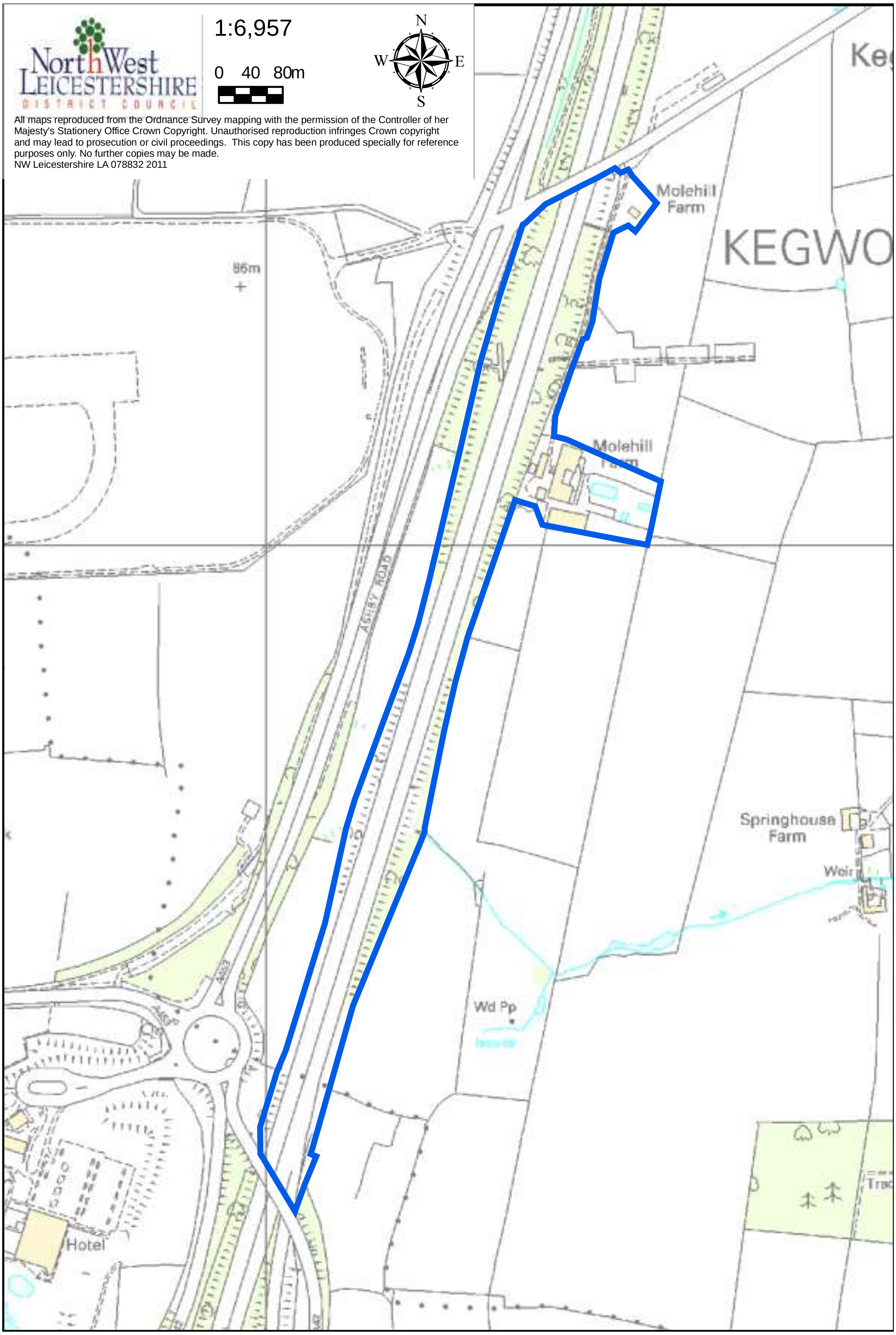


Figure 4 Castle Donington Air Qua lity Management Area

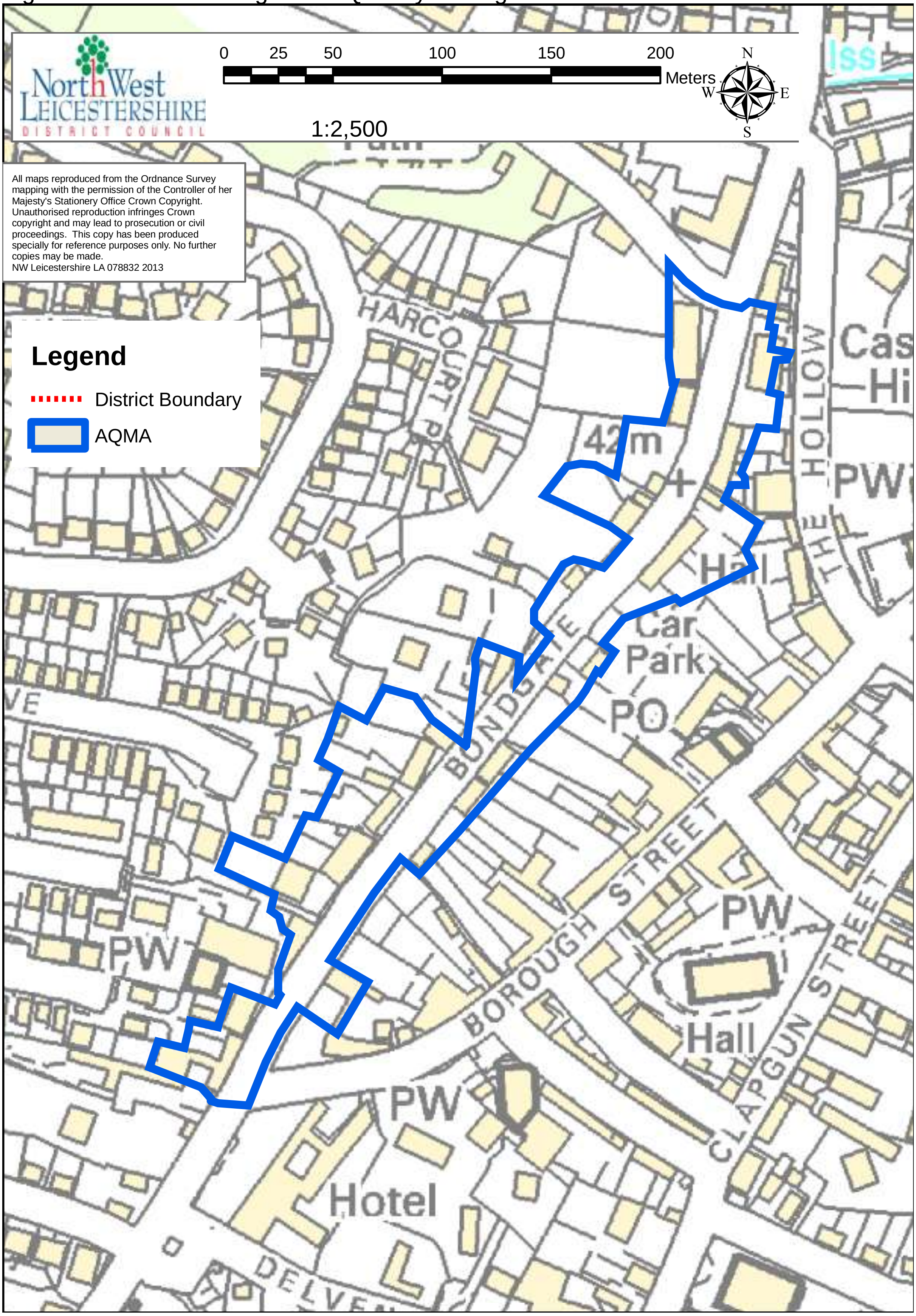


Figure 5 Coalville Air Quality Management Area (Broom Leys Junction)

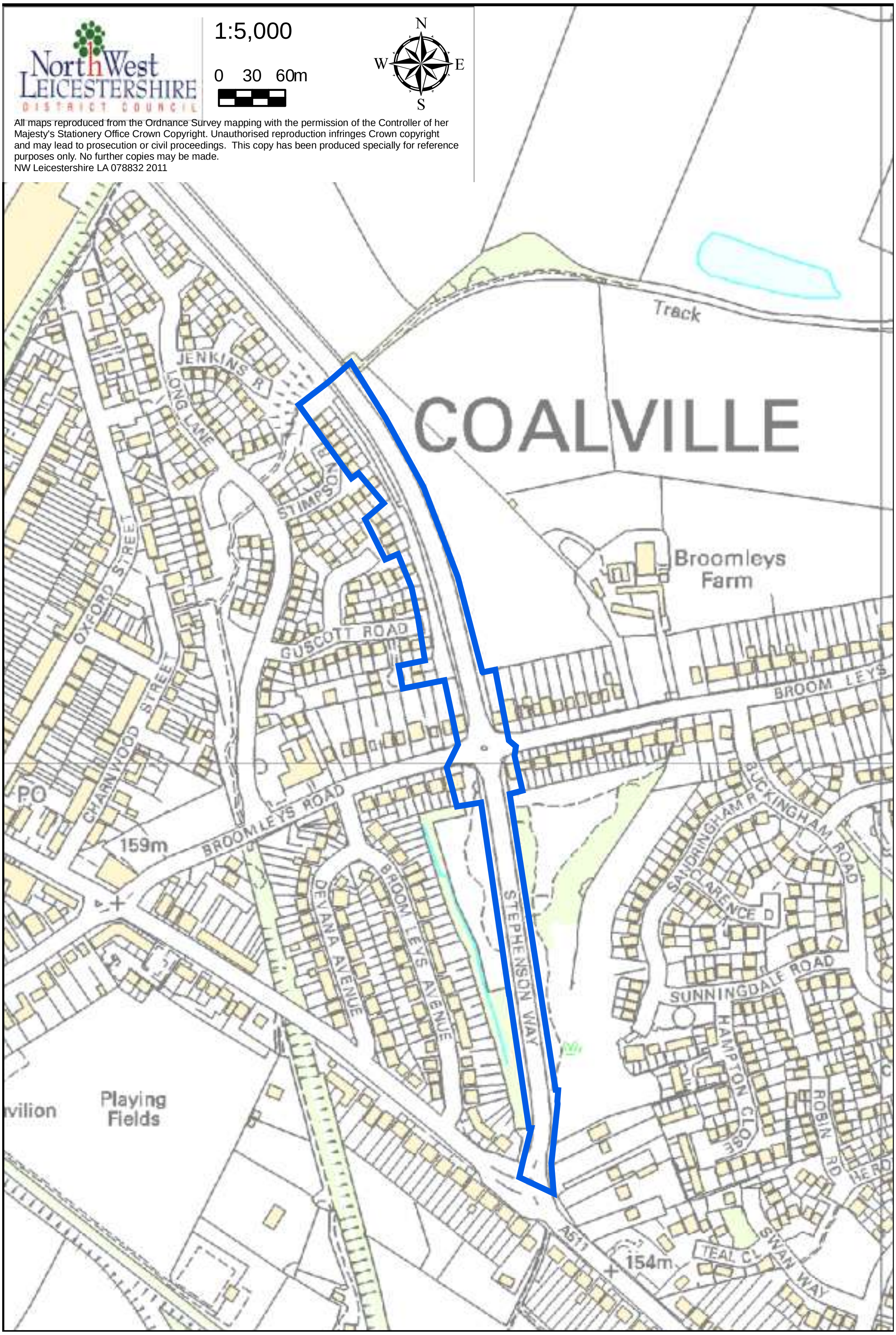
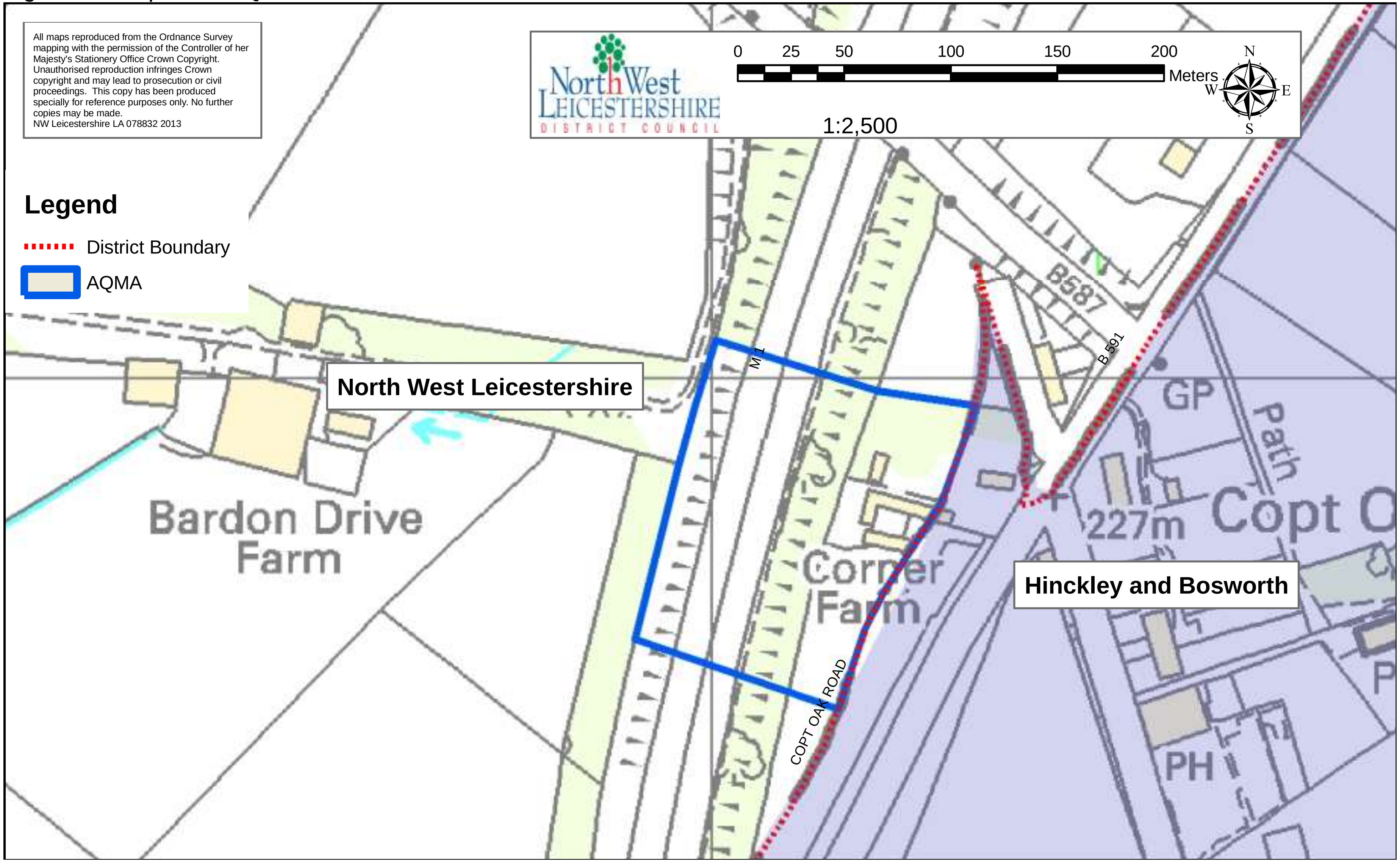


Figure 6 Copt Oak AQMA



2 Methodology

2.1 Projecting measured annual mean roadside nitrogen dioxide concentrations to future years

The technical guidance LAQM.TG(09) [38] defines a method for projecting the NO_2 concentration to future years in paragraph 2.13 page 2-3 and box 2.1 on page 2-4. A correction to box 2.1 was published in an Errata published in 2010 [39]. The corrected version of Box 2.1 is reproduced in Table 2 for reference.

Table 2. Box 2.1 from *Errata to LAQM.TG(09): Is the example in box 2.1 of TG(09) correct?*

Box 2.1: Projecting measured annual mean roadside nitrogen dioxide concentrations to future years

Year	Adjustment factor to be applied			
	Central London	Inner London	Outer London	Rest of UK
2008	1.000	1.000	1.000	1.000
2009	0.940	0.926	0.916	0.916
2010	0.881	0.853	0.832	0.832
2011	0.824	0.799	0.780	0.783
2012	0.766	0.746	0.729	0.735
2013	0.709	0.692	0.678	0.687
2014	0.652	0.639	0.626	0.639
2015	0.595	0.585	0.575	0.591
2016	0.554	0.549	0.542	0.557
2017	0.513	0.513	0.508	0.523
2018	0.472	0.477	0.475	0.489
2019	0.430	0.441	0.442	0.454
2020	0.389	0.405	0.408	0.420

Example:

The measured NO_2 concentration at a roadside site in Outer London in 2009 is 45.8 μgm^{-3}. The projected concentration for 2010 would be

$$45.8 \times \left(\frac{0.832}{0.916}\right) = 41.6\,\mu\text{gm}^{-3}$$

Roadside locations are typically within 1 to 5 metres of the kerbside, but may extend up to 15 metres depending upon the road configuration and traffic flow.

Modified from Box 2.1 in *Errata to TG(09): Is the example in Box 2.1 of TG(09) correct?* [39]

From the example given in Box 2.1 it is believed the projection factors should be used as follows

$$Y_p = Y_m \times \frac{AF_p}{AF_m}$$

Where:

Y_p = NO_2 concentration for the Projected Year

Y_m = Measured NO_2 Concentration

AF_p = Adjustment factor for the year to be projected

AF_m = Adjustment factor for the year NO_2 was measured

2.2 Façade Correction

Some diffusion tubes required a façade correction; the corrections were undertaken using the procedure outlined in Box 2.3: Predicting nitrogen dioxide concentrations at different distances from road of the technical guidance (reproduced in Table 3)

Table 3. Box 2.3: Predicting nitrogen dioxide concentrations at different distances from roads?

Box 2.3: Predicting nitrogen dioxide concentrations at different distances from roads

A method has been developed to allow NO_2 measurements made at one distance from a road to be used to predict concentrations at a different distance from the same road. It is appropriate for distances between 0.1 m and 140 m of the kerb.

Step 1: Identify the local background concentration in µgm^{-3}, either from local monitoring or from the national maps published at www.airquality.co.uk. (Note that the background concentration must be less than the measured concentration).

Step 2: apply the following calculation

$$C_z = \left(\frac{C_y - C_b}{-0.5476 \times Ln(D_y) + 2.7171} \right) \times (-0.5476 \times Ln(D_z) + 2.7171) + C_b$$

Where:

C_z	is the total predicted concentration (µgm^{-3}) at distance D_z;
C_y	is the total measured concentration (µgm^{-3}) at distance D_y;
C_b	is the background concentration (µgm^{-3});
D_y	is the distance from the kerb at which concentrations were measured;
D_z	is the distance from the kerb (m) at which concentrations are to be predicted.
Ln(D)	is the natural log of the number D.

Results derived in this way will have a greater uncertainty than the measured data. Further assistance with this procedure and interpretation of the results can be obtained from the Review and Assessment helpdesk (http://laqm.defra.gov.uk/helpdesks.html).

Calculator

The equation above is available as a simple calculator (available at http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html). This is set up to work from 0.1 to 50 m from the kerb, as this is the range that is likely to be relevant for Local Air Quality Management (LAQM) work. Kerbside sites should be treated as being at 0.1 m from the kerb. The calculator works for receptors either closer to or further from the kerb than the monitor. The greater the distance between the receptor and monitor, the greater the uncertainty in the derived receptor concentration. It is therefore recommended that if the receptor is further from the kerb than the monitor it should be no more than 20m away. If the receptor is closer to the kerb, then it should be no more than 10 m from the monitor.

Modified from Box 2.3 page 2-6 of the technical Guidance 2009 [38] (modification are improved layout of equation and insertion of updated hyperlinks where footnotes are present in the original.

2.3 Annualisation

Where only short-term periods of monitoring data are available, the results may be adjusted to estimate an annual mean concentration using the approach set out in Box 3.2: Estimation of annual mean concentrations from short-term monitoring data of the technical guidance LAQM.TG(09) [38] (reproduced in Table 4).

Table 4. Box 3.2: Estimation of annual mean concentrations from short-term monitoring data

Box 3.2:	Estimation of annual mean concentrations from short-term monitoring data

Example

It has only been possible to carry out a monitoring survey (automatic or diffusion tube) at site **S** for six months between July and December 2008. The measured mean concentration **M** for this period is 30.2µgm^{-3}. How can this be used to estimate the annual mean for this location?

Adjustment to estimate annual mean

The adjustment is based on the fact that patterns in pollutant concentrations usually affect a wide region. Thus if a six month period is above average at one place it will almost certainly be above average at other locations in the region. The adjustment procedure is as follows:

1. Identify two to four nearby, long-term, continuous monitoring sites, ideally those forming part of the national network. These should be background sites to avoid any very local effects that may occur at roadside sites, and should, wherever possible lie within a radius of about 50 miles.
2. Obtain the annual means, **Am**, for the calendar year for these sites, 2008 in this example.
3. Work out the period means, **Pm**, for the period of interest, in this case July to December 2008. [It may be necessary to use unratified automatic data.]
4. Calculate the ratio, **R**, of the annual mean to the period mean $\left(\frac{Am}{Pm}\right)$ for each of the sites.
5. Calculate the average of these ratios, $\mathbf{R_a}$. This is then the adjustment factor.
6. Multiply the measured period mean concentration **M** by this adjustment factor $\mathbf{R_a}$ to give the estimate of the annual mean for 2008.

Long term site	Annual mean 2008 (Am)	Period Mean 2008 (Pm)	Ratio $\left(\frac{Am}{Pm}\right)$
A	28.6	29.7	0.963
B	22.0	22.8	0.965
C	26.9	28.9	0.931
D	23.7	25.9	0.915
		Average ($\mathbf{R_a}$)	0.944

For this example the best estimate of the annual mean for site **S** in 2008 will be **M** × $\mathbf{R_a}$ = 30.2 x 0.944 = 28.5µgm^{-3}.

Notes

Monitoring data for the long-term sites must have adequate data capture rates: above 90% is preferable; sites with data capture below 75% should not be used.

It may be appropriate to use diffusion tube results from a long-term survey to adjust short-term diffusion tube results. To allow for the greater uncertainty of diffusion tubes results from four or more sites should be used. Ensure that the tubes are from the same supplier using the same method of preparation.

If the short-term period covers, for instance, February to June 2009, and the work is being carried out in August 2009, then an annual mean for 2009 will not be available. The calculation can then be carried out using the ratio to the 2008 annual mean, but the result is then an estimate of the 2008 annual mean at the short-term site.

Modified from Box 3.2 page 3-4 of the technical Guidance 2009 [38].

2.4 Design Manual for Roads and Bridges (DMRB)

Due to the complicated layout of roads in the vicinity of the AQMA it may not be appropriate to use façade corrections to estimate exposure at relevant receptors therefore modelling of the NO_2 concentrations at relevant receptors and correction

3 Summary of Monitoring Undertaken

3.1 Automatic monitoring locations

North West Leicestershire District Council has procured 1 automatic monitor located within the AQMA at Coalville and is shown in Table 5. Full Data is available from North West Leicestershire District Council Website [51]

Table 5. Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Ref		Pollutants Monitored	Monitoring Technique	In AQMA?	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Does this location represent worst-case exposure?
			X	Y						
1	Coalville	Roadside	443660	314002	NO NO_2 NO_x	Chemiluminescence	Y	5.8	2	Y

3.2 Diffusion tube Monitoring Locations

The council undertakes extensive diffusion tube monitoring within its AQMAs. Details of the tubes currently and historically present within the Coalville AQMA are shown in Table 6. Full Data is available from North West Leicestershire District Council Website [50]

Figure 7 Map of Coalville Monitoring Sites

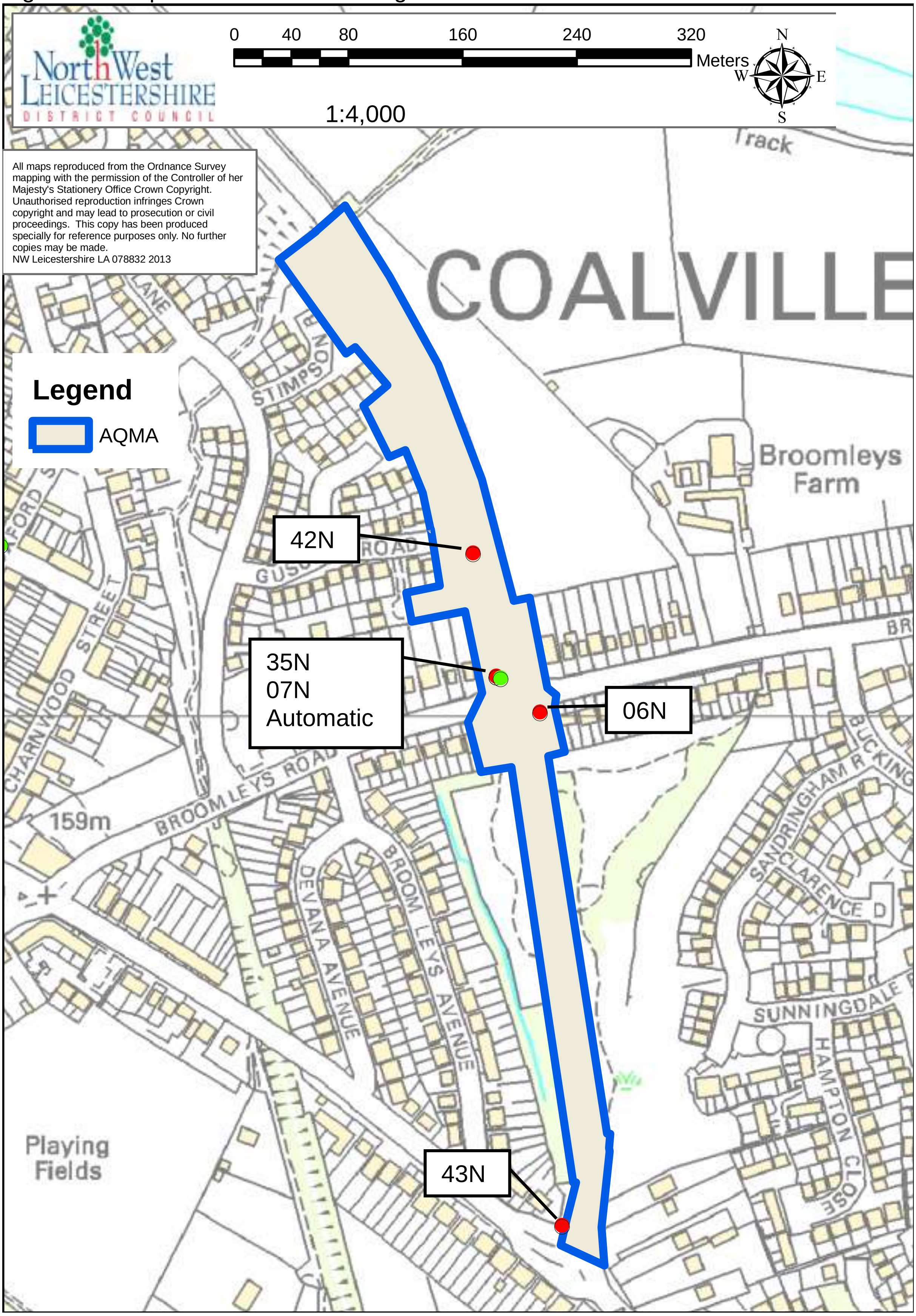


Table 6. Diffusion tube monitoring locations

Site details	Location	Location Type	Grid Reference		Pollutant monitored	In AQMA ?	Is monitoring collocated with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location ?	Monitoring Period	
			X	Y							Start	End
06N	Broomleys junc (1)	Roadside	443748	313528	NO_2	Y	N	5.8	2	Y	2005	
07N	Broomleys junc (2)	Roadside	443660	314002	NO_2	Y	N	5.8	2	Y	2003	2010
35N	monitoring station Coalville (1)	Roadside	443629	314028	NO_2	Y	Y	5.8	2	Y	2010	
36N	monitoring station Coalville (2)	Roadside	443629	314027	NO_2	Y	Y	5.8	2	Y	2010	
42N	lamppost A511 W of broomleys junc	Roadside	443613	314114	NO_2	Y	N	18	1.9	N	2011	
43N	Direction Sign Bardon Rd/A511 RBT	Roadside	443675	313642	NO_2	Y	N	16	3	N	2011	

4 Results

Table 7. NO_2 Diffusion Tube Result

Site details	Location	NO_2 concentration Year measured μgm^{-3}								
		YEAR	2004	2005	2006	2007	2008	2009	2010	2011
		BAF	0.98	1.1	1.01	0.99	0.94	0.9	1.06	1.06
06N	Broomleys junc (1)			**45.76**	**37.57**	**38.23**	**39.63**	**39.37**	**43.77**	**39.66**
07N	Broomleys junc (2)		**40.10**	**46.37**	**40.32**	**43.05**	**40.05**	35.57	**54.02**	
35N	monitoring station Coalville (1)								**48.90**	**39.32**
36N	monitoring station Coalville (2)								**47.90**	31.62
42N	lamppost A511 NW of broomleys junc								**41.07**	**41.07**
43N	Direction Sign Bardon Rd/A511 RBT								33.47	33.47

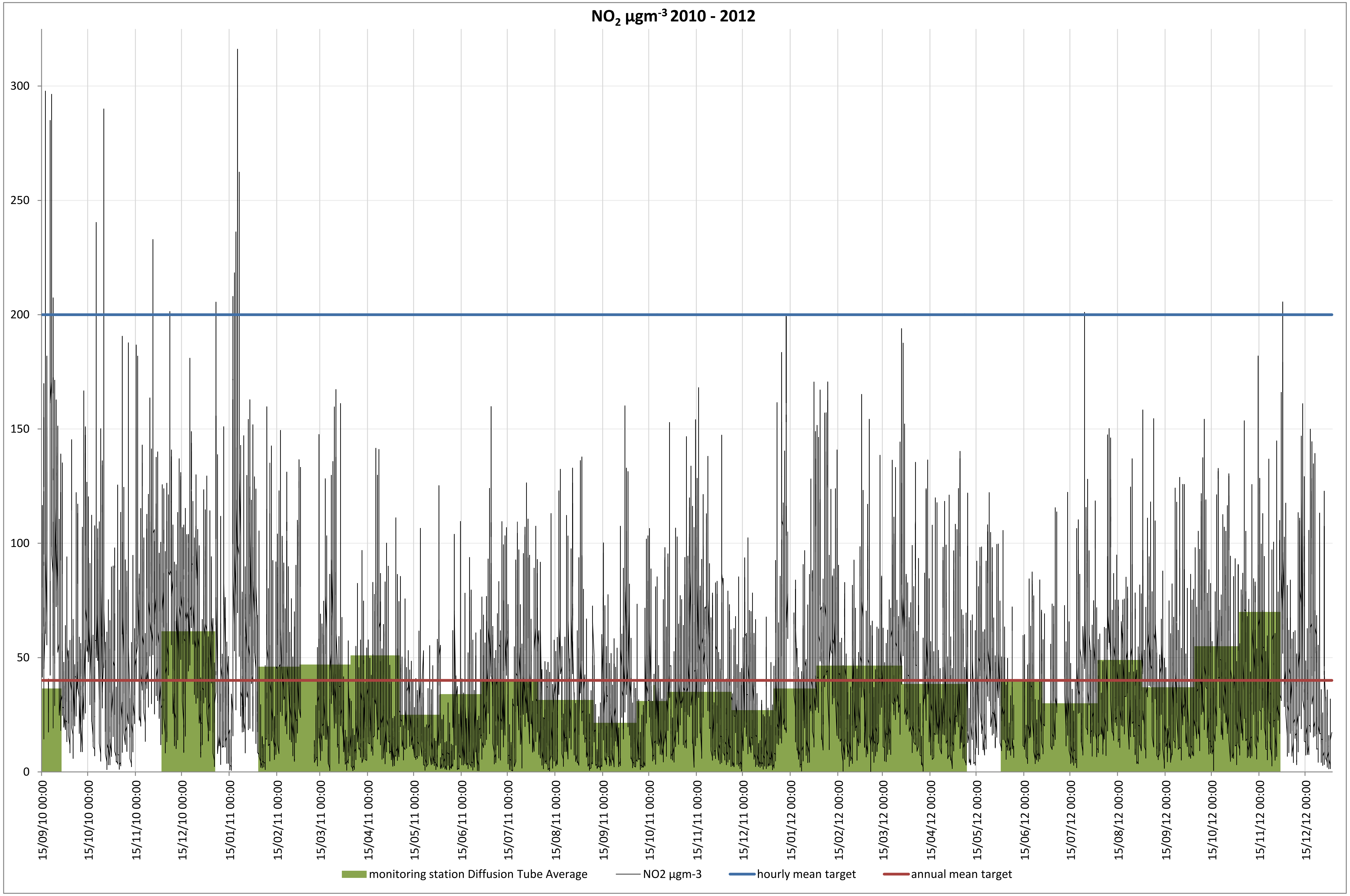
Table 8. Automatic Monitoring Result

Year	Minimum NO_2 μgm^{-3}	Average NO_2 μgm^{-3}	St Dev NO_2 μgm^{-3}	Median NO_2 μgm^{-3}	Maximum NO_2 μgm^{-3}	Count (No. of periods)	Data Capture (%) for monitoring period	Data Capture (%) year	Exceedence of the NO_2 hourly 200 μgm^{-3} objective
2010	1	**54.63**	41.9	61.4	297.8	2533	98.29	28.92	29
2011	0.4	**36.96**	31.0	28.6	316.2	8524	97.29	97.29	20
2012	.2	**45.6**	31.4	38.1	205.6	8228	93.66	93.66	3

4.1 Source Apportionment

At the time of writing the report there is insufficient traffic data for the Broomleys junction for a source apportionment to be undertaken. In order that this important information is available for action planning a supplementary report will be produced when the data becomes available.

Figure 8 Graph of automatic monitoring compared with NO_2 tubes



5 Analysis of Results

5.1 Findings at monitoring location

The findings of each monitoring location is as follows

5.1.1 07N - Broomleys Junc (1)

The annual mean air quality standard for NO_2 was exceeded in 2010 and 2005. In 2006, 2007, 2008, 2009 and 2011 the annual mean air quality standard was not exceeded however values recorded exceeded 36 μgm^{-3}.

It is therefore likely that the Annual Mean Air Quality Standard is being exceeded at this location

5.1.2 06N - Broomleys Junc (2)

Monitoring in this location ceased in 2010 when the monitoring station was commissioned due to its proximity.

The annual mean air quality standard for NO_2 was exceeded in 2014, 2005, 2006 2007, and 2008. The annualised mean in 2010 also annual mean air quality standard for NO_2.

It is therefore likely that the Annual Mean Air Quality Standard is being exceeded at this location

5.1.3 36N and 35N Monitoring Station Diffusion Tubes (1) & (2) and automatic monitor

The automatic monitor recorded 29 exceedences of the hourly mean air quality standard for NO_2 in 2010, recorded 20 exceedences of the hourly mean air quality standard for NO_2 in 2011, and recorded 3 exceedences of the hourly mean air quality standard for NO_2 in 2012.

In 2010 the annualised mean of the automatic monitor significantly exceeded the annual mean air quality standard for NO_2.

In 2012 the annual mean of the automatic monitor significantly exceeded the annual mean air quality standard for NO_2.

The annualised mean of the diffusion tubes in 2010 recorded significant exceedences of the annual mean air quality standard for NO_2.

The diffusion tubes did not record an exceedence of the annual mean air quality standard for NO_2 one of the monitoring sites has a large number of data gaps which may be lowering the annual mean

5.1.4 42N - Lamppost A511 NW of Broomleys Junc

The annualised mean in 2011 recorded an exceedence of the annual mean air quality standard for NO_2

5.1.5 43N - Direction Sign Bardon Rd/A511 RBT

The annualised mean in 2011 was significantly below the annual mean air quality standard for $NO_{2.}$

5.2 Analysis of Receptors

5.2.1 Residential properties south of A511 NW of Broomleys Junc

There is little change is road layout between location 42N and the western most edge of the AQMA, it is therefore assumed that this location is representative of this entire area. The closes receptor to the kerb of the A511 is 30 Guscott Road which is 18m away. This is also the closest receptor to location 42N.

Façade Correction of the 2011 period mean is 24.51 μgm^{-3}

Façade Correction of the 2011 annualised mean is 25.84 μgm^{-3}

Due to the distances from the kerb it is unlikely that properties NW of 21 and 27 Broomleys Road are exceeding the annual mean air quality standard for NO_2

The 2011 mean and 2011 annualised mean concentrations at location 42N is significantly below 60μgm^{-3} it is therefore unlikely that the hourly mean air quality standard for NO_2 is being exceeded at these locations.

There is unlikely to be appropriate receptors for the hourly mean air quality standard for NO_2

5.2.2 21 Broomleys Road

Façade Correction of the Location 07N 2009 annual mean is 28.87 μgm^{-3}

Façade Correction of the Location 07N 2010 period mean is 39.90 μgm^{-3}

Façade Correction of the Location 07N 2010 annualised mean is 41.12μgm^{-3}

Façade Correction of the Location 35N 2010 period mean is 39.71 μgm^{-3}

Façade Correction of the Location 35N 2010 annualised mean is 37.63 μgm^{-3}

Façade Correction of the Location 35N 2011 period mean is 30.94 μgm^{-3}

Façade Correction of the Location 36N 2010 period mean is 38.98 μgm^{-3}

Façade Correction of the Location 36N 2010 annualised mean is 36.95 μgm^{-3}

Façade Correction of the Location 36N 2011 Annual mean is 25.07 μgm^{-3}

Though only 1 façade corrected concentration exceeded the annual mean air quality standard for NO_2 several façade corrected concentration exceeded 36μgm^{-3} most of which were very close to the annual mean air quality standard. It is therefore likely that the annual mean air quality standard is being exceeded at this location

5.2.3 27 Broomleys Road

There is no appropriate monitoring location to estimate exposure at this receptor. When traffic data is available it may be possible to model exposure at this location.

5.2.3.1 44 Broomleys Road

Façade correction of location 06N 2009 annual mean is 31.46 μgm^{-3}

Façade correction of location 06N 2010 annual mean is 34.14 µgm^{-3}

Façade correction of location 06N 2011 annual mean is 31.18 µgm^{-3}

No façade corrected annual means exceeded the annual mean air quality standard and all façade corrected values were below 36 µgm^{-3}. However as the property is located on the corner of a junction normal façade correction may be underestimating the true concentration at the receptor. Therefore the annual mean air quality standard may be being exceeded at this location.

5.2.4 34 Broomleys Road

There is no appropriate monitoring location to estimate exposure at this receptor. When traffic data is available it may be possible to model exposure at this location.

5.2.5 29 Bardon Road

There is little change is road layout south east of 34 and 44 Broomleys Road to the south eastern most edge of the AQMA, it is therefore assumed that this location is representative of this entire area.

Façade Correction of the 2011 period mean is 22.47 µgm^{-3}

Façade Correction of the 2011 annualised mean is 23.71 µgm^{-3}

Due to the distances from the kerb it is unlikely that properties SE of 34 and 44 Broomleys Road are exceeding the annual mean air quality standard for NO_2

Table 9. Façade Correction data

Site details	Location	Location Type	Grid Reference		Relevant Exposure? (Y/N with distance (m) to relevant exposure)	Distance to kerb of nearest road (N/A if not applicable)	Worst-case Location ?	2009			2010			2011		
			X	Y				relevant background concentration	receptor correction for roadside tubes (Bias adjusted mean used)	receptor correction for roadside tubes (Annualised Bias adjusted mean used)	relevant background concentration	receptor correction for roadside tubes (Bias adjusted mean used)	receptor correction for roadside tubes (Annualised Bias adjusted mean used)	relevant background concentration	receptor correction for roadside tubes (Bias adjusted mean used)	receptor correction for roadside tubes (Annualised Bias adjusted mean used)
06N	Broomleys junc (1)	Roadside	443748	313528	5.8	2	Y	14.56	31.46		13.57	34.14		13.05	31.18	
07N	Broomleys junc (2)	Roadside	443660	314002	5.8	2	Y	14.56	28.87		13.57	**39.90**	**41.12**			
35N	monitoring station Coalville (1)	Roadside	443629	314028	5.8	2	Y				13.57	**39.71**	**37.63**	13.05	30.94	
36N	monitoring station Coalville (2)	Roadside	443629	314027	5.8	2	Y				13.57	**38.98**	**36.95**	13.05	25.70	
42N	lamppost A511 W of broomleys junc	Roadside	443613	314114	18	1.9	N							13.05	24.51	25.84
43N	Direction Sign Bardon Rd/A511 RBT	Roadside	443675	313642	16	3	N							13.05	22.47	23.71

6 Conclusions and Proposed Actions

Monitoring has shown that the annual mean air quality standard for NO_2 is unlikely to be exceeded at the most of the receptors within the AQMA.

The hourly mean air quality standard for NO_2 may be exceeded away from the Broomleys Junction however there is unlikely to be an appropriate receptor away from the junction of Broomleys Road and Stephenson Way.

It is not possible to access the air quality at 2 receptors within the AQMA adjacent to the junction of Broomleys Road and Stephenson Way.

6.1 Proposed Actions

- Undertake a traffic survey of the Broomleys Road | Stephenson way junction
- Following the traffic survey undertake a source apportionment study
- Following traffic study undertake air quality modelling of 21, 27, 34 and 44 Broomleys Road
- Following the results of the air quality modelling and the findings of this report amend the area of the AQMA as appropriate. A Draft amendment order is attached as Appendix B
- Publish an action plan

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8 Appendices

Appendix A QA:QC Data

- QA/QC of automatic monitoring

The analyser at Coalville is an API 200 chemiluminescence analyser,

Routine instrument calibrations are conducted once per month, which involve zero and span checks, a written record of the gas analyser diagnostics and a general visual inspection of all equipment is undertaken.

- Data retrieval and daily data checking

Data from the monitoring station is retrieved and processed on a data logger as 15-minute mean data. The logger is interrogated via a Siemens TC35i GSM modem at 8-hourly intervals by the ENVIEW 2000 software hosted at TRL. This is used to retrieve, check and archive data.

TRLs internal QA/QC procedures require all data to be backed up on a secure server and all documentation associated with each site to be uniquely identified and securely stored to provide an audit trail.

Daily data inspections are undertaken during office hours using the facilities of the Data Management System. Initial observations of the Management System indicate whether the site has been contacted during its nominated ‘poll time’ overnight. If this has not been successful a manual poll of the site may be required. If this is not successful further investigation of the communications integrity will be required to establish contact with the site modem and data logger.

Three day plots of recorded data are viewed for the requested site, and these are inspected and assessed for continuity, validity, minimum and maximum values, date and time, power failures and general integrity. All anomalies are recorded on the Daily Check sheet, as required. Any anomalies or queries arising from daily inspection of data, or system operation, are brought to the attention of the Project Manager who will evaluate the situation, and initialise any necessary action. In the event that the PM is not available, contact will be made with the next available senior person within the monitoring team. Any issues identified with equipment operation will be referred to the client for attention within 24 hours (excluding weekends).

On a weekly basis, data are examined using summary statistics and outlier analysis to establish data validity. In the event that unusual data episodes are recorded, these would be routinely examined over longer data periods to establish their impact on trends, but would also be cross referenced with data peaks and troughs recorded at other national monitoring stations. In addition, integrity and validity of data logger clock times are checked, and any significant errors recorded in the Data Management System logbook.

All site data recorded through the Data Management System is archived on TRLs Network. The data is backed up daily, and the TRL IT Department maintains these data within their long-term and secure archives. This secures all data in the event of any system failure.

- Data calibration and ratification

Data is ratified as per AURN recommended procedures. The calibration and ratification process for automatic gas analysers corrects the raw dataset for any drift in the zero baseline and the upper range of the instrument. This is done using a Microsoft Excel-based calibration and ratification file which incorporates the zero and span check information from the calibration visits. The zero reading recorded during the calibration visits is used to adjust any offset of the baseline of the data. The difference between the span value obtained between one calibration visit and the next visit is used to calculate a factor. This change is assumed to occur at the same rate over the period between calibrations and as such the factor is used as a linear data scaler. This effectively results in the start of the period having no factor applied and the end of the period being scaled with the full factor with a sliding scale of the factor in-between. After applying the calibration factors, it is essential to screen the data, by visual examination, to see if they contain any unusual measurements or outliers. Errors in the data may occur as a result of equipment failure, human error, power failures, interference or other disturbances. Data validation and ratification is an important step in the monitoring process. Ratification involves considerable knowledge of pollutant behaviour and dispersion, instrumentation characteristics, field experience and judgement.

On completion of this data correction procedure, these data were converted to hourly means and a summary of these data were provided to North West Leicestershire District Council.

Appendix B Draft AQMA amendment order

ENVIRONMENT ACT 1995 PART IV Section 83(2) (b)

THE NORTH WEST LEICESTERSHIRE DISTRICT COUNCIL

AIR QUALITY MANAGEMENT AREA (nitrogen dioxide) AMENDMENT ORDER 2013 (No.3) Order

By an Order dated 9th January 2008 – North West Leicestershire Council ("the Council") made the North West Leicestershire District Council Air Quality management Area Order 2008 (No. 2) ("the 2008 Order")

By an Order dated 1st July 2011 – North West Leicestershire Council ("the Council") made the North West Leicestershire District Council AIR QUALITY MANAGEMENT AREA (nitrogen dioxide) AMENDMENT ORDER 2011 (No.2) Order ("the 2011 Order")

By an Order dated 1st July 2011 – North West Leicestershire Council ("the Council") made the North West Leicestershire District Council AIR QUALITY MANAGEMENT AREA (nitrogen dioxide) AMENDMENT ORDER 2012 (No.1) Order ("the 2012 Order")

The Council is satisfied that as a result of it's 2013 Air Quality Further Assessment of Coalville AQMA, it appears that the Annual Mean Air Quality Standard and the hourly mean air quality standard is being exceeded at 4 properties adjacent to the junction of Broomleys Road and Stephenson Way.

In using it's authority conferred under Section 83(2) of the Environment Act 1995, the Council make the following Order varying the North West Leicestershire District Council Air Quality Management Area Order 2008 (No. 2) as follows;

1. The Order Known as the North West Leicestershire District Council Air Quality Management Area Order 2008 (No. 2) shall be amended as follows.
2. Paragraph 2 be amended to read as follows:
   1. The area comprises the Stephenson Way I Broom Leys Road Junction, Coalville encompassing 4 individual properties, 21, 27, 34 and 44 Broom Leys Road extending along Stephenson Way up to the junction with Bardon Road thereto shown shaded in blue on the attached Map 1 is declared to be the Air Quality Management Area ("the designated area") for exceedences of

      - the annual mean air quality standard for nitrogen dioxide (NO_2), and

      - the 1-hour mean air quality standard for nitrogen dioxide (NO_2)

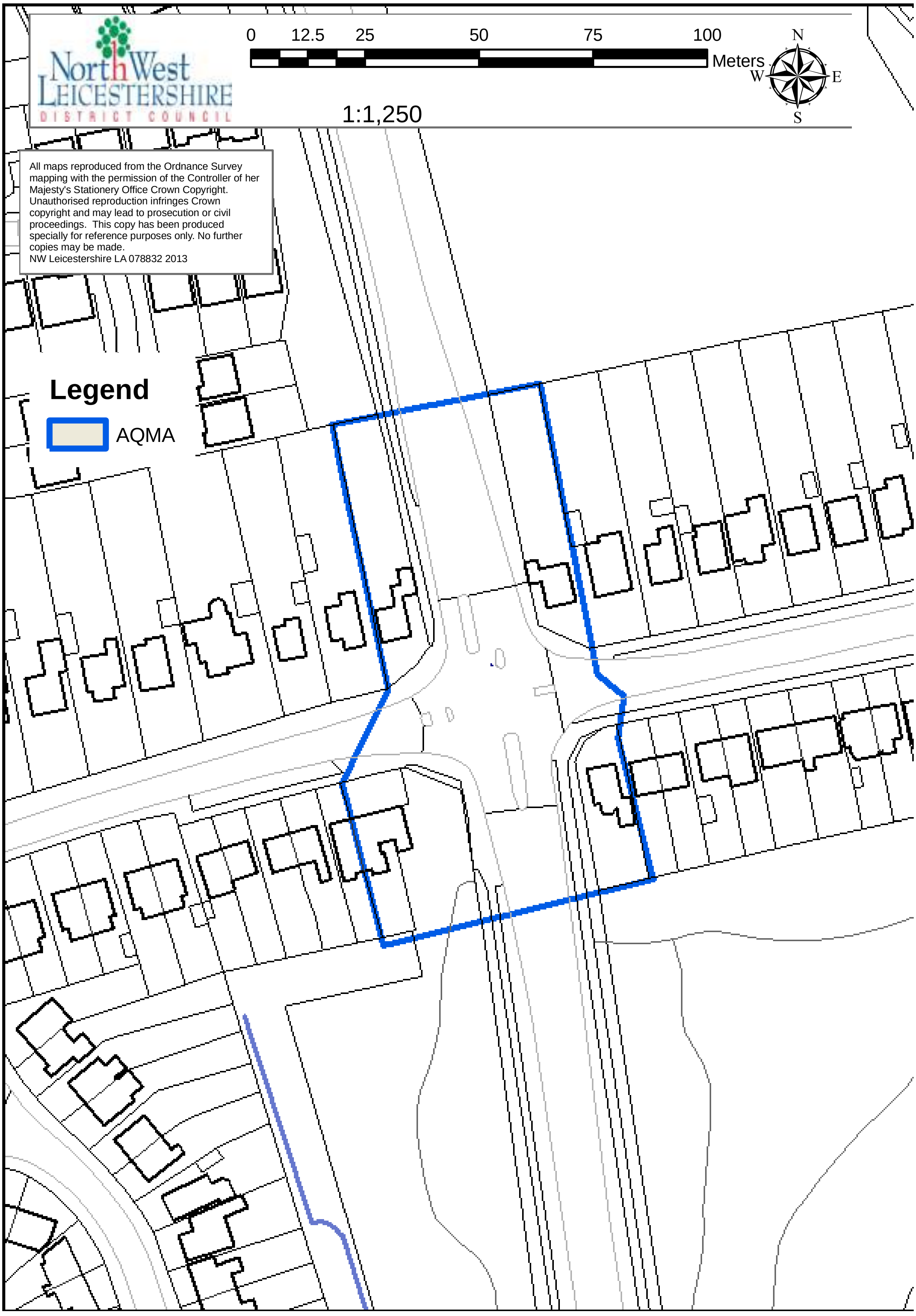
3. The Map attached to "the 2008 Order" be replaced with the attached Map 01
4. This order shall come into force on < insert Date>.

Signed: ____

Steve Bambrick
Director of Services

Date:

Map 01 AQMA Extent



Appendix C Diffusion Tube Monitoring Data

Full details and results of Diffusion Tube monitoring in North West Leicestershire is available from the councils website

http://www.nwleics.gov.uk/pages/air_quality_monitoring_no2_diffusion_tubes

Appendix D Automatic Monitoring Data

Full details and results of Automatic monitoring in North West Leicestershire is available from the councils website

http://www.nwleics.gov.uk/pages/air_quality_realtime_monitoring