2015 Updating and Screening Assessment for Newcastle-under-Lyme Borough Council

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

September 2015

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Executive Summary

Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area and take account of Government Guidance when undertaking such work. This Updating and Screening Assessment is a requirement of the Sixth Round of Review and Assessment and is a requirement for all local authorities. The Report has been undertaken in accordance with the Technical Guidance LAQM.TG (09) and associated tools (as updated in 2014).

Previous assessments have identified nitrogen dioxide as the pollutant of concern, with a number of locations within the Borough exceeding the nitrogen dioxide annual mean objective.

This Updating and Screening Assessment considers all new monitoring data and assesses the data against the Air Quality Strategy (AQS) objectives. It also considers any changes that may have an impact on air quality.

The review of new diffusion tube monitoring data has not identified any locations outside of the four existing Air Quality Management Areas, declared in December 2015 within the Borough where the AQS annual NO_2 objective was exceeded in 2014.

There are five locations in two geographic areas of the Borough which are representative of relevant exposure and where results yielded are at or above the annual mean objective of 40 µg/m3. These locations are:-

- Kidsgrove (A50 Liverpool Road) (Located within the Kidsgrove AQMA)
  Site 6 – 106 Liverpool Road

- Newcastle Town Centre (Located within the Newcastle Town Centre AQMA)
  Site K1 – A34 Holy Trinity
  Site 11 – 11 to 34 London Road
  Site 85 – 106 King Street
  Site 96 – 52/54 London Road Newcastle

All of the above mentioned locations are within the AQMA boundaries declared by the Council in January 2015. Air Quality action planning is currently being undertaken to look at

ways in which the NO2 levels in these areas can be addressed. Details regarding action planning for the AQMAs will be discussed in future reports.

There are a further six sites in three geographic locations, which have yielded bias adjusted results that are below the annual mean objective, but are showing results that are within 10% of the annual mean objective (at or above 36µgm3). These sites are;

- Located within the Maybank, Porthill, Wolstanton AQMA
  Site 9 – 32 Port Hill Bank

- Located within the Newcastle Town Centre AQMA
  Site 42 – Jubilee Baths, Brunswick Street
  Site 84 – 102 King Street
  Site 87 – Blue Chilli, 1 King Street
  Site 98 – Newcastle Taxis

- Located within the Kidgrove AQMA
  Site 64 - Kidsgrove Carpets, 57-59 Liverpool Road

The sites above are included in the AQMAs which have been declared by Newcastle Borough in December 2014, as they are risk of exceeding the annual mean in future years.

All sites which have shown annual mean nitrogen dioxide levels that are in excess or within 10% of the annual emission limit are within areas which have been declared as AQMAs. No further sites have been found to be in exceedance of the annual emission limit value.

The Little Madeley AQMA has remained below the objective for the third year running, however as this continues to be within 10% of the annual mean objective, there are no immediate plans to explore revocation of this AQMA.

With regards to the assessment of industrial sources, the Council is proceeding to a detailed assessment for emissions associated with the Loucetios STOR site at Holditch.

Proposed actions arising from the 2015 Updating and Screening Assessment are as follows:

- Continue the current network of NO_2 diffusion tube monitoring in the District to identify future changes in pollutant concentrations;
- Undertake a detailed assessment for emissions associated with the Locuetios STOR site at Holditch and report the findings as soon as this is available.;

- Finalise the Air Quality Action Plan for the Newcastle under Lyme Town Centre AQMA;
- Finalise the Air Quality Action Plan for the Maybank, Wolstanton and Porthill AQMA;
- Finalise the Air Quality Action Plan for the Kidsgrove AQMA;
- Finalise the Air Quality Action Plan for the Little Madeley AQMA;
- Proceed to a Progress Report in 2016.

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1 Introduction

1.1 Description of Local Authority Area

The Borough is located in North Staffordshire and covers an area of 21,096 hectares (81 square miles), with a population of approximately 123,000. Newcastle's strategic location at the important junction between the roads running north from London to Carlisle and west to Chester has ensured that transport has played a major part in its growth. In addition to these historical routes, modern trunk roads also pass through the Borough. These include the M6, which is currently one of the most heavily trafficked and congested roads in the country along with the A500, which is a major route linking many areas of Newcastle under Lyme and Stoke on Trent with junctions 15 and 16 of the M6. Both of these junctions are adjacent to the Borough boundary and thus contribute to the traffic congestion in the area. A number of main roads converge on the two main towns in the Borough, notably Newcastle under Lyme and Kidsgrove. The A34, A52, A525, A527 and the A53 pass through Newcastle and the A50, A5011 and A34 pass though Kidsgrove.

Traffic on these roads is a significant source of air pollutants affecting the air quality of the Borough. The other sources are industry and domestic properties. Particular industries with the greatest potential to cause air pollution have been prescribed for air pollution control under the Environmental Permitting (England and Wales) Regulations 20101. Some processes are regulated by the Environment Agency (these are referred to as Part A1 processes) and others regulated by local authorities (these are referred to as Part A2 and Part B processes). Within the Borough there are two Part A1 processes, three Part A2 processes and forty-five Part B processes holding a permit.

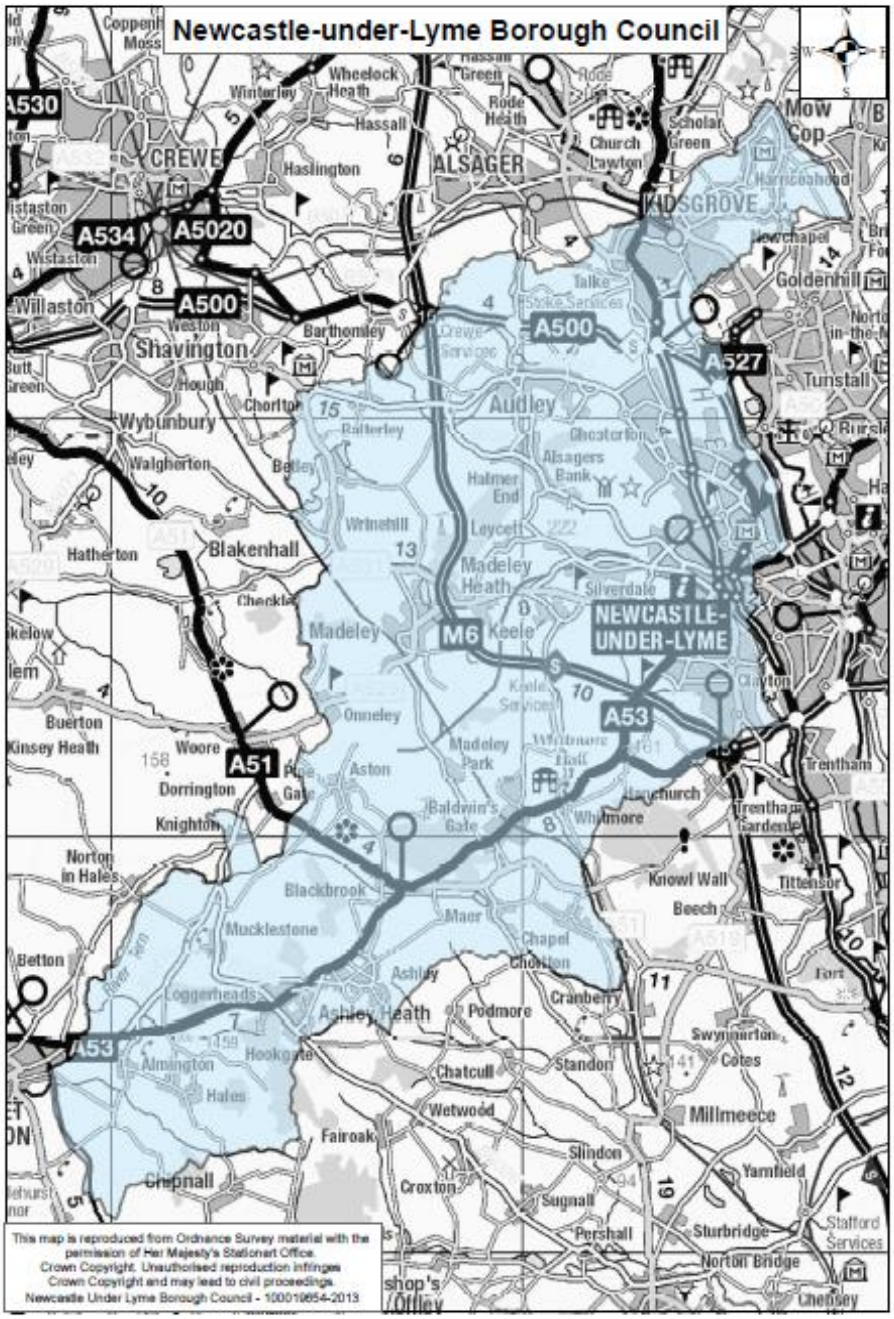

***Figure 1*:** Newcastle Borough Council Area Map

1.2 Purpose of Report

This report fulfils the requirements of the Local Air Quality Management process as set out in Part IV of the Environment Act (1995), the Air Quality Strategy for England, Scotland, Wales and Northern Ireland 2007 and the relevant Policy and Technical Guidance documents. The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to

be achieved. Where exceedences are considered likely, the local authority must then declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives.

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

1.3 Air Quality Objectives

The air quality objectives applicable to LAQM in England are set out in the Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043), and are shown in Table 1. This table shows the objectives in units of micrograms per cubic metre $\mu g/m^3$ (milligrams per cubic metre, mg/m^3 for carbon monoxide) with the number of exceedences in each year that are permitted (where applicable).

Table 1: Air Quality Objectives included in Regulations for the purpose of LAQM in England

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	Running annual mean	31.12.2010
1,3-Butadiene	2.25 $\mu g/m^3$	Running annual mean	31.12.2003
Carbon monoxide	10.0 mg/m^3	Running 8-hour mean	31.12.2003
Lead	0.5 $\mu g/m^3$	Annual mean	31.12.2004
	0.25 $\mu g/m^3$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu g/m^3$ not to be exceeded more than 18 times a year	1-hour mean	31.12.2005
	40 $\mu g/m^3$	Annual mean	31.12.2005
Particles (PM_{10}) (gravimetric)	50 $\mu g/m^3$, not to be exceeded more than 35 times a year	24-hour mean	31.12.2004

	40 µg/m^3	Annual mean	31.12.2004
Sulphur dioxide	350 µg/m^3, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 µg/m^3, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1.4 Summary of Previous Review and Assessments

Table 2: Summary of findings of previous air quality reports for Newcastle under Lyme Borough Council 1999 to 2014

Air Quality Reports	Description
2014 Progress Report	This report confirms that there are exceedances of the Nitrogen dioxide annual mean in four areas within the Borough, these areas are, Madeley (M6 motorway) Kidsgrove (A50 - Liverpool Road) Newcastle Town Centre (A34 Northbound - London Road); Newcastle Town Centre (A53 - King Street), Porthill (A527). Following submission of this report we have now declared the above four areas as Air Quality Management Areas and are currently consulting on action planning. For further information see www.newcastle-staffs.gov.uk
2013 Combined Detailed and Further Assessment DEFRA's Appraisal Report for the 2013 Combined Detailed and Further Assessment	A combined Detailed Assessment with Further Assessment was undertaken based on results from2012 to determine the AQMA boundaries for exceedance of the NO_2 annual mean objective. This report confirms that there are exceedances of the Nitrogen dioxide annual mean in four areas within the Borough, these areas are, Madeley (M6 motorway) Kidsgrove (A50 -Liverpool Road)

	Newcastle Town Centre (A34 Northbound - London Road); Newcastle Town Centre (A53 - King Street), Porthill (A527). The AQMA boundaries are currently being consulted upon prior to formal declaration by the Borough Council in winter 2014.
Progress Report 2013 DEFRA's Appraisal Report for the 2013 Progress Report	The report identified exceedance locations of the NO_2 annual mean objective in five geographic areas of the borough at Newcastle-under-Lyme Town Centre, Kidsgrove and Porthill. These areas were considered in the 2013 Combined Detailed and Further Assessment to determine the AQMA boundaries. The AQMA boundaries are currently being consulted upon prior to formal declaration by the Borough Council expected in Autumn 2014.
2012 Update and Screening Assessment DEFRA's Appraisal Report for the 2012 Update and Screening Assessment	This report has identified exceedances of the annual mean nitrogen dioxide objective at Madeley (M6 motorway) Kidsgrove (A50 – Liverpool Road) Newcastle Town Centre (A34 Northbound - London Road); Newcastle Town Centre (A53 – King Street) Therefore, detailed assessments are required in these locations to inform the minimum extent of the required Air Quality Management Areas.
2011 Progress Report DEFRA's Appraisal of the 2011 Progress Report	The report has identified exceedances of the annual mean nitrogen dioxide objective in four areas of the Borough in Newcastle town centre, Kidsgrove, Madeley, Porthill. Therefore, detailed assessments are required in these locations to inform the minimum extent of the required Air Quality Management Areas.
2010 Detailed Assessment DEFRA's Appraisal of the 2010 Detailed Assessment	The assessment concluded that Air Quality Management Areas should be declared in Kidsgrove and Newcastle.

2010 Progress Report DEFRA's Appraisal of the 2010 Progress Report	The report concluded that monitoring had identified a risk of exceeding the Nitrogen Dioxide annual mean objective at Kidsgrove and Newcastle. Therefore Detailed Assessments were required at these locations.
2009 Updating and Screening Assessment DEFRA's Appraisal of the 2009 Updating and Screening Assessment	The assessment concluded that monitoring had identified a risk of exceeding the Nitrogen Dioxide annual mean objective at Madeley, Kidsgrove, Newcastle and Shraleybrook. Modelling predicted a risk of exceeding the Nitrogen Dioxide annual mean objective at the Church Street/ Wolstanton Link Road Junction. Therefore detailed assessments were required at these locations.
2007 Progress Report DEFRA's Appraisal of the 2007 Progress Report	The report concluded that there were no exceedances of the air quality objectives.
2007 Detailed Assessment DEFRA's Appraisal of the 2007 Detailed Assessment	The assessment concluded that no Air Quality Management Area should be declared.
2006 Updating and Screening Assessment	The assessment identified a risk of exceeding the Nitrogen Dioxide annual mean objective at Madeley, Kidsgrove, Porthill Bank, Shraleybrook, London Road and Barracks Road. Therefore Detailed Assessments were required at these locations.
2005 Progress Report	The report concluded that there were no exceedences of the air quality objectives
2004 Progress Report	The report concluded that there were no exceedences of the air quality objectives
2003 Updating and Screening Assessment	The assessment concluded that no air quality objectives were exceeded at sensitive receptors and there was no need to proceed to a Detailed Assessment.

Third Round Review and Assessment April 2001	The report concluded that no Air Quality Management Area should be declared.
Second Round Review and Assessment – February 2001	The report concluded that it was necessary to proceed to Stage Three in order to assess the likelihood of exceedances of the Nitrogen Dioxide and Particulate Matter objectives.
First Round Review and Assessment – January 1999	The report concluded that it was necessary to proceed to Stage Two to assess Nitrogen Dioxide, Particulate Matter, Sulphur Dioxide, Carbon Monoxide and Lead. Benzene and 1,3 Butadiene were expected to meet the air quality objectives.

Maps of AQMA Boundaries

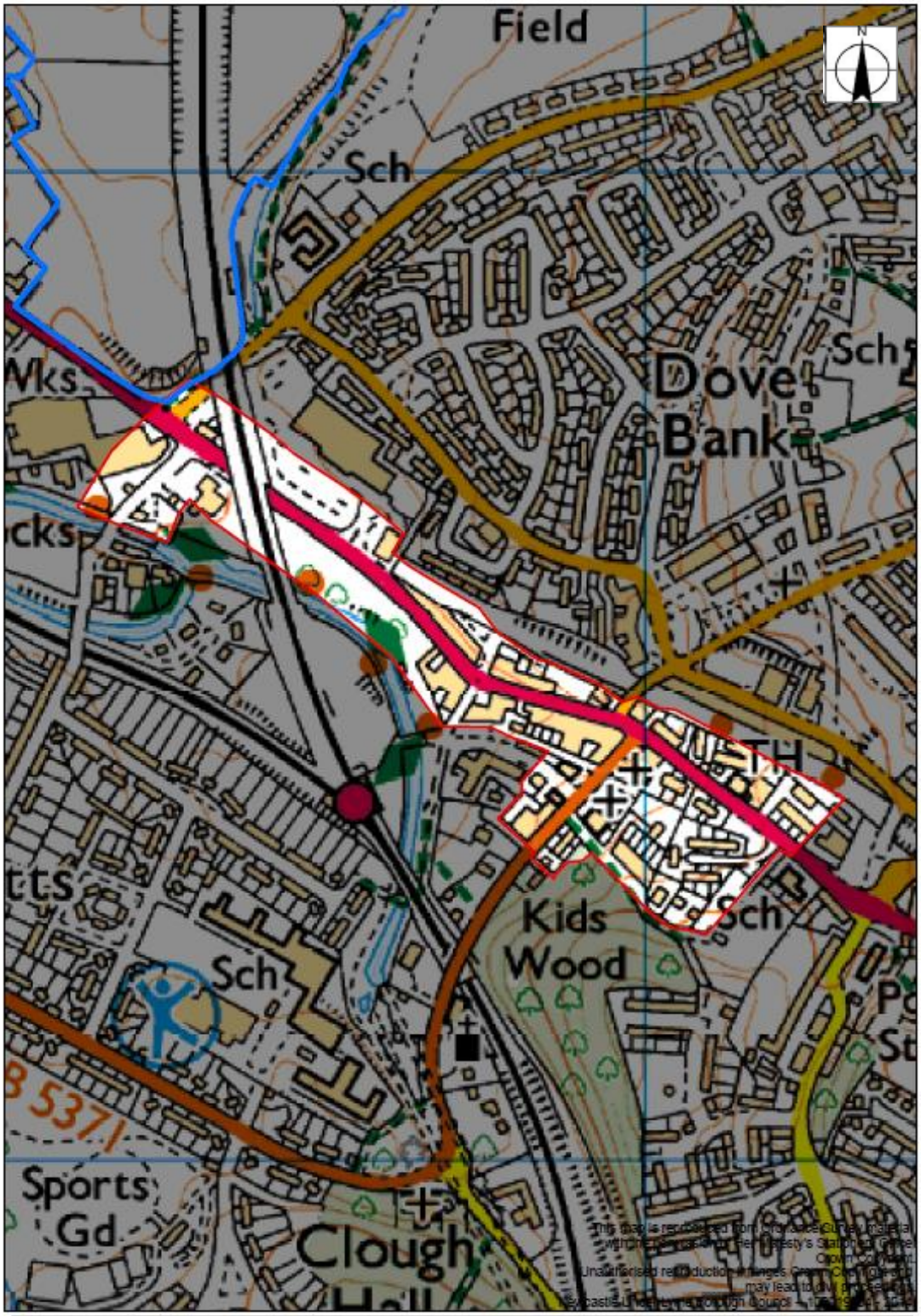

Figure 2: Map of AQMA in Kidsgrove (Liverpool Road)

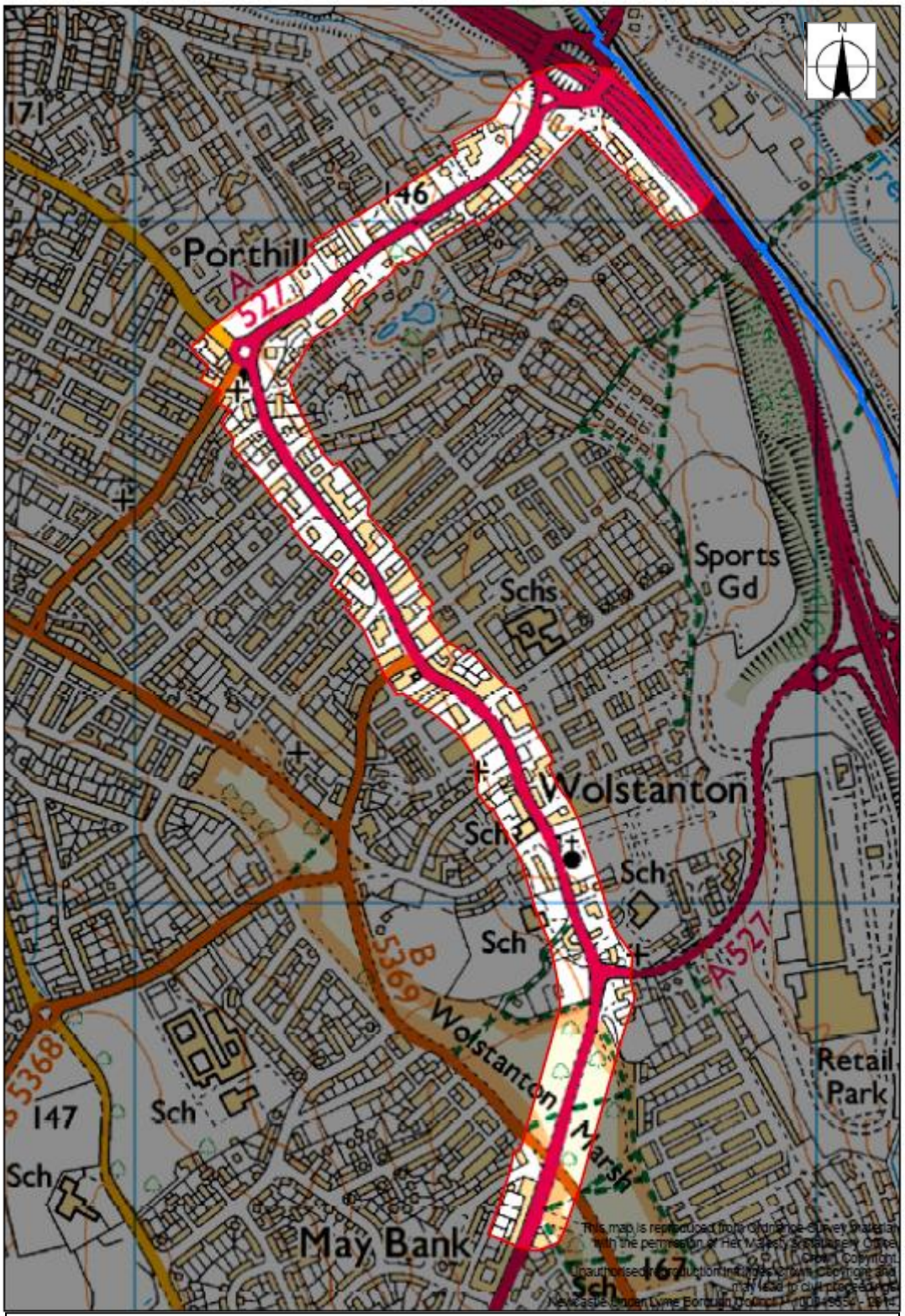

Figure 3: Map of AQMA in Porthill- Wolstanton- Maybank

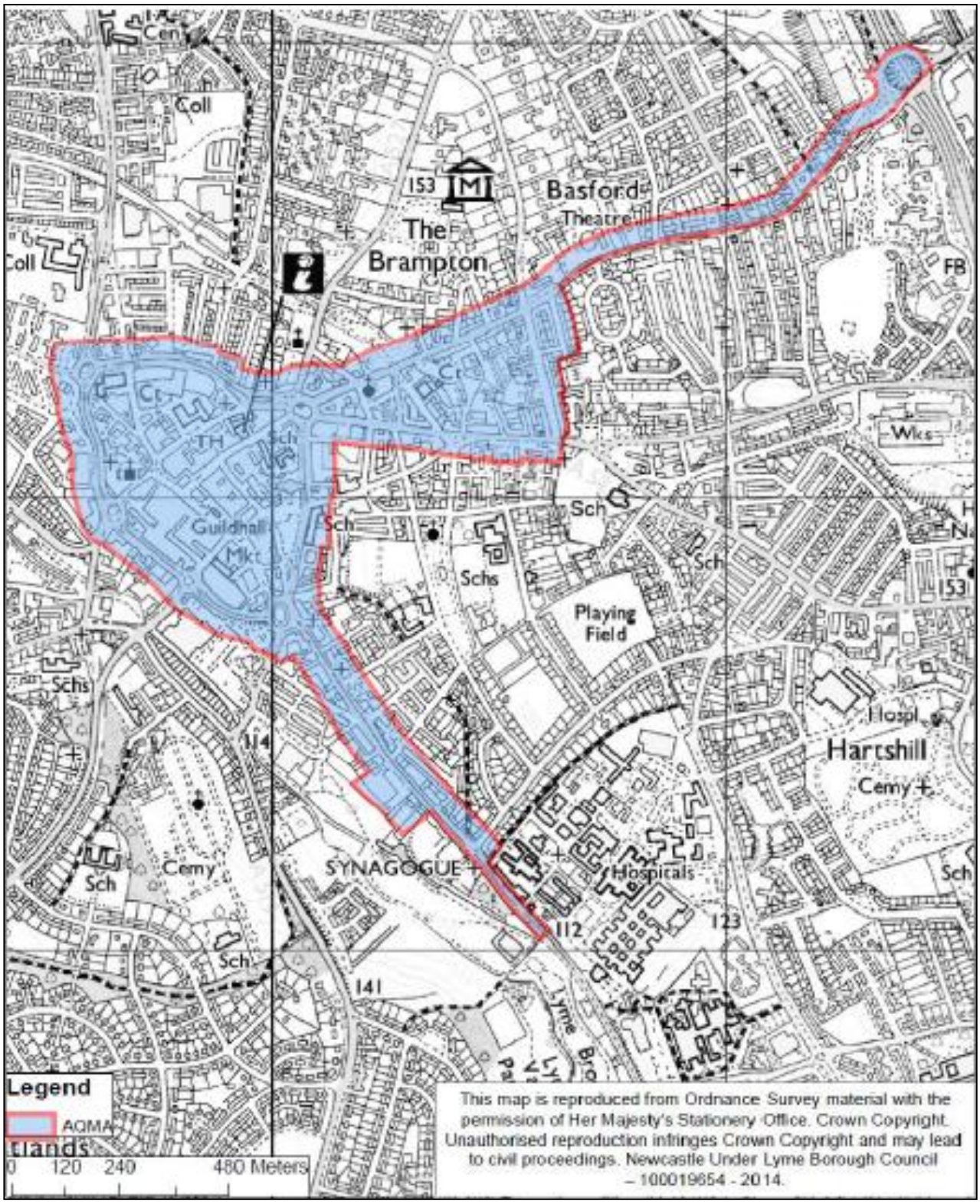

Figure 4: Map of AQMA in Newcastle-under-Lyme Town Centre

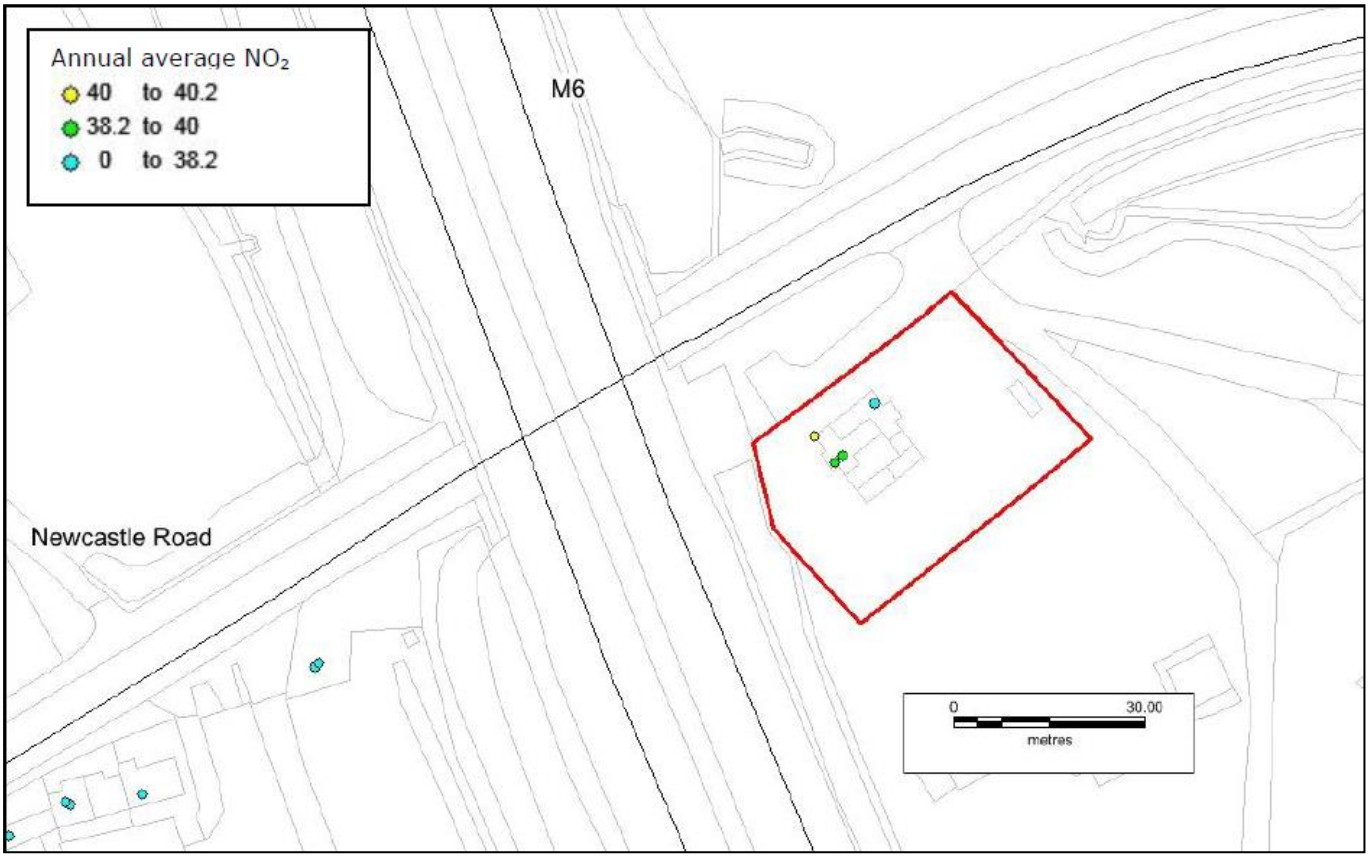

Figure 5: Map of AQMA in Madeley

2 New Monitoring Data

2.1 Summary of Monitoring Undertaken

2.1.1 Automatic Monitoring Sites

The Borough Council currently has one **roadside** automatic monitoring station located at Queen's Gardens, Newcastle-under-Lyme. Full details of this site are given in **Table 3** below, whilst the location of this site is shown in ***Figure 6***.

This site is equipped with an API M200e NOx Analyser which is used to measure Nitrogen Dioxide, and a Met One BAM 50.5 PM10 analyser. Both instruments were fully operational throughout 2014.

Table 3: Details of Automatic Monitoring Sites

Site ID	Site Name	Site Type	OS Grid Reference	Inlet Height (m)	Pollutants Monitored	In AQMA?	Monitoring Technique	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
CM1	Queens Gardens	Road -side	385046 346147	2.0	PM_{10}	Y	Beta Attenuation	Y (2M)	3	y
					$N0_2$	Y	Chemiluminescence	Y(2M)	3	y

2.1.2. Automatic monitoring sites – quality assurance and quality control procedures

Details of the QA/QC procedures for this site are given in Appendix A.

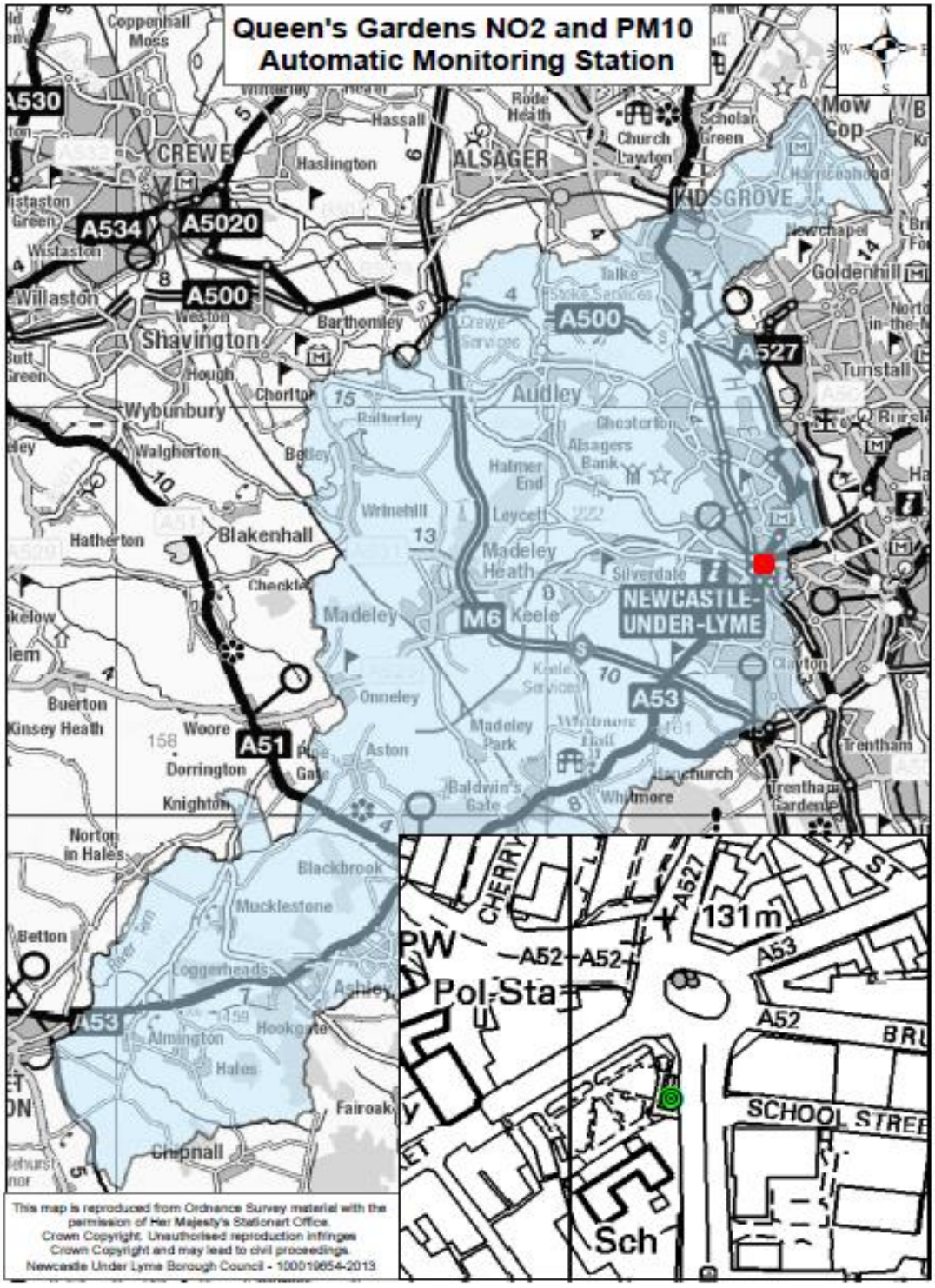

Figure 6: Location of automatic monitoring station

2.1.2 Non-Automatic Monitoring Sites

During 2014, the Borough Council operated a Nitrogen Dioxide diffusion tube network consisting of 39 sites principally located near to major highways or traffic congested areas. Sites have been chosen based on local knowledge and are in the main representative of relevant worst case exposure.

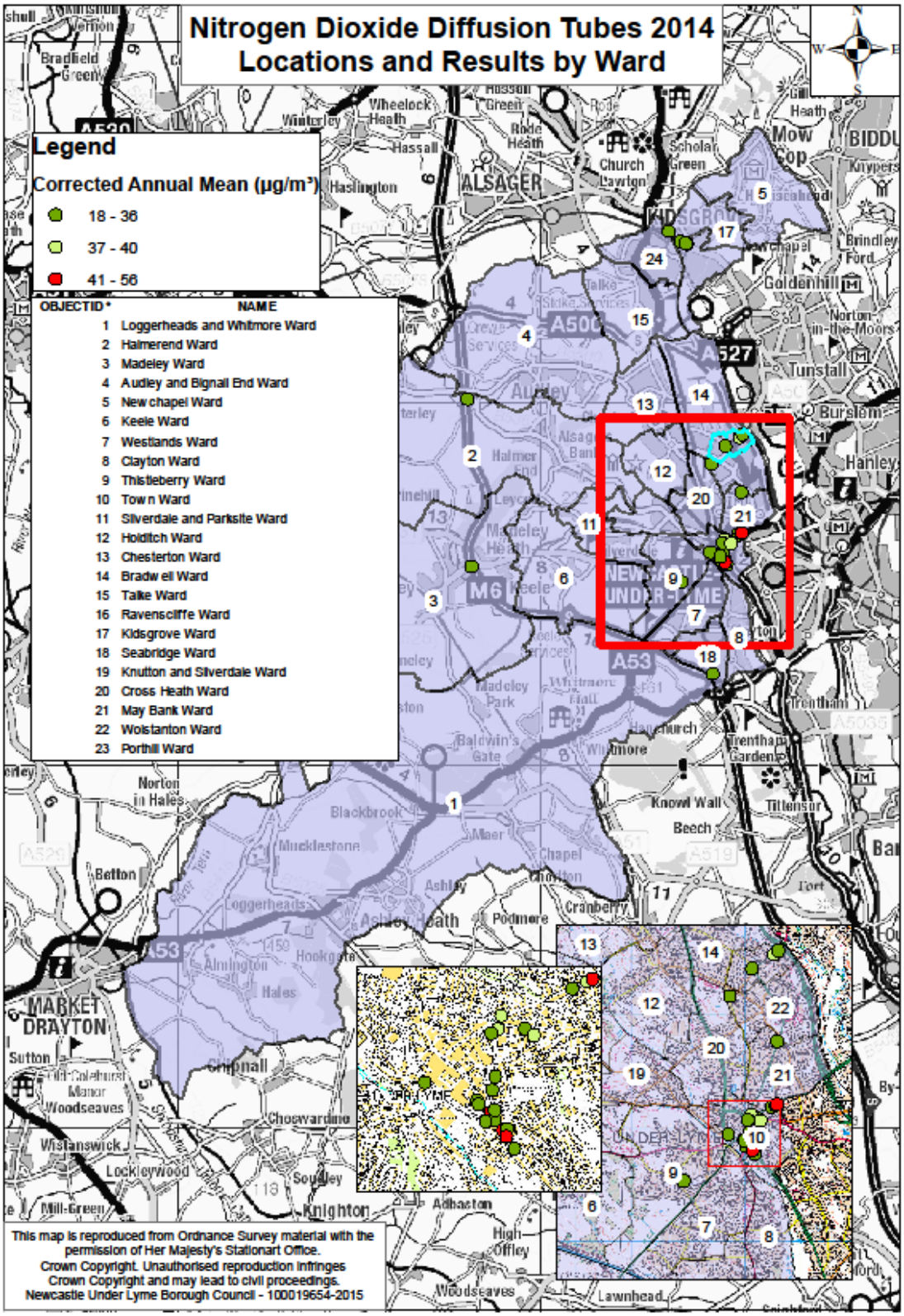

Figure 7 N02 Diffusion tube locations 2014

Figure 7, shows the diffusion tube monitoring locations across the Borough whilst Error! Reference source not found.**4** gives the details of these sites.

During 2014, the supply and analysis of the nitrogen dioxide diffusion tubes was undertaken by Gradko International Ltd. Officers from the Council are responsible for deploying and retrieving diffusion tubes with handling procedures following relevant guidance detailed in LAQM.TG(09). Diffusion tubes are typically exposed for either 4 or 5 whole weeks in accordance with the calendar published by DEFRA.

2.1.3 QA / QC Procedures for Diffusion Tubes

Details of the QA/QC procedures for the nitrogen dioxide diffusion tubes used in 2014 are given in Appendices C & D.

Table 4: Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT K1	A34 Holy Trinity	Kerbside	385051	345726	3	NO_2	**Yes**	N	N (22)	3	Y
DT K2	76 King St, N/C	Urban Centre	385469	346362	2	NO_2	**Yes**	N	N (0.2)	3	Y
DT UB1	Wolstanton (Haritngton St)	Kerbside	384739	348326	3	NO_2	**Yes**	N	N (7)	2	Y
DT UB2	Westlands (4 Sneyd Cr)	Kerbside	383916	345059	3	NO_2	No	N	N (23)	2	Y
DT 3	Madeley (Collingwood 3 Newcastle Rd)	Rural	378116	345488	-2	NO_2	**Yes**	N	Y (0.2)	128	Y
DT 6	Kidsgrove (106 Liverpool Rd)	Suburban	384014	354429	3	NO_2	**Yes**	N	Y (0.2)	4	Y
DT 9	32 Porthill Bank	Suburban	385519	349055	3	NO_2	**Yes**	N	Y (0.2)	6	Y
DT 11	34 London Road, N/C	Suburban	385112	345636	3	NO_2	**Yes**	N	Y (0.3)	3	Y
DT 15	218 Congleton Road	Suburban	382660	354191	3	NO_2	No	N	Y (0.2)	4	Y
DT24	26 High Street, May Bank	Suburban	385574	347530	3	NO_2	**Yes**	N	Y (0.2)	4	Y
DT 28	Limbrick Cottage Shraleybrook	Rural	377994	350105	6	NO_2	No	N	Y (0.3)	45	Y
DT 34	15 Barracks Road	Urban Centre	385059	345840	3	NO_2	**Yes**	N	Y (1)	4	Y
DT 39	4/6 Liverpool Road, Kidsgrove	Suburban	383560	354739	3	NO_2	**Yes**	N	Y (0.2)	2	Y

Table 4: Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT40	Banktop Court, Porthill	Suburban	385128	348811	5	NO_2	**Yes**	N	Y (0.2)	20	Y
DT 42	Jubilee Baths, Newcastle	Urban Centre	385086	346155	3	NO_2	**Yes**	N	N (0.2)	4	Y
DT 46	1 London Road (Trinity Court)	Urban Centre	385073	345685	3	NO_2	**Yes**	N	Y (0.3)	5	Y
DT 47	1 London Rd (Brook La)	Urban Centre	385023	345678	3	NO_2	**Yes**	N	Y (0.3)	6	Y
DT 49	2 Vale View, Porthill	Urban Centre	385595	349129	10	NO_2	**Yes**	N	Y (0.2)	10	Y
DT 64	Kidsgrove Carpets 57 - 59 Liverpool Road	Roadside	383950	354445	3	NO_2	**Yes**	N	Y (0.2)	3	Y
DT 72	134 High Street Newcastle	Roadside	384980	345787	3	NO_2	**Yes**	N	Y (0.2)	4	Y
DT 73	21 London Road Newcastle	Roadside	385070	345738	3	NO_2	**Yes**	N	Y (0.2)	4	Y
DT 74	39 London Road Newcastle	Roadside	385132	345640	3	NO_2	**Yes**	N	Y (0.2)	2	Y
DT 76	11 Brunswick Street Newcastle	Roadside	385226	346156	3	NO_2	**Yes**	N	Y (0.2)	2	Y
DT 84	102 King Street Newcastle	Urban Centre	385548	346400	3	NO_2	**Yes**	N	Y (0.2)	5	Y
DT 85	106 King Street Newcastle	Urban Centre	385575	346413	2	NO_2	**Yes**	N	Y (0.2)	5	Y

Table 4: Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT 86	Hassell C.P. School Barracks Road N/C	Urban Centre	385075	345910	3	NO_2	**Yes**	N	Y (0.2)	5	Y
DT 87	Blue Chilli 1 King Street Newcastle	Urban Centre	385105	346225	2	NO_2	**Yes**	N	Y (0.2)	5	Y
DT 88	27 Lower Street Newcastle	Urban Centre	384709	345881	3	NO_2	**Yes**	N	Y (0.2)	5	Y
DT 89	Queens Gardens Newcastle	Urban Centre	385054	346134	1	NO_2	**Yes**	N	Y (1)	5	Y
DT 90	Queens Gardens Newcastle	Urban Centre	385054	346134	1	NO_2	**Yes**	N	Y (1)	5	Y
DT 91	Queens Gardens, Newcastle	Urban Centre	385054	346134	1	NO_2	**Yes**	N	Y (1)	5	Y
DT 92	41/43 Liverpool Road Kidsgrove	Urban Centre	383890	354461	3	NO_2	**Yes**	N	Y (0.2)	2	Y
DT 93	118 Liverpool Road Kidsgrove	Urban Centre	384056	354393	4	NO_2	**Yes**	N	Y (0.2)	3	Y
DT 94	116 Liverpool Road Kidsgrove	Urban Centre	384030	354416	4	NO_2	**Yes**	N	Y (0.2)	4	Y
DT 95	76 London Road Newcastle	Roadside	385171	345539	4	NO_2	**Yes**	N	Y (0.2)	2	Y
DT 96	52/54 London Road Newcastle	Roadside	385131	345601	3	NO_2	**Yes**	N	Y (0.2)	3	Y
DT 97	Blackfriars/ Lower Street	Roadside	384795	345796	2	NO_2	**Yes**	N	N (0.2)	2	Y
DT 98	Newcastle Taxis, Brunswick Street	Roadside	385274	346124	4	NO_2	**Yes**	N	Y (0.2)	6	Y

Table 4: Details of Non- Automatic Monitoring Sites

Site ID	Site Name	Site Type	X OS Grid Reference	Y OS Grid Reference	Site Height (m)	Pollutants Monitored	In AQMA?	Is Monitoring Co-located with a Continuous Analyser (Y/N)	Relevant Exposure? (Y/N with distance (m) from monitoring site to relevant exposure)	Distance to Kerb of Nearest Road (m) (N/A if not applicable)	Does this Location Represent Worst-Case Exposure?
DT 99	Morston Drive, Newcastle	Suburban	384784	342528	2	NO_2	No	N	Y (0.2)	117	Y

2.2 Comparison of Monitoring Results with Air Quality Objectives

During 2014, the Council undertook monitoring across the Borough to assess compliance with the objective standards for nitrogen dioxide ($N0_{2)}$ and particulate matter up to 10 microns in size (PM_{10}). This section discusses the findings of this monitoring.

2.2.1 Nitrogen Dioxide (NO_2) Automatic Monitoring Data

Automatic monitoring of nitrogen dioxide was undertaken throughout 2014 at Queens Gardens, Newcastle under Lyme.

The data capture for this site for 2014 was 99.6%. As this site yielded data capture of greater than 90%, it has not been necessary to annualise the results.

The results of this monitoring are presented in Table 5 for the annual mean objective and Table 6 for comparison with the 1-hour Mean Objective. There were no exceedances of the hourly mean objective or annual mean objective in this location

The trends in the automatic annual mean Nitrogen dioxide concentrations are shown in *Figure 8*. This graph compares the measurements taken by the automatic monitoring site within the Borough, to those of other authorities within the North Staffordshire and Midlands region.

Figure 8 shows that the Nitrogen dioxide levels within Newcastle Borough have good correlation with those in the other named authorities; therefore we can be confident that the results from the automatic monitoring site are recording emissions which are representative of the conditions in this region of the U.K. As expected the Nitrogen dioxide levels are higher in the winter months.

Table 5: Results of Automatic Monitoring for NO_2: Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2014 % [b]	Annual Mean Concentration (µg/m^3)					
					2009* [c]	2010* [c]	2011* [c]	2012 [c]	2013 [b]	2014 [b]
Queens Gardens	Roadside	Y	100	99.6	32.53	35.86	Data not available	31.92	28.8	33

In bold, exceedance of the NO_2 annual mean AQS objective of 40µg/m^3

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] Means have been annualised for April to December be "annualised" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if valid data capture is less than 75%

Table 6: Results of Automatic Monitoring for NO_2: Comparison with 1-hour Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data Capture for Monitoring Period % [a]	Valid Data Capture 2014 % [b]	Number of Hourly Means > 200µg/m^3					
					2009* [c]	2010* [c]	2011* [c]	2012 [c]	2013 [b]	2014 [b]
Queens Gardens	Roadside	Y	100	99.6	0	0	-	0	0	0

In bold, exceedance of the NO_2 hourly mean AQS objective (200µg/m^3 – not to be exceeded more than 18 times per year)

[a] i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

[b] i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

[c] If the data capture for full calendar year is less than 90%, include the 99.8th percentile of hourly means in brackets

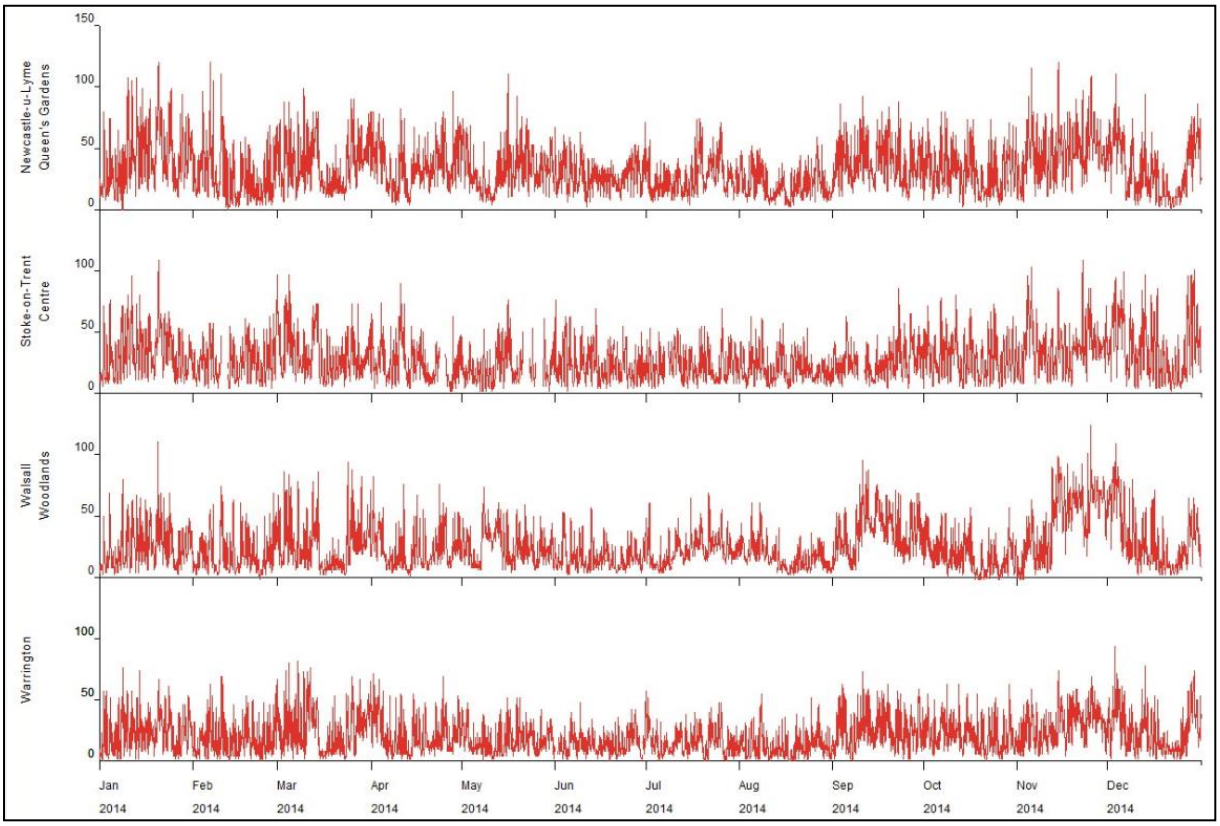

Figure 8 Trends in Annual Mean Nitrogen Dioxide Concentrations measures at Automatic Monitoring Sites

2.2.2 Passive Diffusion Tube Monitoring Data

At the start of 2014 a review of the monitoring locations was undertaken which resulted in13 diffusion tube sites being withdrawn from the monitoring scheme. Details of the sites which have been removed and the monitoring results for these sites over the past 5 years can be found in Table 7 below.

Sites DT41 and DT42, were removed from the monitoring scheme as they had been part of an historic triplicate tube exposure used during co-location sampling when a chemiluminescence analyser had also been in situ at the Jubilee Baths site. The analyser was removed from this location in 2005 however, the triplicate exposure remained.

Monitoring of this location is now undertaken by a single diffusion tube (Site ID DT42), which along with sites 89, 90, 91 and the automatic analyser situated at Queens Gardens; give a good indication of the NO_2 concentrations along this section of the A34-Rye Croft ring road which circles Newcastle-under-Lyme Town Centre.

The remaining 11 sites were removed from the diffusion tube monitoring scheme as the

annual corrected mean concentrations of NO_2 have been consistently below the annual mean objective.

Table 7: Diffusion Tube Sites which have been removed from the monitoring scheme

Site ID	Site Name	Annual Corrected Mean NO_2 Concentrations					
		2013[a]	2012[b]	2011[c]	2010[d]	2009[e]	5 Year Average
DT 31	102 London Road	30.2	33.8	32.1	39.3	32.4	33.56
DT 32	139 Dimsdale Parade West	28.9	32.3	31.3	36.3	30.8	31.92
DT 33	9 Hart Court, N/C	32.1	33.6	33.2	37.6	31.8	33.66
DT 41	Jubilee Baths	37	38.9	39	43.8	35.7	38.88
DT 43	Jubilee Baths	36.7	37.6	38.6	43.6	35.8	38.46
DT 50	84 London Road, N/C	28.1	30.2	30.2	35.2	28.9	30.52
DT 52	Agricon House, Madeley	29.3	31.1	32.9	34.4	31.2	31.78
DT 53	2 Knowle Bank Road, Audley	31.1	34	34.8	35.8	32.5	33.64
DT 62	79 Liverpool Road, Kidsgrove	28	30.1	29.6	32.8	27.9	29.68
DT 63	9-11 The Avenue, Kidsgrove	30.9	31.9	30.5	35.6	28.8	31.54
DT 77	68 Liverpool Road, Kidsgrove	28.5	28.4	28.8	33.6	26.9	29.24
DT 78	140 Liverpool Road, Kidsgrove	23.1	24.3	22.5	27	21.9	23.76
DT 79	89 Liverpool Road, Kidsgrove	31.1	33.5	33.5	38.1	30.4	33.32

Note
a Bias adjustment factor for 2013 is 0.95
b Bias adjustment factor for 2012 is 0.97
c Bias adjustment factor for 2011 is 0.88
d Bias adjustment factor for 2010 is 0.90
e Bias adjustment factor for 2009 is 0.80

Values highlighted in red show sites where the annual mean objective has been exceeded.
Values highlighted in yellow show sites where the annual mean concentration is within10% of the annual mean objective.

The Nitrogen dioxide diffusion tube results for 2014 are shown in Table 8 with the full dataset for the year given in Appendix 3. Detailed maps showing the results at local level are shown in *Figure 9*, *Figure 10*, *Figure 11*, *Figure12* and *Figure* ***Error! Reference source not found.****13*.

All results have been bias corrected by a factor of 0.91 for the Gradko Laboratory, 20% TEA Water. The bias correction factor was obtained from the National Bias Adjustment Factors page of the Defra website.[1] A copy of the bias correction study is included in Appendix A.

With the exception of sites K1, K2, UB1 and UB2 which are diffusion tube sites forming part of the national diffusion tube network, all sites are considered to be representative of relevant exposure and accordingly it has not been necessary to undertake any distance correction of the measured results.

As all sites have yielded greater than nine months' worth of data, it has not been necessary to annualise any of the results.

There are five locations in two geographic areas of the Borough which are representative of relevant exposure and where results yielded are at or above the annual mean objective of 40 µg/m^3 and these are highlighted in red. These locations are:-

- Kidsgrove (A50 Liverpool Road)
    - Site 6 – 106 Liverpool Road
- Newcastle Town Centre
    - Site K1 – A34 Holy Trinity
    - Site 11 – 11 to 34 London Road
    - Site 85 – 106 King Street
    - Site 96 – 52/54 London Road Newcastle

All of the above mentioned locations are within the AQMA boundaries declared by Newcastle Borough in January 2015. Air Quality action planning is currently being undertaken to look at ways in which the NO_2 levels in these areas can be addressed. Details regarding action planning for the AQMAs will be discussed in future reports.

[1] http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html

There are a further six sites in three geographic locations, which have yielded bias adjusted results that are below the annual mean objective, but are showing results that are within 10% of the annual mean objective (at or above 36µgm^3). These sites are;

- Porthill Bank
    - Site 9 – 32 Port Hill Bank
- Newcastle Town Centre
    - Site 42 – Jubilee Baths, Brunswick Street
    - Site 84 – 102 King Street
    - Site 87 – Blue Chilli, 1 King Street
    - Site 98 – Newcastle Taxis
- Kidsgrove
    - Site 64 - Kidsgrove Carpets, 57-59 Liverpool Road

The sites above are included in the AQMAs which have been declared by Newcastle Borough in December 2014, as they are risk of exceeding the annual mean in future years.

All sites which have shown annual mean nitrogen dioxide levels that are in excess or within 10% of the annual emission limit are within areas which have been declared as AQMAs. No further sites have been found to be in exceedance of the annual emission limit value.

There are no locations which have shown results in excess of 60 µg/m^3, accordingly this can be taken as a positive indication that the 1 hourly objective standard of 200 µg/m^3 is not being breached.

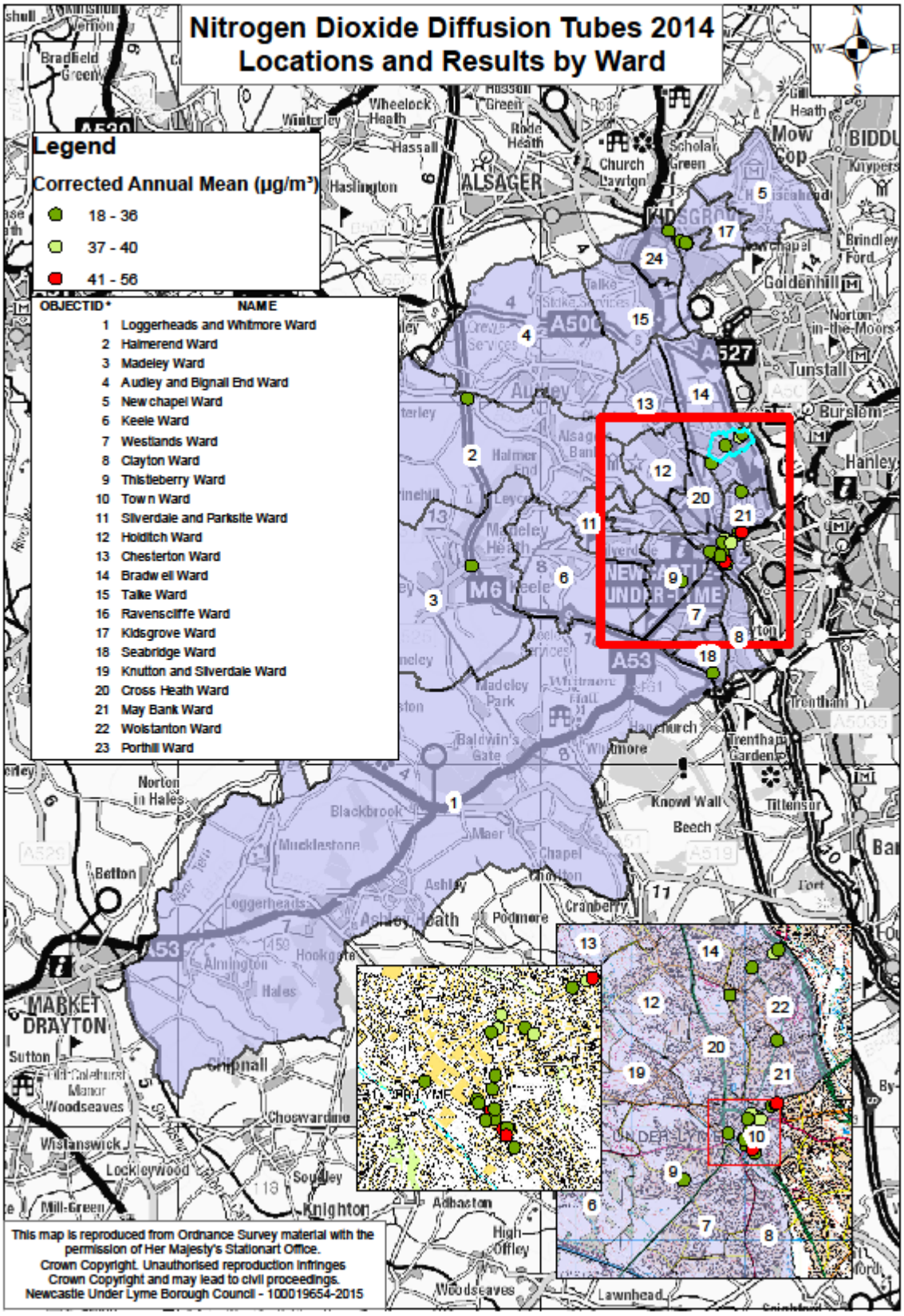

Figure 9: Nitrogen Dioxide Diffusion tube results 2014

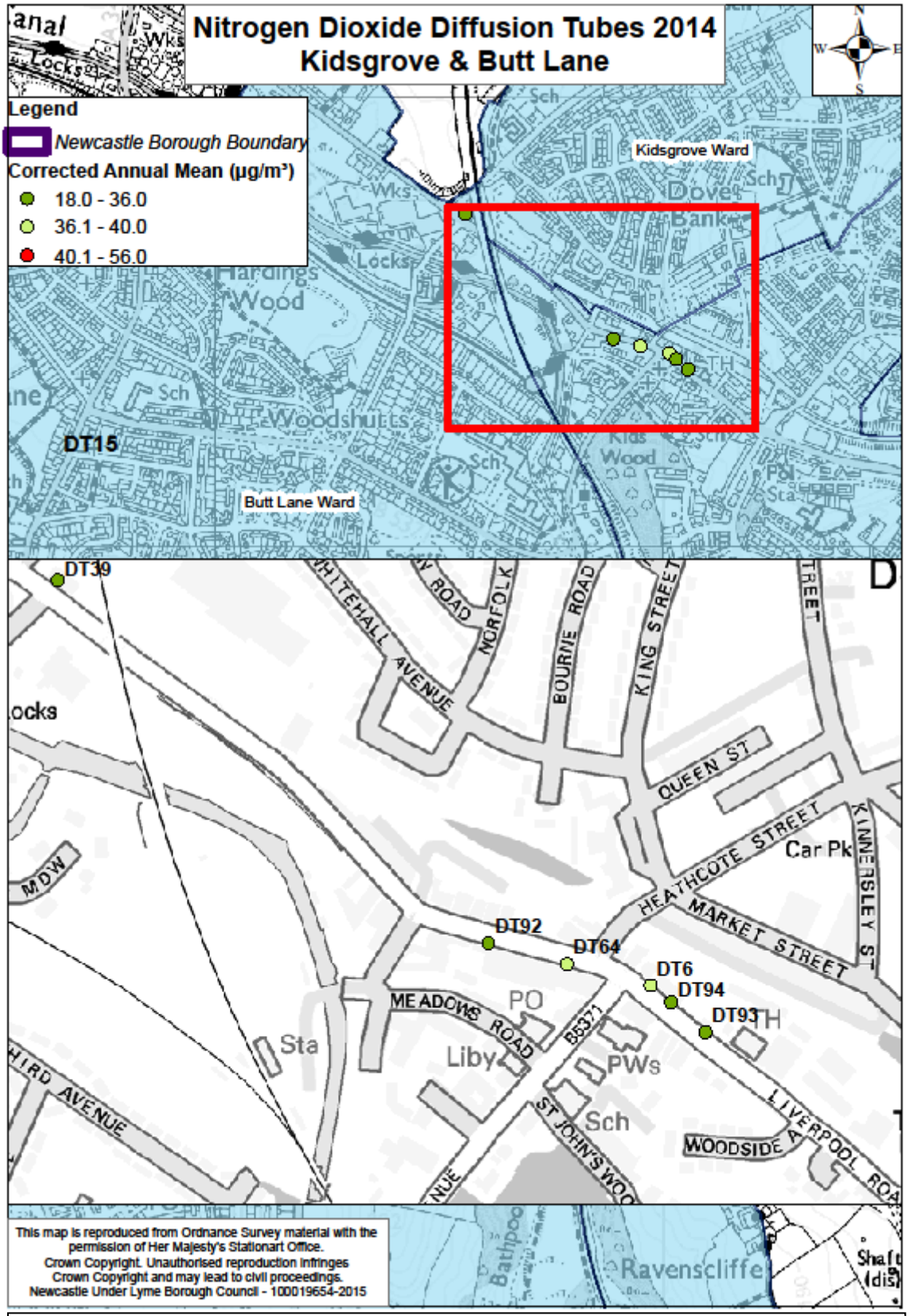

Figure 10: Map of the Kidsgrove and Butt Lane area showing Nitrogen Dioxide Diffusion Tube annual mean results for 2014

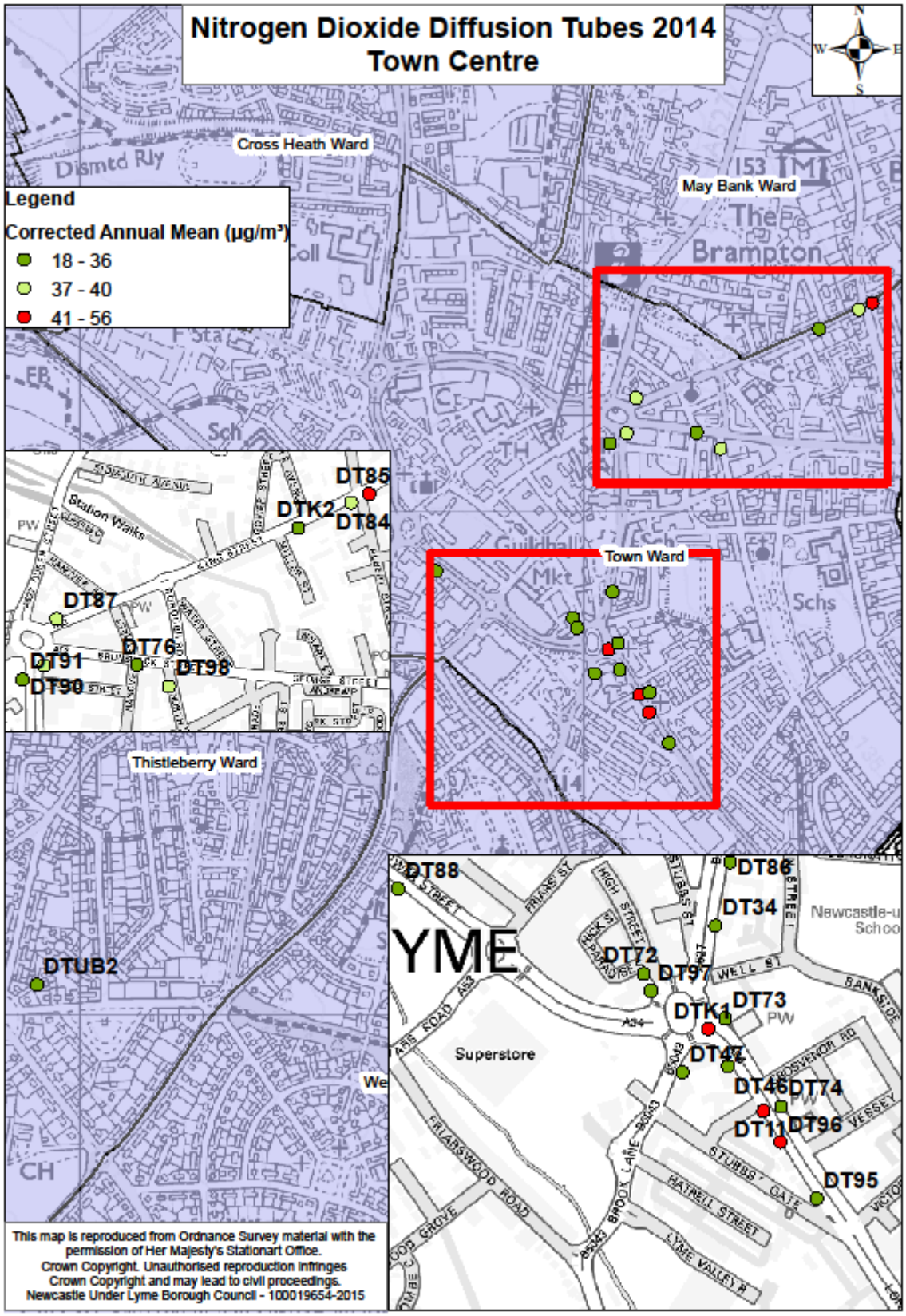

Figure 11: Map showing annual mean Nitrogen Dioxide results in the Town Centre

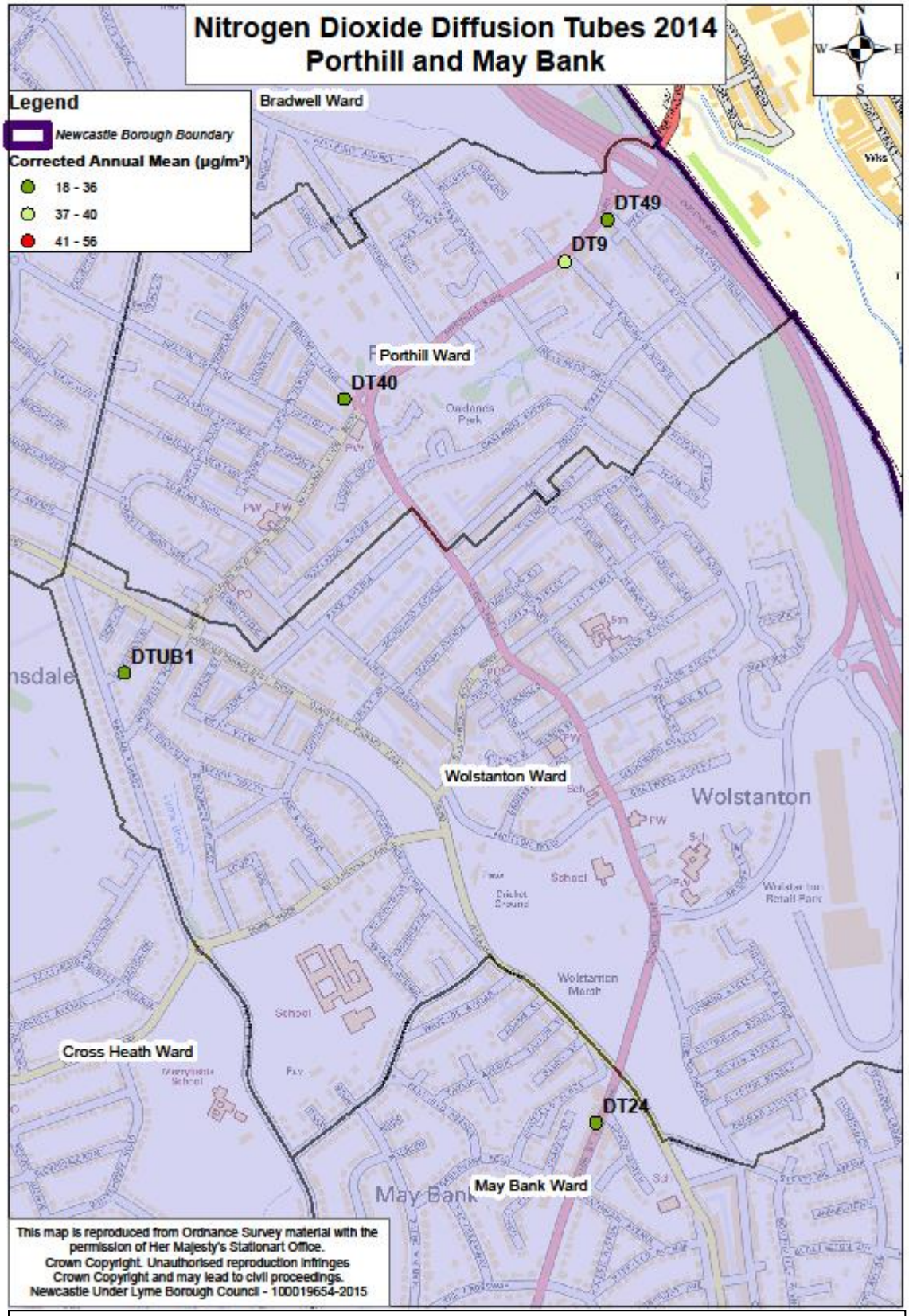

***Figure 12*:** Map showing Map showing annual mean Nitrogen Dioxide results in the Porthill Maybank area

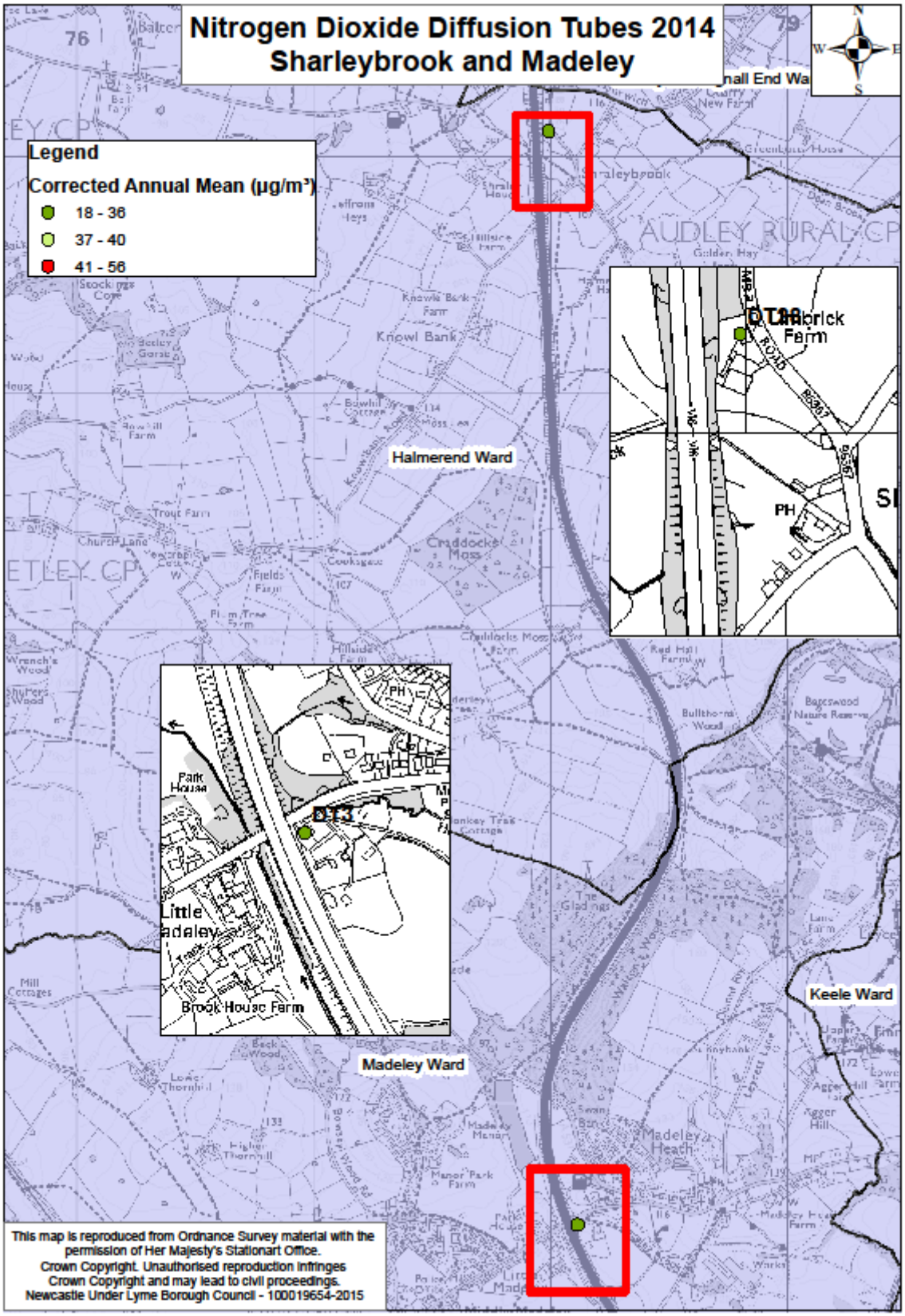

***Figure 13*:** Map showing annual mean N02 results in the Shraley Brook and Madeley area

Table 8: Results of NO_2 Diffusion Tubes 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2014 (Number of Months or %) [a]	2014 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.91 [b]
DTK1	**A34 Holy Trinity**	**Kerbside**	**Y**	**N**	**11**	**41.4**
DTK2	76 King St, N/C	Urban Centre	Y	N	12	31.4
DTUB1	Wolstanton (Haritngton St)	Kerbside	Y	N	11	18.3
DTUB2	Westlands (4Sneyd Cr)	Kerbside	N	N	12	17.9
DT3	Madeley (Collingwood 3 Newcastle Rd)	Rural	Y	N	12	36.3
DT6	**Kidsgrove (106 Liverpool Rd)**	**Suburban**	**Y**	**N**	**12**	**40.5**
DT9	32 Porthill Bank	Suburban	Y	N	12	37.2
DT11	**34 London Road, N/C**	**Roadside**	**Y**	**N**	**12**	**56.2**
DT24	26 High Street, Maybank	Suburban	Y	N	12	35.9
DT28	Limbrick Cottage Shraleybrook	Rural	N	N	12	33.1
DT34	15 Barracks Road	Urban Centre	Y	N	12	34.6
DT39	4/6 Liverpool Road, Kidsgrove	Suburban	Y	N	12	35.9
DT40	Banktop Court, Porthill	Suburban	Y	N	12	33.7
DT42	Jubilee Baths, Newcastle	Urban Centre	Y	Y	12	36.9
DT46	1 London Road (Trinity Court)	Urban Centre	Y	N	12	27.2
DT47	1 London Rd (Brook La)	Urban Centre	Y	N	12	32.9
DT49	2 Vale View, Porthill	Urban Centre	Y	N	12	30.6
DT64	Kidsgrove Carpets 57 - 59 Liverpool Road	Roadside	Y	N	12	37.3

Table 8: Results of NO_2 Diffusion Tubes 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2014 (Number of Months or %) [a]	2014 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.91 [b]
DT72	134 High Street Newcastle	Roadside	Y	N	11	32.2
DT73	21 London Road Newcastle	Roadside	Y	N	12	34.2
DT74	39 London Road Newcastle	Roadside	Y	N	12	35.0
DT76	11 Brunswick Street Newcastle	Roadside	Y	N	11	35.2
DT84	102 King Street Newcastle	Urban Centre	Y	N	12	39.5
DT85	**106 King Street Newcastle**	**Urban Centre**	**Y**	**N**	**12**	**42.4**
DT86	Hassell C.P. School Barracks Road N/C	Urban Centre	Y	N	12	33.2
DT87	Blue Chilli 1 King Street Newcastle	Urban Centre	Y	N	12	36.8
DT88	27 Lower Street Newcastle	Urban Centre	Y	N	12	33.6
DT89	Queens Gardens Newcastle	Urban Centre	Y	Y	12	32.0
DT90	Queens Gardens Newcastle	Urban Centre	Y	Y	12	33.7
DT91	Queens Gardens, Newcastle	Urban Centre	Y	Y	12	33.9
DT92	41/43 Liverpool Road Kidsgrove	Urban Centre	Y	N	12	36.0
DT93	118 Liverpool Road Kidsgrove	Urban Centre	Y	N	12	32.5
DT94	116 Liverpool Road Kidsgrove	Urban Centre	Y	N	12	34.6
DT95	76 London Road Newcastle	Roadside	Y	N	12	36.3
DT96	**52/54 London Road Newcastle**	**Roadside**	**Y**	**N**	**11**	**40.6**
DT97	Blackfriars/ Lower Street	Roadside	Y	N	12	35.5

Table 8: Results of NO_2 Diffusion Tubes 2014

Site ID	Location	Site Type	Within AQMA?	Triplicate or Co-located Tube	Full Calendar Year Data Capture 2014 (Number of Months or %) [a]	2014 Annual Mean Concentration (µg/m^3) - Bias Adjustment factor = 0.91 [b]
DT98	**Newcastle Taxis, Brunswick Street**	**Roadside**	**Y**	**N**	**12**	**40.3**
DT99	Morston Drive, Newcastle	Suburban	N	N	11	27.68

Note.

Rows highlighted in red show sites where the annual mean objective has been exceeded.

Rows highlighted in yellow show sites where the annual mean concentration is within10% of the annual mean objective.

Table 9: Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3					
			2010[(a)]	2011[(b)]	2012[(c)]	2013[(d)]	2014[(e)]	5 year Average
DTK1	Kerbside	Y	**52.0**	**44.8**	**47.1**	**45.0**	**41.4**	**46.06**
DTK2	Urban Centre	Y	**45.8**	37.8	34.2	32.9	31.4	36.42
DTUB1	Kerbside	Y	26.4	21.1	23.7	21.4	18.3	22.18
DTUB2	Kerbside	N	22.5	18.7	18.6	18.5	17.9	19.24
DT3	Rural	Y	**42.9**	**40.3**	39.6	36.4	36.3	39.10
DT6	Suburban	Y	**49.3**	**43.4**	**45.3**	**42.4**	**40.5**	**44.18**
DT9	Suburban	Y	**44.0**	39.3	**40.4**	35.6	37.2	39.30
DT11	Suburban	Y	**51.3**	**42.4**	**44.7**	**52.1**	**56.2**	**49.34**
DT24	Suburban	Y	**42.1**	38.8	**40.9**	37.0	35.9	38.94
DT28	Rural	N	**42.3**	37.6	36.8	35.3	33.1	37.02
DT34	Urban Centre	Y	**42.0**	37.1	38.7	37.7	34.6	38.02
DT39	Suburban	Y	**47.2**	39.8	39.9	38.3	35.9	**40.22**
DT40	Suburban	Y	38.3	34.7	33.8	34.8	33.7	35.06
DT42	Urban Centre	Y	**42.9**	39.5	38.4	35.7	36.9	38.68

Table 9: Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3					
			2010[(a)]	2011[(b)]	2012[(c)]	2013[(d)]	2014[(e)]	5 year Average
DT46	Urban Centre	Y	38.7	33.4	35.3	31.5	27.2	33.22
DT47	Urban Centre	Y	**40.2**	32.3	34.4	33.1	32.9	34.58
DT49	Urban Centre	Y	**40.4**	34.9	35.6	33.3	30.6	34.96
DT64	Roadside	Y	**44.6**	**40.1**	**41.1**	37.6	37.3	**40.14**
DT72	Roadside	Y	38.3	34.1	34.4	30.4	32.2	33.88
DT73	Roadside	Y	**44.1**	36.1	37.6	35.7	34.2	37.54
DT74	Roadside	Y	**46.0**	37.6	38.8	38.9	35.0	39.26
DT76	Roadside	Y	**45.2**	37.0	37.0	36.3	35.2	38.14
DT84	Urban Centre	Y	**43.2**	**41.2**	**43.9**	**40.1**	39.5	**41.58**
DT85	Urban Centre	Y	**50.7**	**52.1**	**49.1**	**45.1**	**42.4**	**47.88**
DT86	Urban Centre	Y	39.9	33.6	37.0	34.8	33.2	35.70
DT87	Urban Centre	Y	**48.2**	**42.0**	**43.4**	**40.3**	36.8	**42.14**
DT88	Urban Centre	Y	39.2	33.6	37.7	34.0	33.6	35.62

Table 9: Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) µg/m^3					
			2010[(a)]	2011[(b)]	2012[(c)]	2013[(d)]	2014[(e)]	5 year Average
DT89	Urban Centre	Y	38.5	34.2	34.9	34.9	32.0	34.90
DT90	Urban Centre	Y	37.3	34.4	37.0	33.5	33.7	35.18
DT91	Urban Centre	Y	39.2	34.2	36.6	32.5	33.9	35.28
DT92	Urban Centre	Y	-	35.8	39.0	36.9	36.0	36.93
DT93	Urban Centre	Y	-	35.2	37.8	33.8	32.5	34.83
DT94	Urban Centre	Y	-	36.3	39.2	38.1	34.6	37.05
DT95	Roadside	Y	-	37.1	**40.8**	**40.3**	36.3	38.63
DT96	Roadside	Y	-	**40.5**	**44.9**	39.2	**40.6**	**41.30**
DT97	Roadside	Y	-	35.2	39.6	36.7	35.5	36.75
DT98	Roadside	Y	-	-	-	**42.0**	**40.3**	**41.15**
DT99	Suburban	N	-	-	-	-	27.68	27.68

Table 9: Results of Nitrogen Dioxide Diffusion Tubes (2010 to 2014)

Site ID	Site Type	Within AQMA?	Annual mean concentration (adjusted for bias) μg/m^3					
			2010[(a)]	2011[(b)]	2012[(c)]	2013[(d)]	2014[(e)]	5 year Average

Note

(a) Bias adjustment factor for 2010 is 0.90

(b) Bias adjustment factor for 2011 is 0.88

(c) Bias adjustment factor for 2012 is 0.97

(d) Bias adjustment factor for 2013 is 0.95

(e) Bias adjustment factor for 2014 is 0.91

Values highlighted in red show sites where the annual mean objective has been exceeded.

Values highlighted in yellow show sites where the annual mean concentration is within10% of the annual mean objective.

Trends in Annual Mean Nitrogen Dioxide Concentrations measured at Diffusion Tube Monitoring Sites

The results obtained for 2014 have been compared with previous year's results as far back as 2007 and these are reproduced in Table 9. For sites which have been monitored since at least 2010, trends have been plotted and these are shown in Figures 9 to 33 together with appropriate comments.

The annual mean results for urban background sites shown in *Figure 10* and *Figure 11*, show that the long term trends in urban background concentrations of NO_2 have been increasing slightly each year since 2007. A peak in NO_2 concentrations can be seen in 2010 which corresponds with elevated levels that were detected nationwide in that year. The annual mean results (shown by the dark blue line) in *Figures 14* and *15* show that Nitrogen Dioxide levels for both sites UB1 and UB2 have been consistently below the annual mean objective since 2007. Both figures also show that there has been a decrease in background NO_2 concentrations from 2012 to 2014 in these areas; this is most noticeable on *Figure 11,* where from 2012 to 2014 there has been a decrease of 65% (5.6ug/m^3 NO^2).

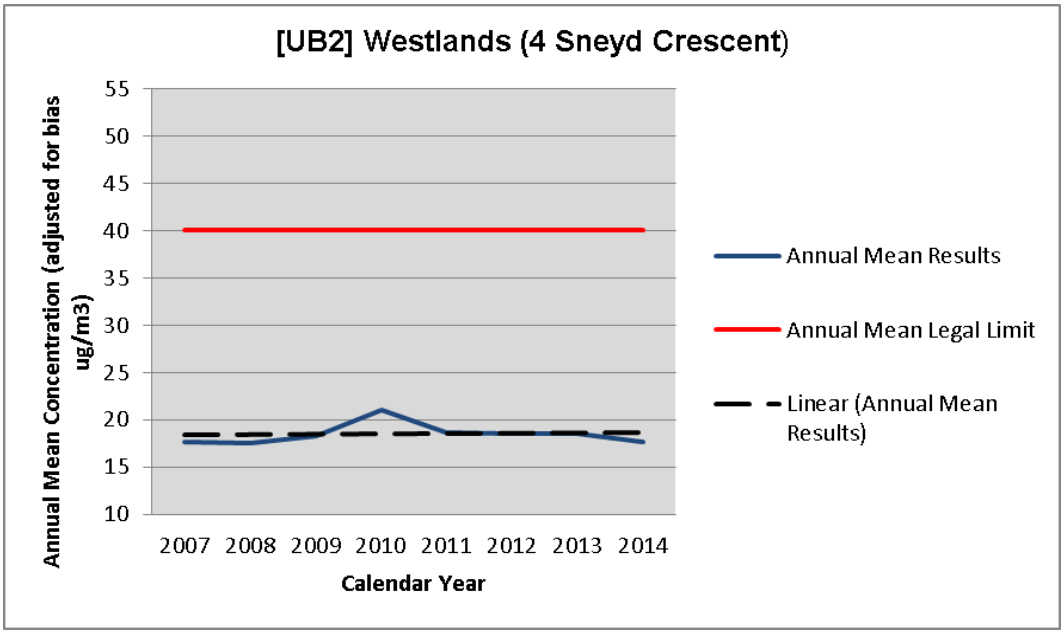

Figure 14: Long term annual mean $N0_2$ trends at urban background site DT UB2 4 Sneyd Crescent, Westlands

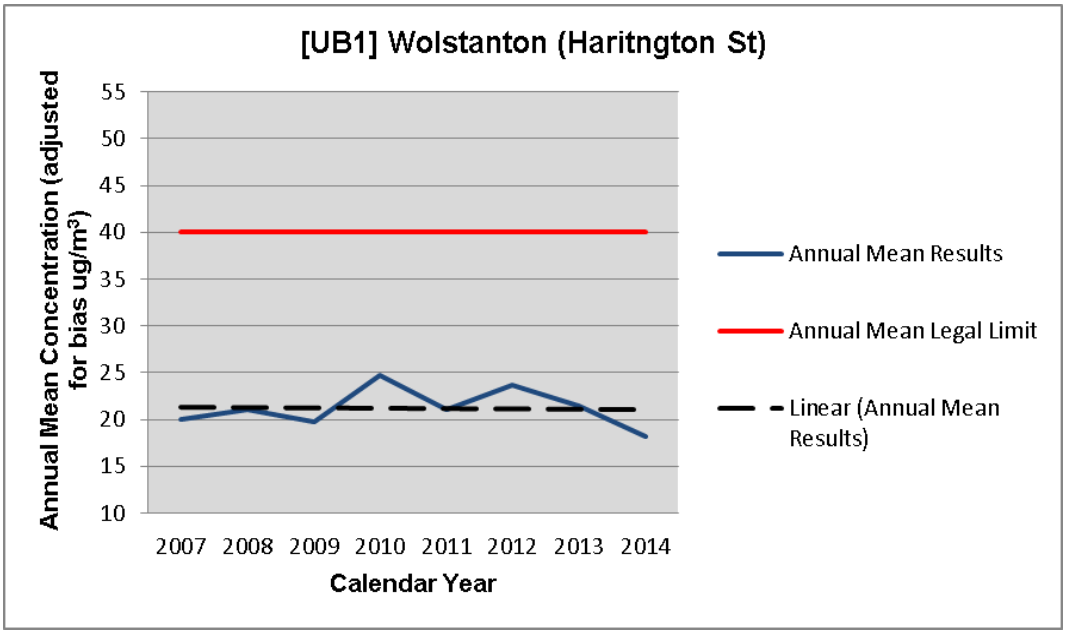

Figure 15: Long term annual mean $N0_2$ trends at urban background site DTUB1, Hartington Street, Wolstanton

Passive Nitrogen Dioxide Diffusion Tubes in Newcastle Town Centre

Newcastle-under-Lyme Town Centre has a total of 23 diffusion tube sites which measure NO_2 levels in this area.

Three diffusion tube sites around the town centre were withdrawn from the monitoring scheme at the start of 2014. Details of which sites were removed from the monitoring scheme are listed below, with further information given in Table 7;

Site 31	The annual corrected mean concentrations of NO_2 have been consistently below the annual mean objective.
Site 33	The annual corrected mean concentrations of NO_2 have been consistently below the annual mean objective.
Site 41 & 42	Part of an historic triplicate tube exposure used during co-location sampling when a chemiluminescence analyser had also been in situ. The analyser was removed from this location in 2005. Monitoring of this location is now undertaken by a single diffusion tube (Site ID DT42)

Figure 16 below, shows the long term annual mean NO_2 trends for 10 sites across the town centre. From this graph it is clear to see that there has been a general decrease in NO_2 concentrations at the majority of sites since 2012. However, this graph also shows that there has been a significant increase in NO_2 concentration over the past 8 years at a single location (site 11) at 34 London Road, Newcastle in particular (trends for this site are shown in green on *Figure 16*).

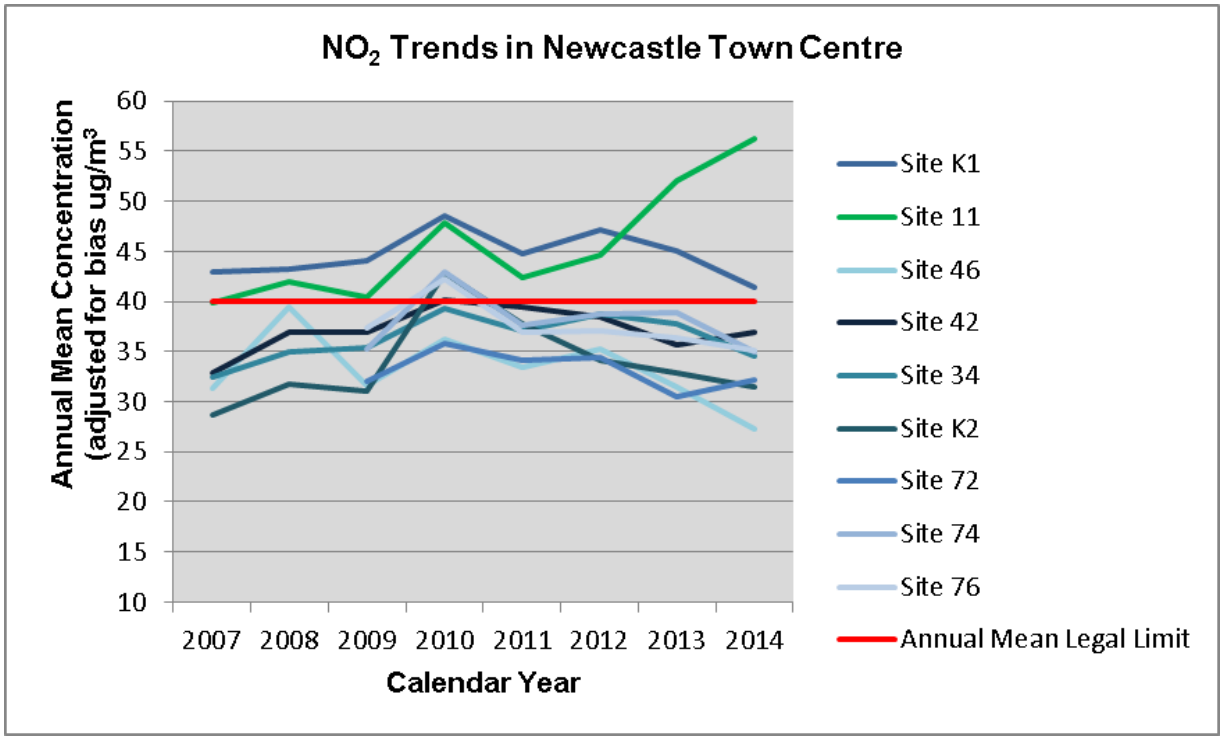

***Figure 15**:* Long term annual mean $N0_2$ trends at 10 monitoring sites across Newcastle Town Centre

The location of site 11 (34 London Road) is shown in *Figure 17*, with *Figure 18* showing the annual mean trends in NO_2 at this location in greater detail. This site is a roadside location which obtained 12 months of data capture in 2014. The increased NO_2 concentration being measured at this location may be attributed to a number of factors such as;

- This area of London Road being heavily congested – London Road is one of the main routes which join on to the Town Centre ring-road (A34)
- The road having a high flow of buses/ HGVs
- This area of road meeting with a heavily trafficked junction and roundabout
- The street being narrow with residential properties close to the kerb on either side of the road

In *Figure 18* below, it is clear that since 2011 there has been a steady rise in NO_2 concentrations at site 11. In three years (from 2011 to 2014) there has been an increase of 7.8% in NO_2 concentration at this site.

***Figure 16*:** Map showing the location of site 11 at 34 London Road, Newcastle

Site 11 is encompassed within the Air Quality Management Area for Newcastle Town Centre, and so the causes for the increase in NO_2 at this location will be looked at in detail to try to ascertain the best control method(s) that can be used at this location to prevent further increases and bring the NO_2 level down to within the annual mean objective. Action planning for the AQMA is due to take place during 2015, with details of the outcome of the planning stage being discussed in future monitoring reports.

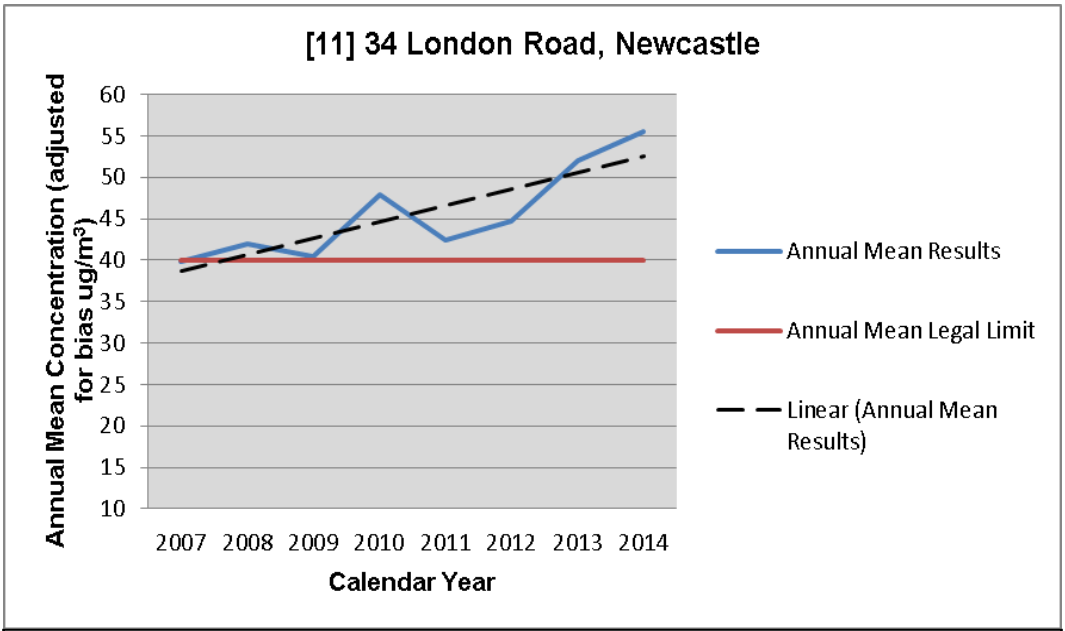

Figure 17: Long term annual mean $N0_2$ trends at site DT11, 34 London Road, Newcastle

Diffusion tube site K1 is not representative of relevant exposure as it is sited on a lamppost adjacent to the A34 dual carriageway. This site does however form part of the national $N0_2$ diffusion tube monitoring network. Annual NO_2 concentrations at site K1 for the past seven years can be seen in *figure 19* below. *Figure 19* shows that there has been a neutral trend in NO_2 concentrations at this site over the past seven years, with an 8% decrease in NO_2 concentrations at this site over the past three years. Annual mean nitrogen dioxide values are still above the annual mean objective, and so further monitoring of this site is to be undertaken.

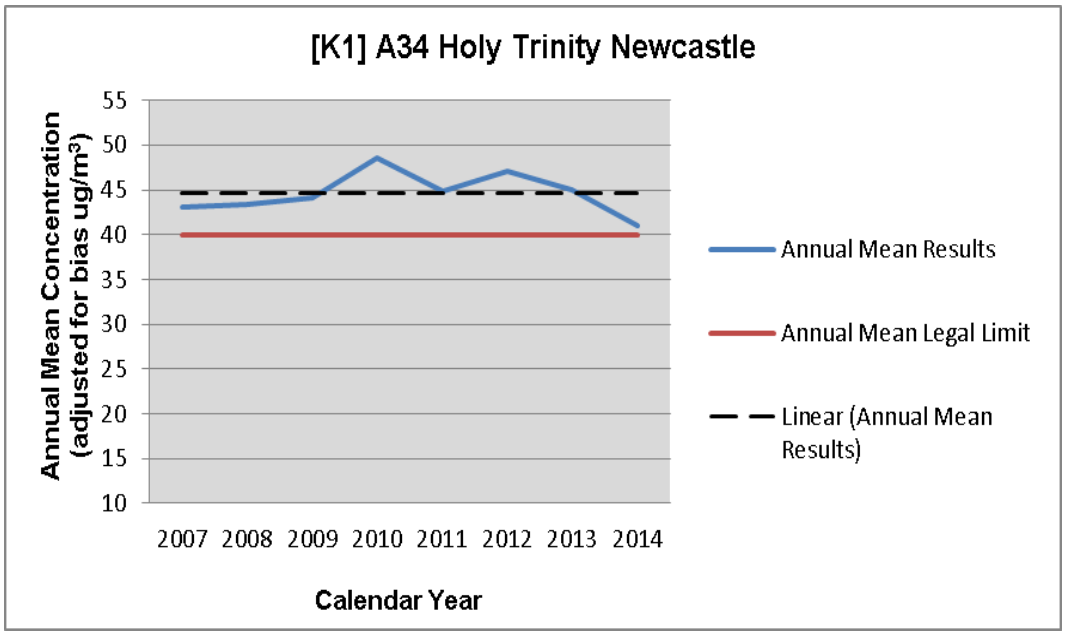

Figure 18: Long term annual mean $N0_2$ trends at site K1, A34 Holy Trinity

Diffusion tube site 34 (*Figure 20*) is representative of relevant exposure being sited on the façade of a terraced property which sits on the footway adjacent to the town centre ring road. At peak times there is quite often slow moving and queuing traffic in this location. This site is exhibiting a gradual upward trend in $N0_2$ exposure, despite nitrogen dioxide levels decreasing slightly (decrease of 8%) over the past 12 months. Further monitoring of this site is to be undertaken to assess the risk of breaching the annual mean objective in future years.

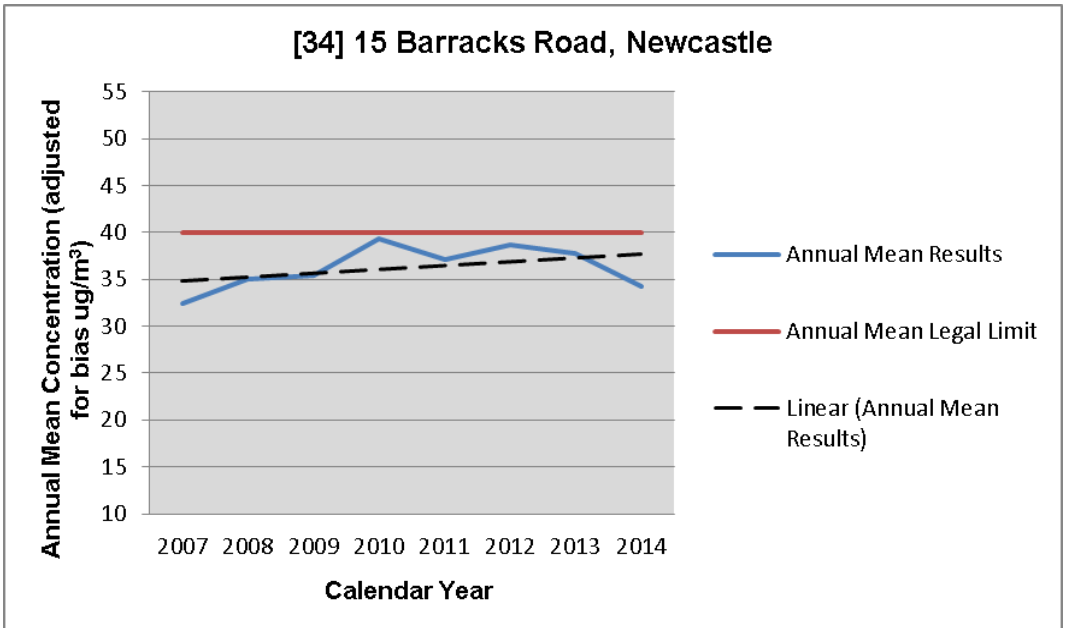

Figure 19: Long term annual mean trends at site DT34, 15 Barracks Road, Newcastle

Diffusion tube site 46 (*Figure 21*) are representative of relevant exposure being located on the façade of a block of flats which sit on a footway adjacent to a major roundabout on the A34 and town centre ring road. This forms one of the major routes into the town centre. Traffic around this location tends to flow freely. There is a downward trend in NO_2 exposure in this location with a significant decrease in concentrations from 2012 to 2014 (dropped from 35.3 to 27.2, decrease of 22.9%). Continued monitoring of the NO_2 levels at this site will be undertaken due to the position of the site within the town centre ring road.

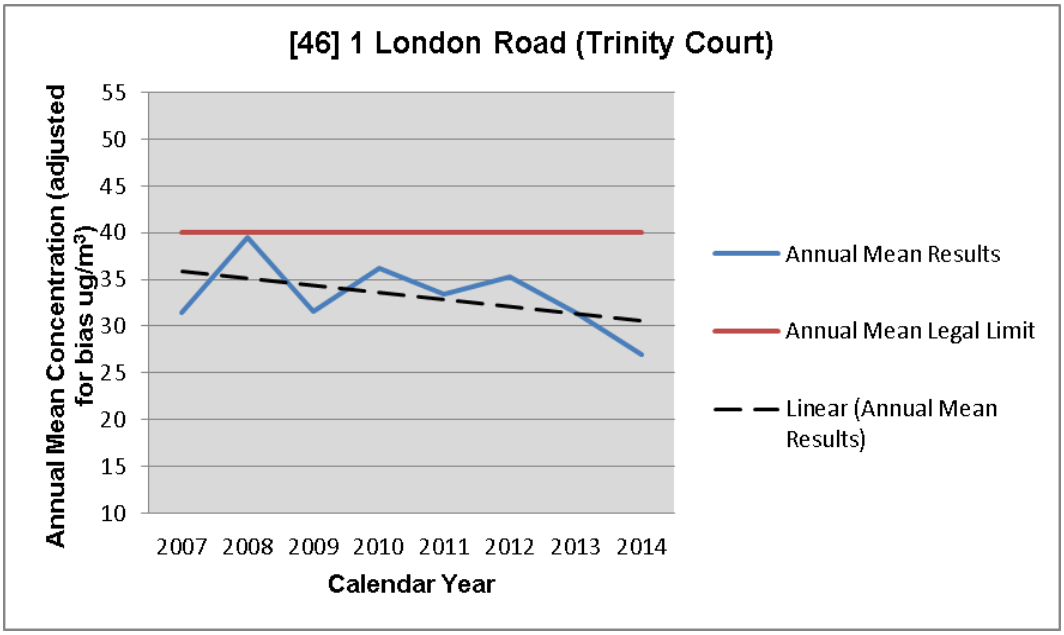

Figure 20: Long term annual mean $N0_2$ trends at site DT46, 1 London Road, (London Road Façade) Newcastle

Diffusion tube site 42 (*Figure 22*) is not currently representative of relevant exposure being located on the site of the former Jubilee Pool. This site sits adjacent to the town centre ring road and the Nelson Place Roundabout which is an important junction for traffic entering and leaving the Borough and travelling around the town centre. The site is to be developed for student accommodation over the next 24 months. At peak times there is quite often slow moving and queuing traffic in this location. This site is exhibiting a gradual upward trend in $N0_2$ exposure and there is a risk of breaching the annual mean objective in future years.

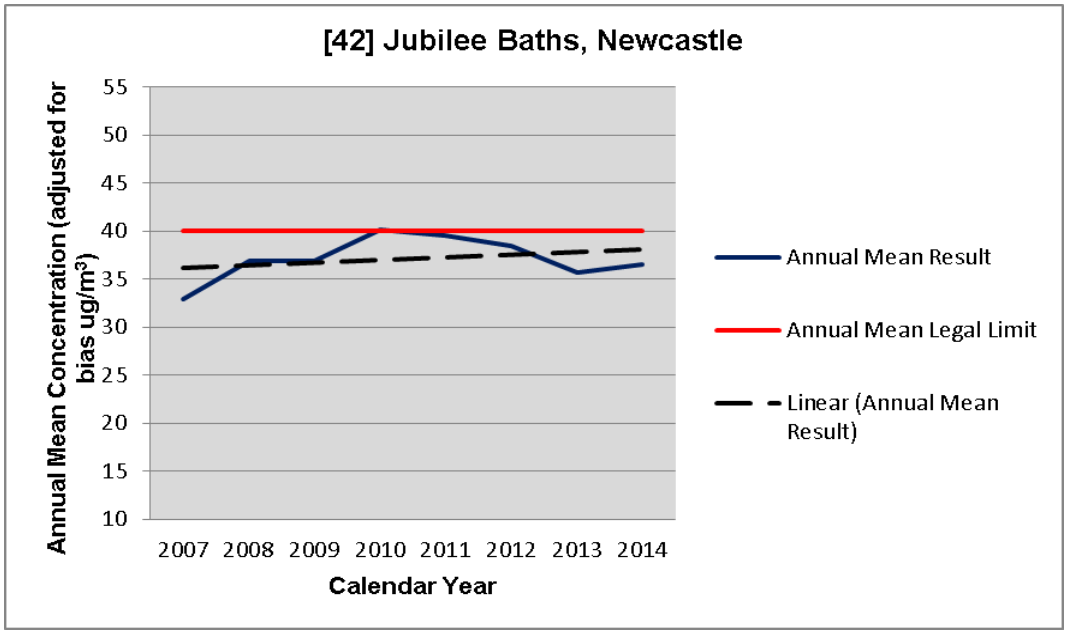

Figure 22: Long term annual mean $N0_2$ trends at site 42 Jubilee Baths, Newcastle

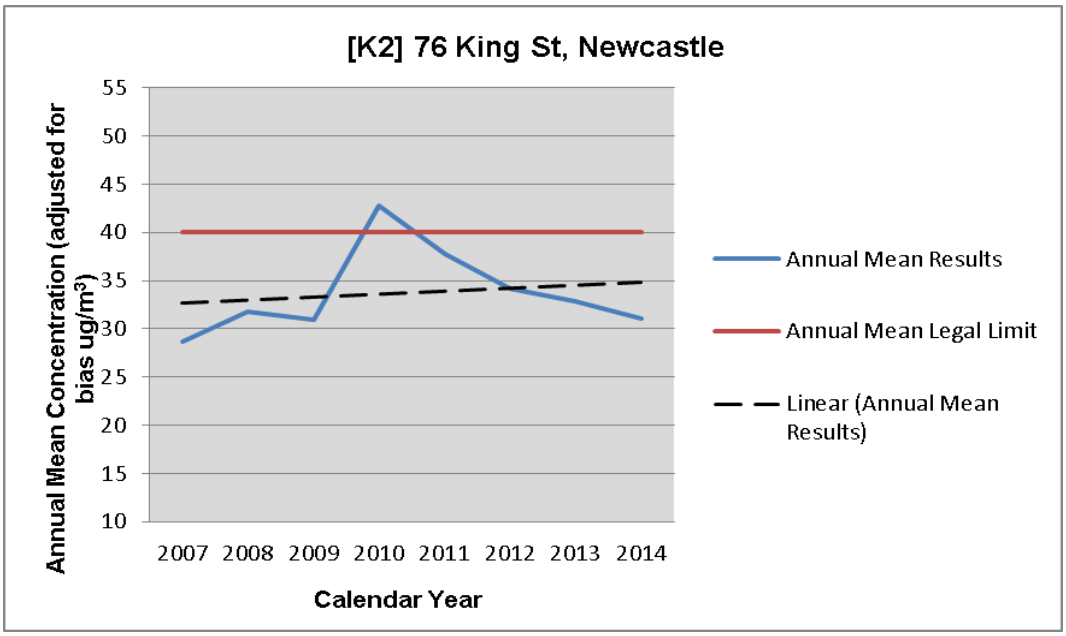

Figure 21: Long term annual mean $N0_2$ trends at site K2- 76 King Street, Newcastle

Long term annual mean concentrations for diffusion tube site K2 can be seen in *Figure 23* above. The location of this monitoring site is representative of relevant exposure as it is located on the façade of a house on the A53, which is forms one of the major routes between Newcastle-under-Lyme and Stoke-on-Trent. At peak times there is quite often queuing traffic on the road. This site is exhibiting a gradual increase in $N0_2$ exposure despite measure annual mean values at this location (shown by the blue graph line) decreasing from 2010.

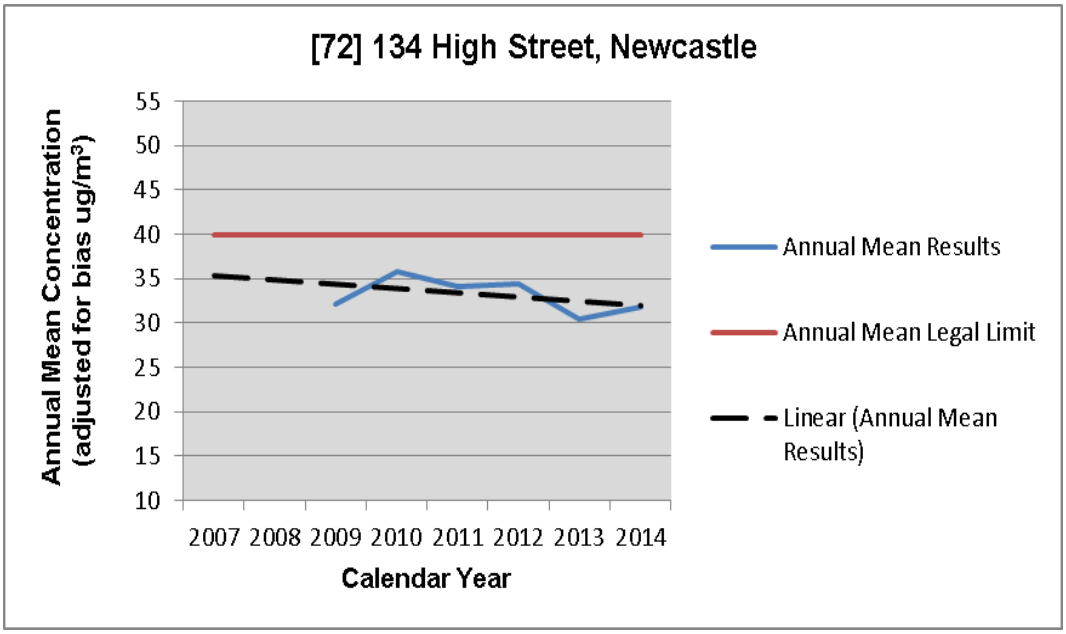

Figure 22: Long term annual mean NO_2 trends at site 72, 134 High Street, Newcastle

Diffusion tube site 72 is not representative of relevant exposure as it is adjacent to an entrance to the pedestrian subway which passes under one of the main roundabouts which feed into the ring road. *Figure 24* shows that there has been a gradual decrease in the long term annual mean NO_2 trends at site 74 over the past seven years, and that NO_2 levels at this location have been below the annual mean legal limit value since monitoring of this location began.

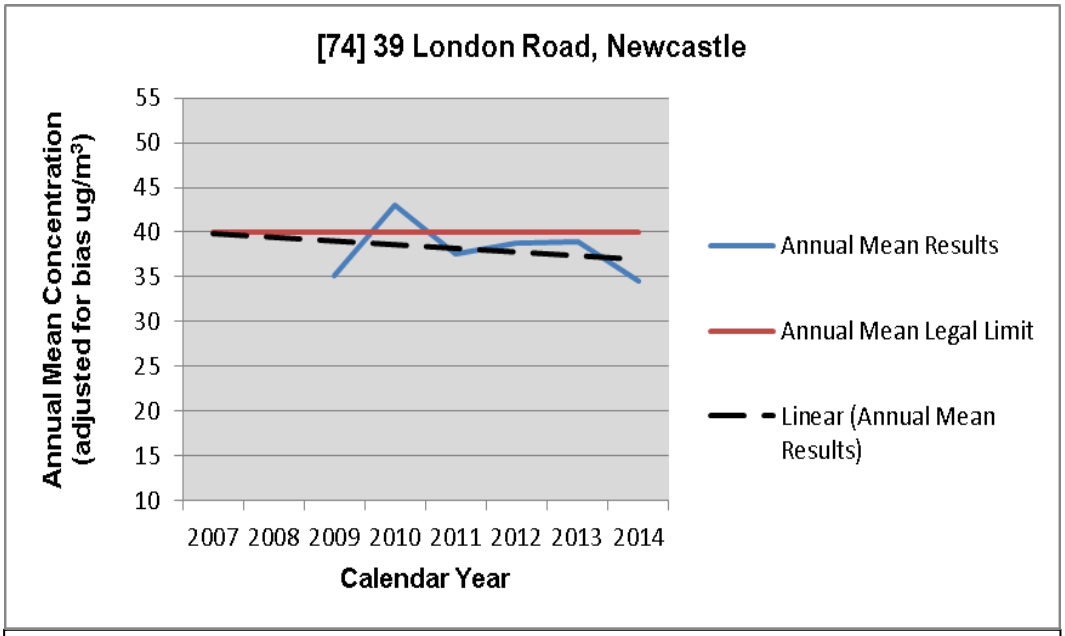

Figure 23: Long term annual mean NO_2 trends at site 74, 39 London Road, Newcastle

Site 74 is representative of relevant exposure as it is situated on the façade of a residential property. *Figure 25*, shows that there has been a general decrease in the nitrogen dioxide levels at site 74, with a decrease of 10% in measured levels of nitrogen dioxide over the past 12 months. As the 5 year average for this site is 39.26, it warrants further monitoring.

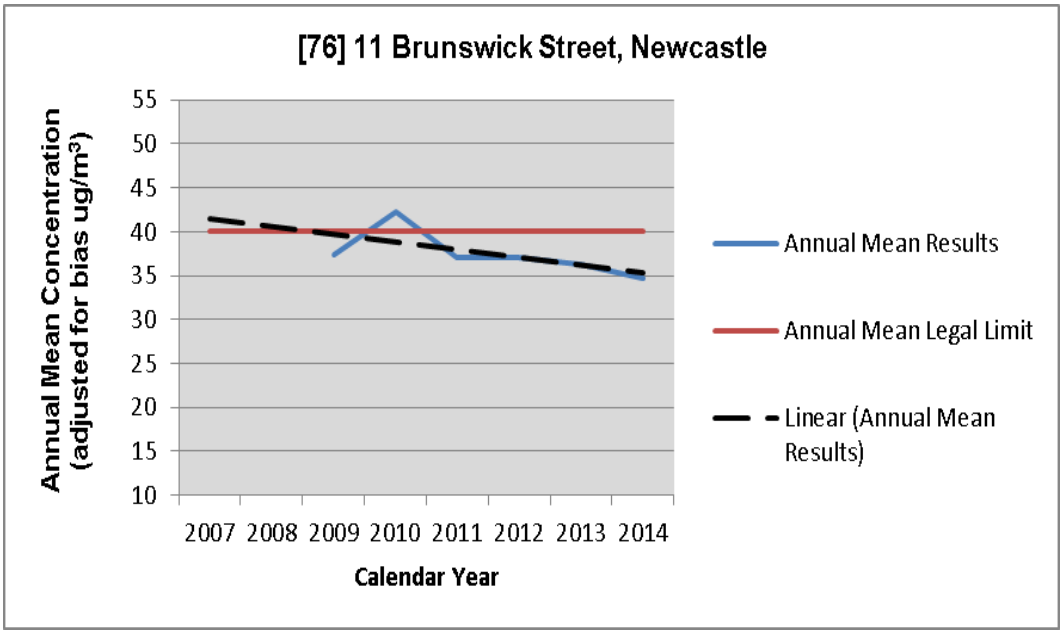

Figure 24: Long term annual mean NO_2 trends at site 76, 11 Brunswick Street, Newcastle

Site 76, is represenative of relevant exposure as it is positioned on the façade of a property which is on one of the main routes which feed into the A34 Town Center ring road. *Figure 26*, shows that there has been a downward trend in NO_2 exposure at this location with annual nitrogen dioxide levels now being below the annual mean legal limit.

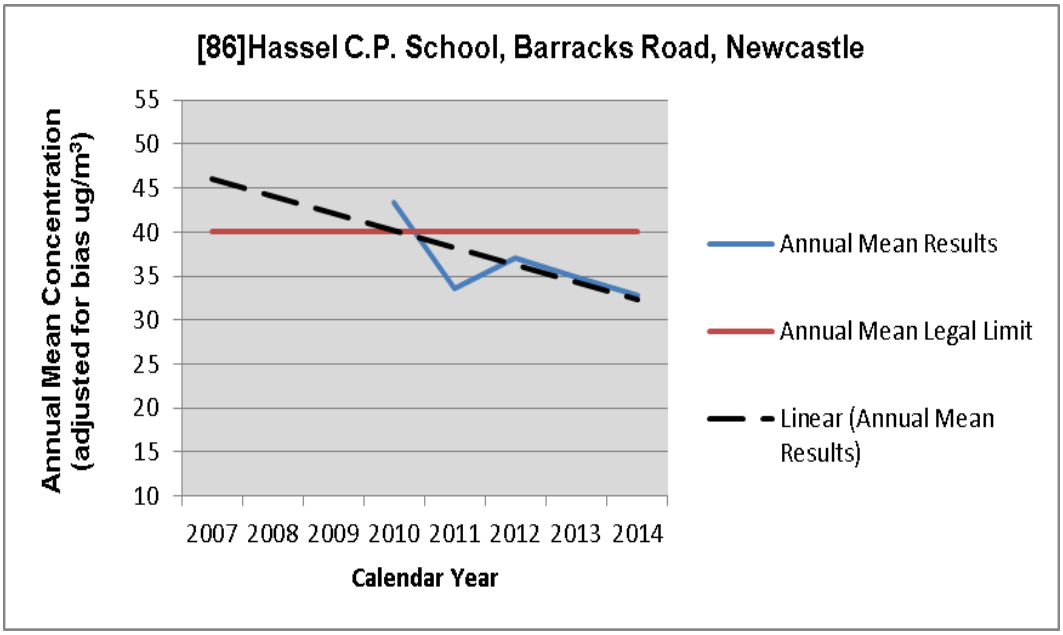

Figure 25: Long term annual mean NO_2 trends at site 86, Hassel C.P. School, Barracks Road, Newcastle

Figure 27 shows the long term annual NO_2 trends at site 86. This site also shows a donward tren in Nitrogen dioxide levels. There was a slight increase of NO_2 in 2012 which could have been attributed to the re-modelling of the bus station. Since this project has been completed, levels have decreased each year.

Passive Nitrogen Dioxide Diffusion Tubes in Kidsgrove

Kidsgrove has 6 passive diffusion tube sites which measure NO_2 levels.

Five diffusion tube sites in the Kidsgrove area were withdrawn from the monitoring scheme at the start of 2014, as they showed annual corrected mean concentrations of NO_2 which were consistently below the annual mean objective. Further details about these sites can be found in Table 7.

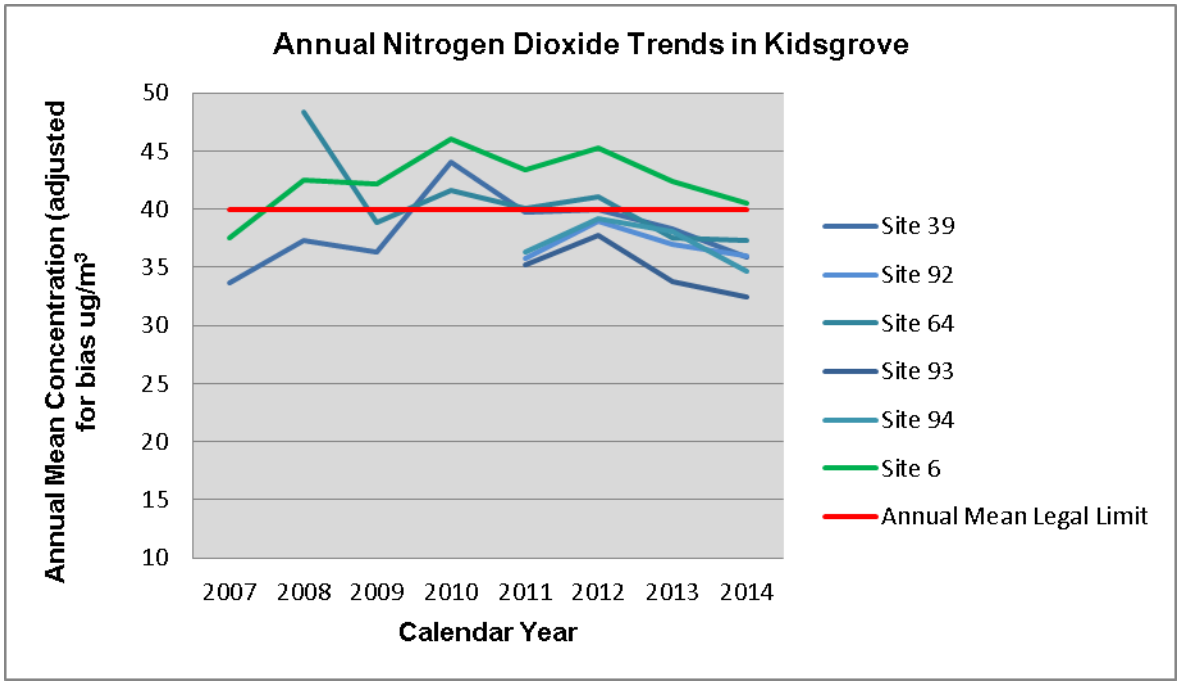

Figure 26: Graph showing the annual NO_2 trends at diffusion monitoring sites in Kidsgrove

Figure 28 shows the general annual NO_2 trends at diffusion tube monitoring sites across KIdsgrove. From this graph it is clear that site 6 (green line) has been consistently above the annual mean legal limit value for the past 7 years. All sites are currently showing a reduction in NO_2 concentration values over the past 12 months.

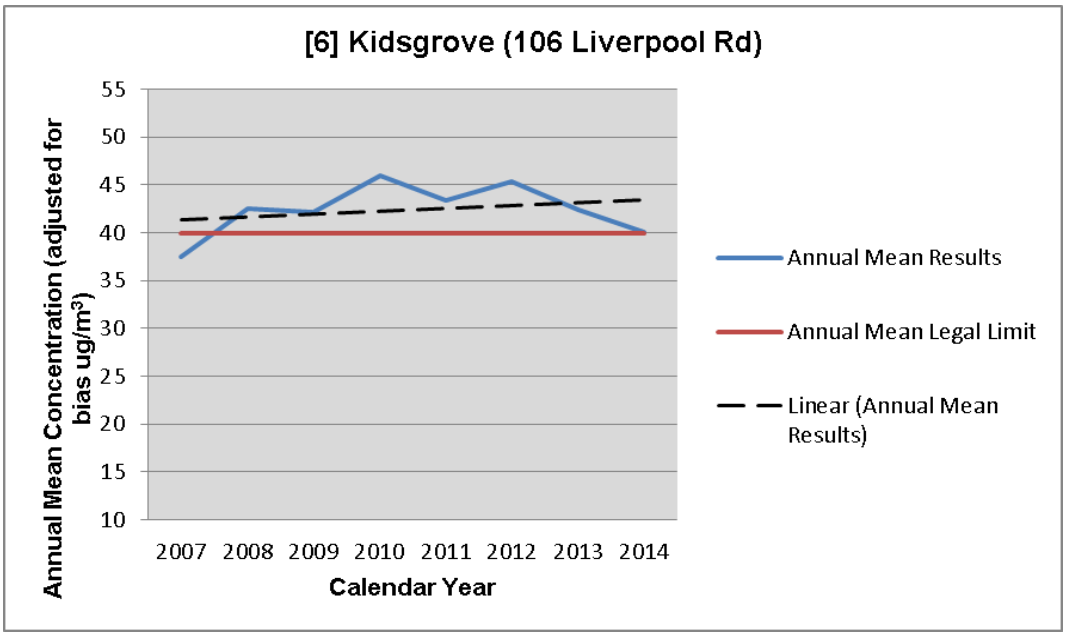

Figure29: Long term annual NO_2 trends at site 6, 106 Liverpool Road, Kidsgrove

Diffusion tube site 6, (*Figure 29*), is representative of relevant exposure, being located on the façade of a dwelling. This site is also adjacent to a traffic lighted junction and is located on the A50 Liverpool Road which is a heavily trafficked main road in this area. The annual mean level of nitrogen dioxide exposure in this location is exhibiting an upward trend, with exceedances of the relevant objective in each of the last six years. There has been a slight decrease in the level of NO_2 over the past 12 months; however the annual mean concentration remains above the legal limit value.

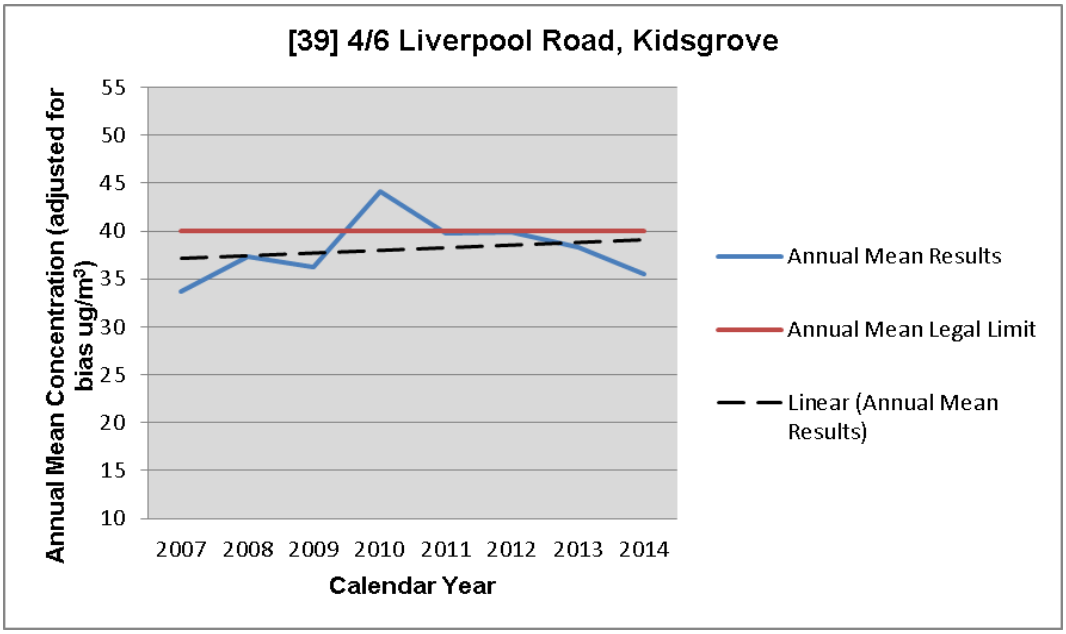

Figure 27: Long term annual NO_2 trends at site 39, 4/6 Liverpool Road, Kidsgrove

Diffusion tube site 39, (*Figure 30*), is representative of relevant exposure, being located on the façade of a mid-terrace dwelling. It is positioned at the point of a traffic light controlled junction which is heavily trafficked at peak times of the day. Over the past 12 months there has been a decrease of 6% in annual NO_2 concentration of Annual Nitrogen dioxide levels at this location have continued to exibit a general upward trend.

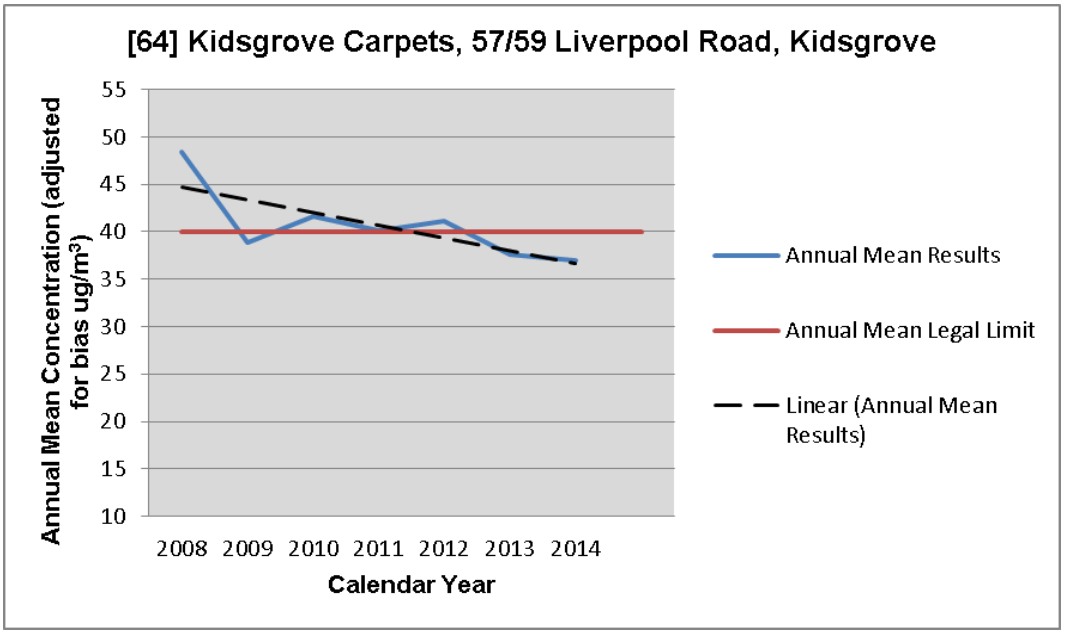

Figure 28: Long term annual NO_2 trends at site 64, Kidsgrove Carpets, 57/59 Liverpool Road, Kidsgrove

Diffusion tube site 64 is representative of relevant exposure, being located on the façade of a building. *Figure 31* shows that there has been a downward trend in the annual NO_2 levels over the past seven years at diffusion tube site 64. Levels are still within 10% of the annual mean emission limit value, and therefore further monitoring is to be conducted at this site.

Passive Nitrogen Dioxide Diffusion Tubes in Porthill – Wolstanton- Maybank

The areas of Porthill-Wolstanton-Maybank have been linked together in an AQMA due to the geographic locations and the shared trunk road which runs through these areas. This area has 4 diffusion tube sites which measure NO_2 levels.

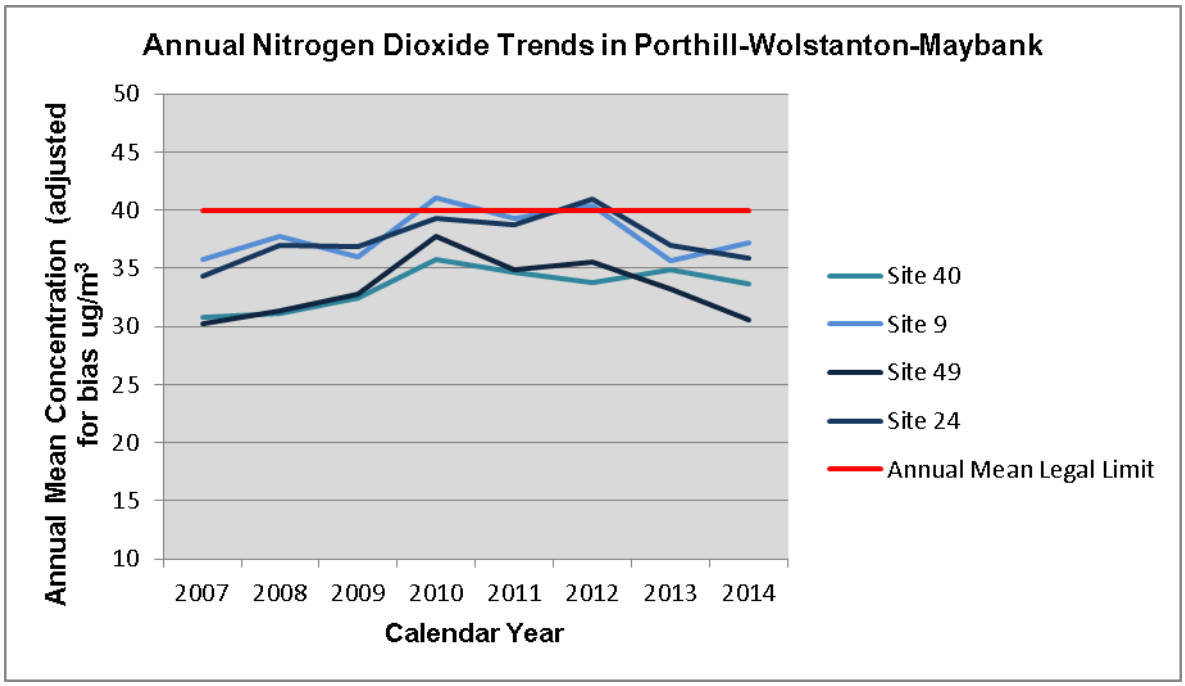

Figure 29: Graph showing the annual NO_2 trends at diffusion monitoring sites in Porthill-Wolstanton-Maybank

Figure 32 shows the general annual NO_2 trends at diffusion tube monitoring sites in Porthill-Wolstanton-Maybank. It can be seen that three of the four diffusion tube sites have shown a decrease in annual NO_2 concentrations over the past 12 months. Site 9 (32 Porthill Bank) shows a slight increase.

Diffusion tube site 24 (*Figure 33*) is representative of relevant exposure being located on the façade of a house located adjacent to a zebra crossing and a traffic lighted junction. At peak times there is quite often queuing traffic on the road. This site continues to exhibit an increasing trend in NO_2 exposure; however the annual mean of NO2 at this site reduced in 2014 and is now below the annual mean objective.

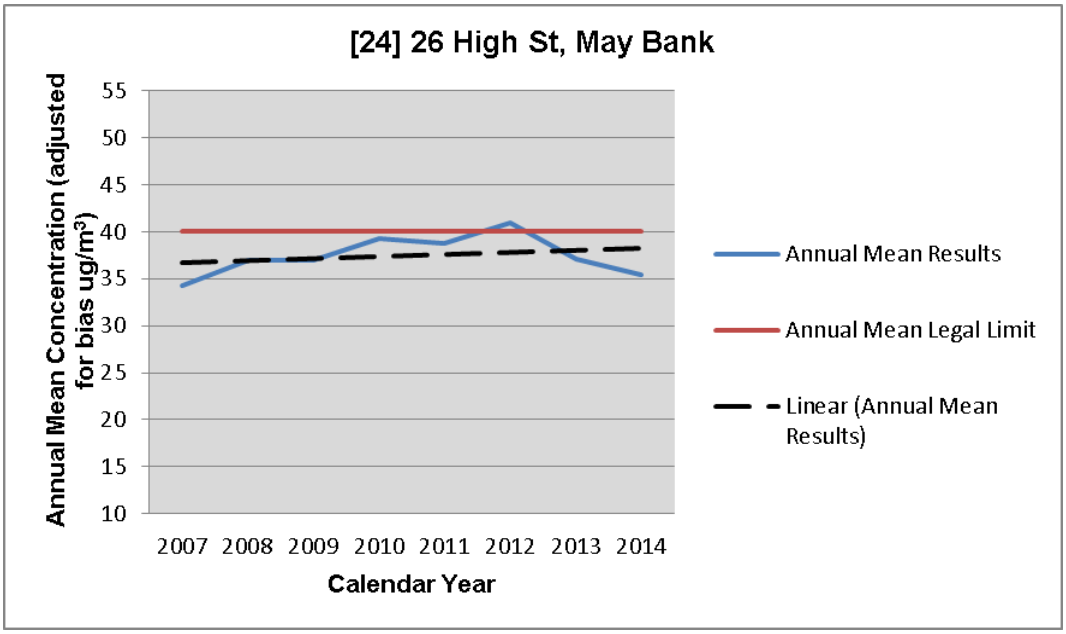

Figure 33: Long term annual NO_2 trends at site 24, 26 High Street, May Bank

Diffusion tube site 49 (*Figure 34*) is representative of relevant exposure and is situated on the façade of a terraced property which sits on the footway adjacent to one of the principal routes between this area of Newcastle and Stoke on Trent. The property is in close proximity to a roundabout and is situated on an incline. This site continues to exhibit an increasing trend in $N0_2$ exposure.

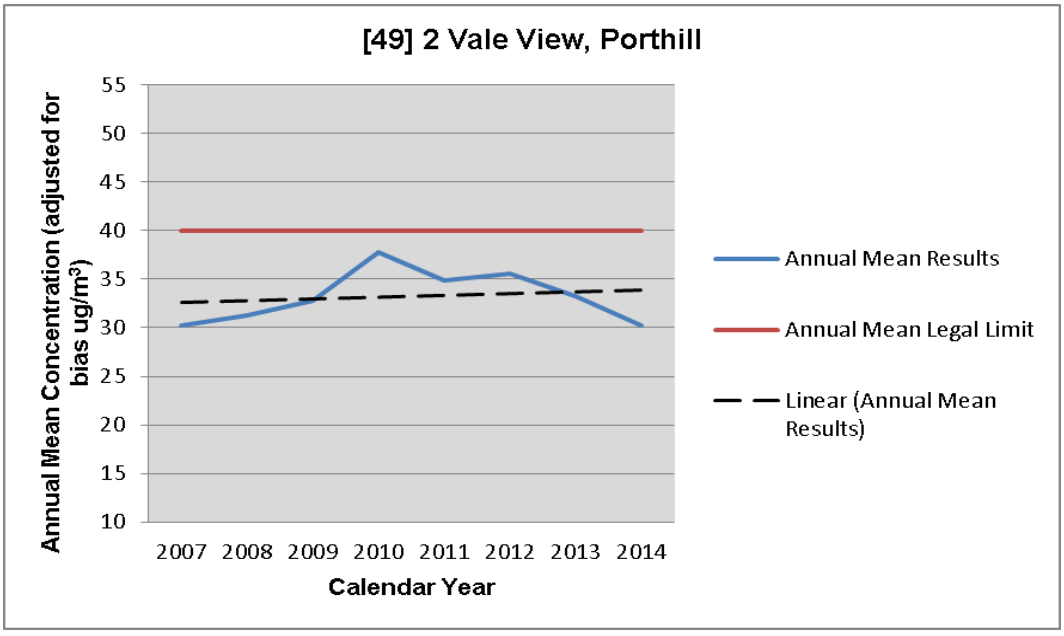

Figure 30: Long term annual NO_2 trends at site 49, 2 Vale View, Porthill

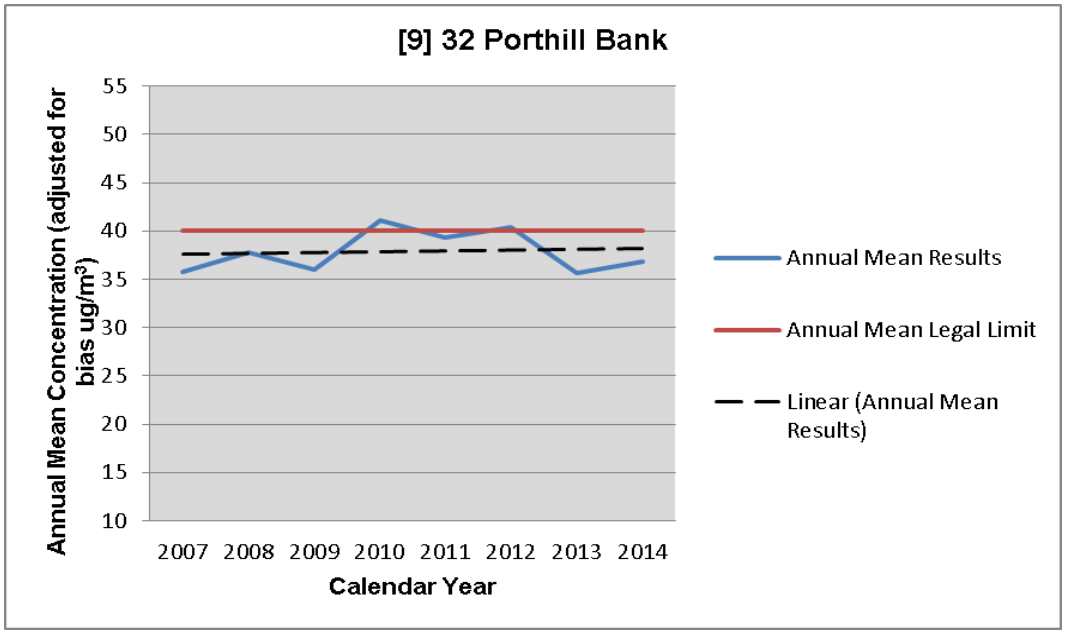

Figure 31: Long term annual NO_2 trends at site 9, 32 Porthill Bank

Diffusion tube site 9 (*Figure 35*) is representative of relevant exposure being located on the façade of a house located on an incline adjacent to one of the main routes between this area of Newcastle and Stoke on Trent. At peak times there is quite often queuing traffic on the road. This site is continuing to exhibit an increasing trend in $N0_2$ exposure, with the annual concentration for 2014 being within 10% of the legal limit value.

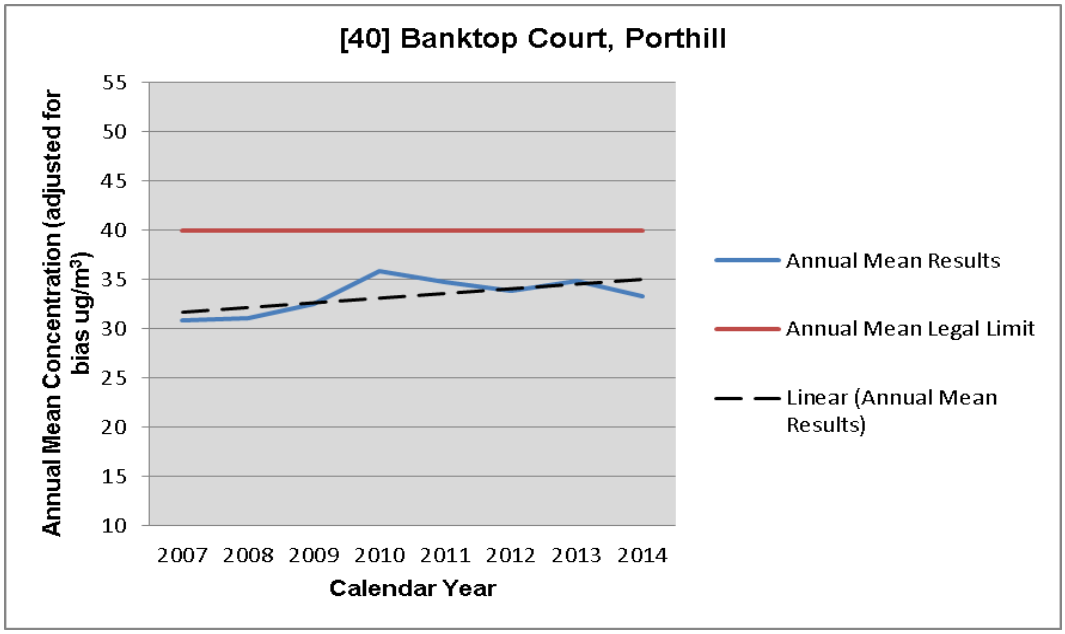

Figure 32: Long term annual NO2 trends at site 40, Banktop Court, Porthill

Diffusion site 40 (*Figure 36*) is representative of relevant exposure and is situated on the façade of a block of flats in close proximity to a roundabout which forms one of the principal routes between this part of the Borough and Stoke-on-Trent. This site is continuing to exhibit an increasing trend in $N0_2$ exposure, despite the annual mean value for 2014 being slightly lower than that of 2013 (decrease of 1.1µg/m^3).

Passive Nitrogen Dioxide Diffusion Tube in Madeley

Diffusion tube site 3 (*Figure 37*) represents exposure at a single dwelling adjacent to the southbound carriageway of the M6 motorway between junctions 15 and 16. This site is currently exhibiting a decreasing trend in nitrogen dioxide exposure, however has exhibited an upward trend in nitrogen dioxide exposure from 2009 to 2012 and has previously exceeded the annual mean objective. There has been very little change in the annual NO_2 concentration measured in 2013 (36.4µg/m^3) and 2014 (36.3µg/m^3).

This site is located within an Air Quality Management Area based on results of monitoring in 2012. The Highways Agency has plans to introduce hard shoulder running on this stretch of the M6, however there is no confirmed date for this to be introduced.

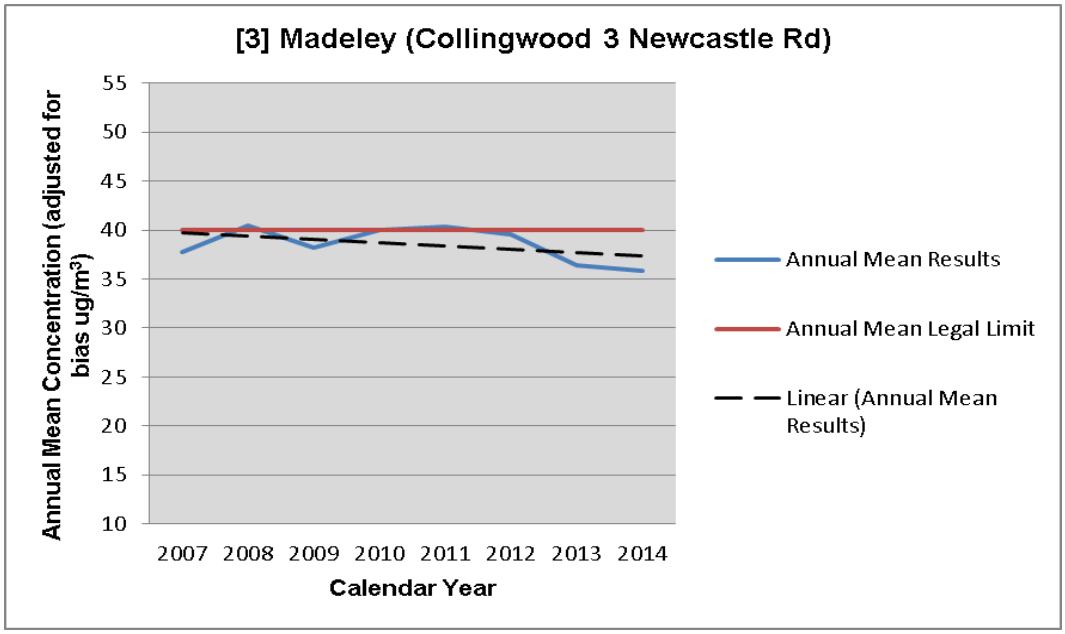

Figure 33: Long term annual NO_2 trends at site 3, Collingwood, Newcastle Road, Madeley

2.2.3 Particulate Matter (PM_{10})

Automatic Monitoring of PM_{10} is undertaken by a BAM1020 unit sited alongside the automatic nitrogen dioxide monitor at Queens Gardens, the location of which is shown in *Figure 6*.

The annual data capture for the BAM1020 unit was above the 90% target data capture, as a result data was not annualised and 90th percentiles have not been calculated.

The PM_{10} results were found to exceed the daily limit value of 50µg/m^3 on 9 days over 2014, with the maximum daily mean being 66µg/m^3 on the 20th November 2014. As the annual allowance is 35days, the annual 24hr objective for PM_{10} was not exceeded.

The annual mean PM_{10} for 2014 was 22µg/m3, and so the annual mean was not exceeded.

Table 10: Results of Automatic Monitoring for PM_{10} – Comparison with Annual Mean Objective

Site ID	Site Type	Within AQMA?	Valid Data capture for monitoring period %[a]	Valid Data Capture 2014%[b]	Confirm Gravimetric Equivalent (Y or N/A)	Annual Mean Concentration (µg/m^3)					
						2009 [c]	2010 [c]	2011 [c]	2012 [c]	2013	2014
Queens Gardens	**Roadside**	**Y**	**91.8**	**91.8**	**Y**	**-**	**26.25**	**-**	**14.19**	**22.5**	**22**

In bold, exceedance of the PM10 annual mean AQS objective of 40µg/m3

a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

c Means should be "annualised" as in Box 3.2 of TG(09) (http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38), if valid data capture is less than 75%

Table 11: Results of Automatic Monitoring for PM_{10} – Comparison with Number of Exceedances of 24-Hour Mean (>50µg/m^3)

Site ID	Site Type	Within AQMA?	Valid Data capture for monitoring period %[a]	Valid Data Capture 2014%[b]	Confirm Gravimetric Equivalent (Y or N/A)	Number of Exceedences of 24-Hour Mean (>50µg/m^3)					
						2009 [c]	2010 [c]	2011 [c]	2012 [c]	2013	2014
Queens Gardens	**Roadside**	**Y**	**91.8**	**91.8**	**Y**	**-**	**13**	**-**	**3 (28.1)**	**7 (31.2)**	**9**

In bold, exceedance of the PM10 daily mean AQS objective (50µg/m3 – not to be exceeded more than 35 times per year)

a i.e. data capture for the monitoring period, in cases where monitoring was only carried out for part of the year

b i.e. data capture for the full calendar year (e.g. if monitoring was carried out for six months the maximum data capture for the full calendar year would be 50%)

c if data capture for full calendar year is less than 90%, include the 90.4th percentile of 24-hour means in brackets

Trends in Annual Mean PM_{10} Concentrations

Figure 38 shows the average daily PM_{10} values during 2014. The dates upon which the 24 hour mean PM10 was greater than 50ug/m3 are as follows;

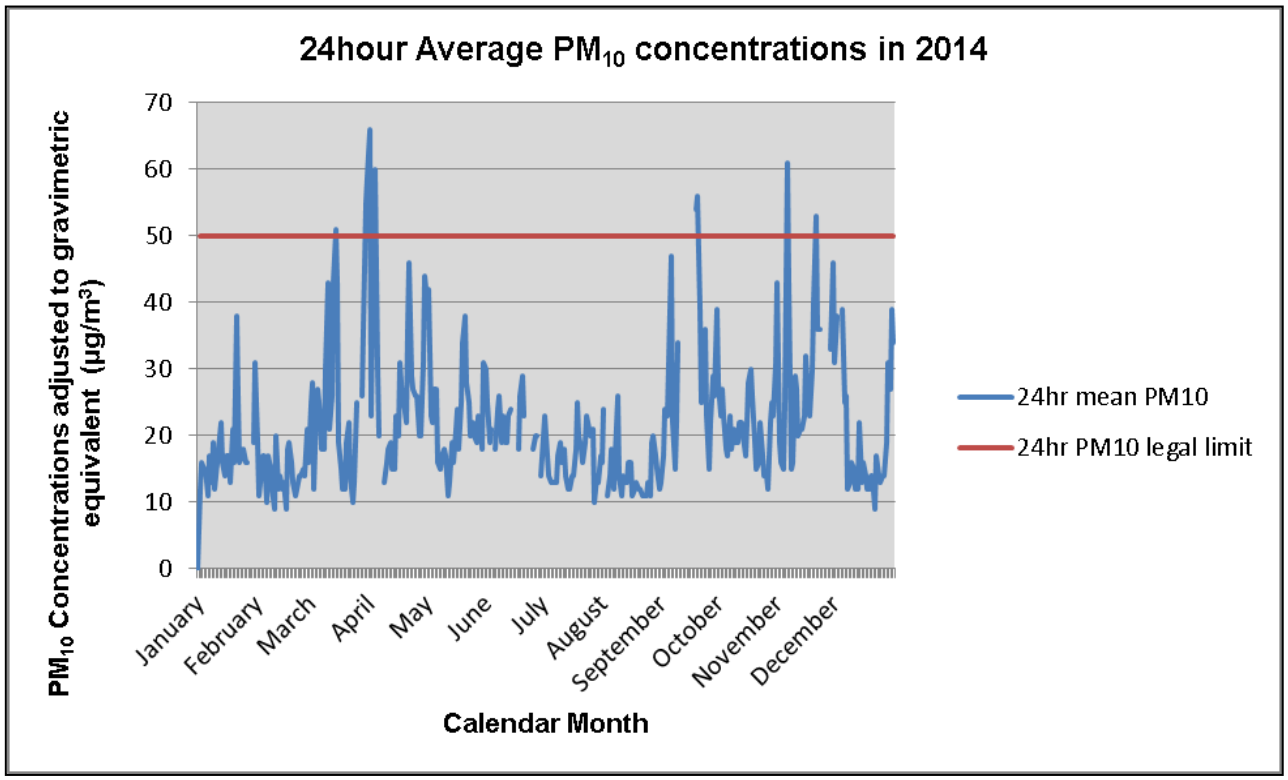

***Figure 34*: 24hour average PM10 concentrations adjusted to gravimetric equivalents in 2014**

From *Figure 38* above, it can be seen that exceedances of the 50µg/m^3, 24hour limit took place in March, April, September and November of 2014. The dates upon which the exceedances took place are detailed in Table 13 below;

Figure 39, shows the hourly PM10 results at automatic monitoring stations at

1. Newcastle-under-Lyme
2. Stoke-on-Trent
3. Warrington

It can be seen from *Figure 39* that there is a correlation between all three sites over the same dates in March, April, September and November 2014. This suggests that PM_{10} levels across the region were affected by a similar/ the same incident taking place (e.g. Saharan dust episode), and that the increased levels were not due to a single localised event within Newcastle-under-Lyme.

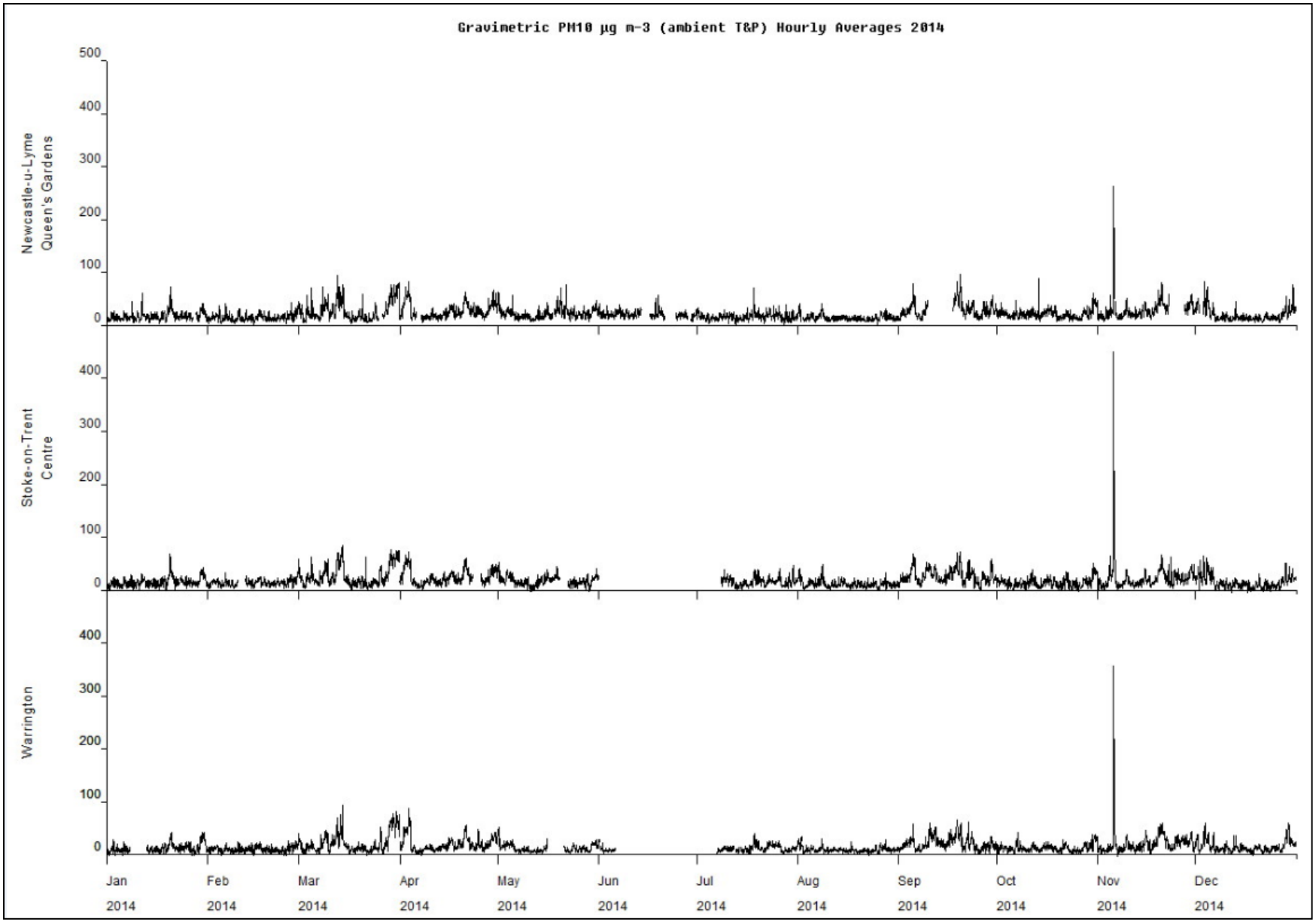

Figure 39: Comparison of PM_{10} hourly averages with other automatic sites in the region

Table 12: Details of 24hr PM_{10} exceedances in 2014

Date	Mean 24hr PM_{10} recorded ($\mu g/m^3$)	Possible reason for elevated PM_{10} level
13th March 2014	51	A pollution incident took place between the 12th and the 14th March in which areas of England 9particularly London and the South East) were affected. Feeds of ground level continental air caused the episode to intensify on Thursday 13th March which may have affected the Midlands. Composition of the particles showed a dominance of nitrate and organic particles likely to be from distant traffic emissions. (a)
29th March 2014	55	Saharan dust episode across the UK contributed to high levels of particulate pollution.(b)
30th March 2014	59	Saharan dust episode across the UK contributed to high levels of particulate pollution.(b)
31st March 2014	66	Elevated levels caused by a combination of high level of air pollution already existing in urban areas exacerbated by Saharan dusts and easterly winds, bringing pollutants from mainland Europe.(c)
3rd April 2014	60	Moderate levels of pollution recorded in the Midlands related to a mixture of local emissions and dust from the Sahara.(c)
18th & 19th September 2014	54	Increased particulate caused by winds bringing in particulate pollution from the continent in addition to still conditions leading to the build-up of emissions from local sources. Saharan dust may have also contributed to high levels.(d)
5th November 2014	61	Bonfire Night celebrations – Particulate levels increased due to annual celebrations taking place. Levels expected to increase during this period.
20th November 2014	53	The reason for this spike is unknown

(a) Information taken from http://www.londonair.org.uk

(b) Information taken from www.metoffice.gov.uk

(c) Information taken from http://www.environment-health.ac.uk/news/air-pollution

(d) Information taken from UK Air (DEFRA) http://uk-air.defra.gov.uk/news?view=183

2.26 Summary of Compliance with AQS Objectives

Newcastle-under-Lyme Borough Council has examined the results from monitoring in the borough of Newcastle-under-Lyme. Concentrations outside of the AQMA's are all below the objectives at relevant locations, therefore there is no need to proceed to a Detailed Assessment.

3 Road Traffic Sources

There have been no newly identified road traffic sources since the last Updating and Screening Assessment. None of the Boroughs roads have experienced a significant change in traffic flow over the past 12 months.

3.1 Narrow Congested Streets with Residential Properties Close to the Kerb

Table 13 lists the diffusion tubes which are situated along a narrow street with residential properties within 2 meters of the kerb.

Table 13: Nitrogen dioxide diffusion tubes situated along narrow streets within the borough

Diffusion Tube Site Number	Location of diffusion tube	Property Type	AADF[1]	Average Speed	Distance to kerb (m)
39	4/6 Liverpool Road, Kidsgrove	Residential	12,473		2
74	39 London Road, Newcastle-under-Lyme	Residential	20,537		2
76	11 Brunswick Street, Newcastle-Under-Lyme	Business with residential flats above	15,240		2
92	41/43 Liverpool Road, Kidsgrove	Residential	13,704		2
95	76 London Road, Newcastle-Under-Lyme	Residential	20,537		2

[1] AADF figures listed are taken from the www.dft.gov.uk and give the number of vehicles that drove on that stretch of road on an average day during 2013 (most up to date data available). A breakdown of the vehicle numbers and composition can be seen in Appendix E

The above sites meet the criteria for narrow congested streets with residential properties close to the Kerb, as they;

1. Are within 2 meters of the kerb

2. Have a daily traffic flow in excess of 5,000 vehicles per day
3. Traffic along these sections of road have an average speed of 15mph due to vehicles frequently stopping and starting due to traffic light controlled junctions, pedestrian crossings, parked vehicles and bus stops restricting traffic flow.

As the above sites are already part of AQMAs and are being considered there is no need to progress to a detailed assessment for these areas.

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

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

An assessment was carried out to identify busy streets within the borough, to determine whether individuals may be exposed to traffic within 5 meters of the kerb for 1 hour or more.

TG09 defines a ‘busy street’, as one with in excess of 10,000 vehicles per day.

Through consulting the traffic data available on www.dft.gov.uk the locations detailed in Table 14 have been highlighted as being ‘busy streets’, however none of the ‘busy streets’ identified are locations where people may spend in excess of 1 hour as these streets do not have many shops, outdoor cafes or outdoor bar areas.

Table 14: Details of 'busy streets' within the Borough

Diffusion Tube Site Number	Street Name	Distance to kerb	AADF[1]	Busy Street?	Persons likely to spend in excess of 1 hour here?
K1	London Road (A34), Newcastle-under-Lyme	3	20,537	Yes	No
46		5			
11		3			
73		4			
74		2			
95		2			
96		3			
6	Liverpool Road, Kidsgrove	4	13,704	Yes	No
39		2			
64		3			
92		2			
93		3			
94		4			
K2	King Street (A53), Newcastle-Under-Lyme	3	13,555	Yes	No
84		5			
85		5			
87		5			
34	Barracks Road, Newcastle-under-Lyme	4	22,366	Yes	No
42		4			
86		5			
89		5			
90		5			
91		5			
76	Brunswick Street, Newcastle-under-Lyme	2	15,240	Yes	No
98		6			
88	Lower Street, Newcastle-under-Lyme	5	24,752	Yes	No
97		2			
24	26 High St, May Bank	3	12,748	Yes	No

[1] AADF figures listed are taken from the www.dft.gov.uk and give the number of vehicles that drove on that stretch of road on an average day during 2013 (most up to date data available). A breakdown of the vehicle numbers and composition can be seen in Appendix E

Newcastle-under-Lyme Borough Council confirms that there are no new/newly identified busy streets where people may spend 1 hour or more close to traffic.

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

An assessment has been made of roads in the Borough which may have a high flow of buses and heavy goods vehicles.

Changes to the bus station layout along Barracks Road, has increased the number of buses which travel along this section of road. However this area is already being considered as it forms part of the Town Centre AQMA.

Newcastle-Under-Lyme Borough Council confirms that there are no new/newly identified roads with high flows of buses/HDVs.

3.4 Junctions

An assessment has been made to identify any 'busy' junctions that are new or were not previously assessed. It was found that there are no streets with new exposure or streets where exposure was previously not present.

Newcastle-Under-Lyme Borough Council confirms that there are no new/newly identified busy junctions/busy roads.

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

Stoke-on-Trent City Council is proposing to develop an area known as Etruria Valley which is located on the border with Newcastle-Under-Lyme. The area is adjacent to the A500 trunk road which runs alongside the Porthill-Wolstanton-Maybank AQMA.

Development of this area will involve the construction of a connection to the A500 at the Wolstanton roundabout with a lengthening of the A500 slip roads to improve capacity, and the development of traffic, cycle and pedestrianized crossing to link Porthill directly to the Etruria Valley Development site.

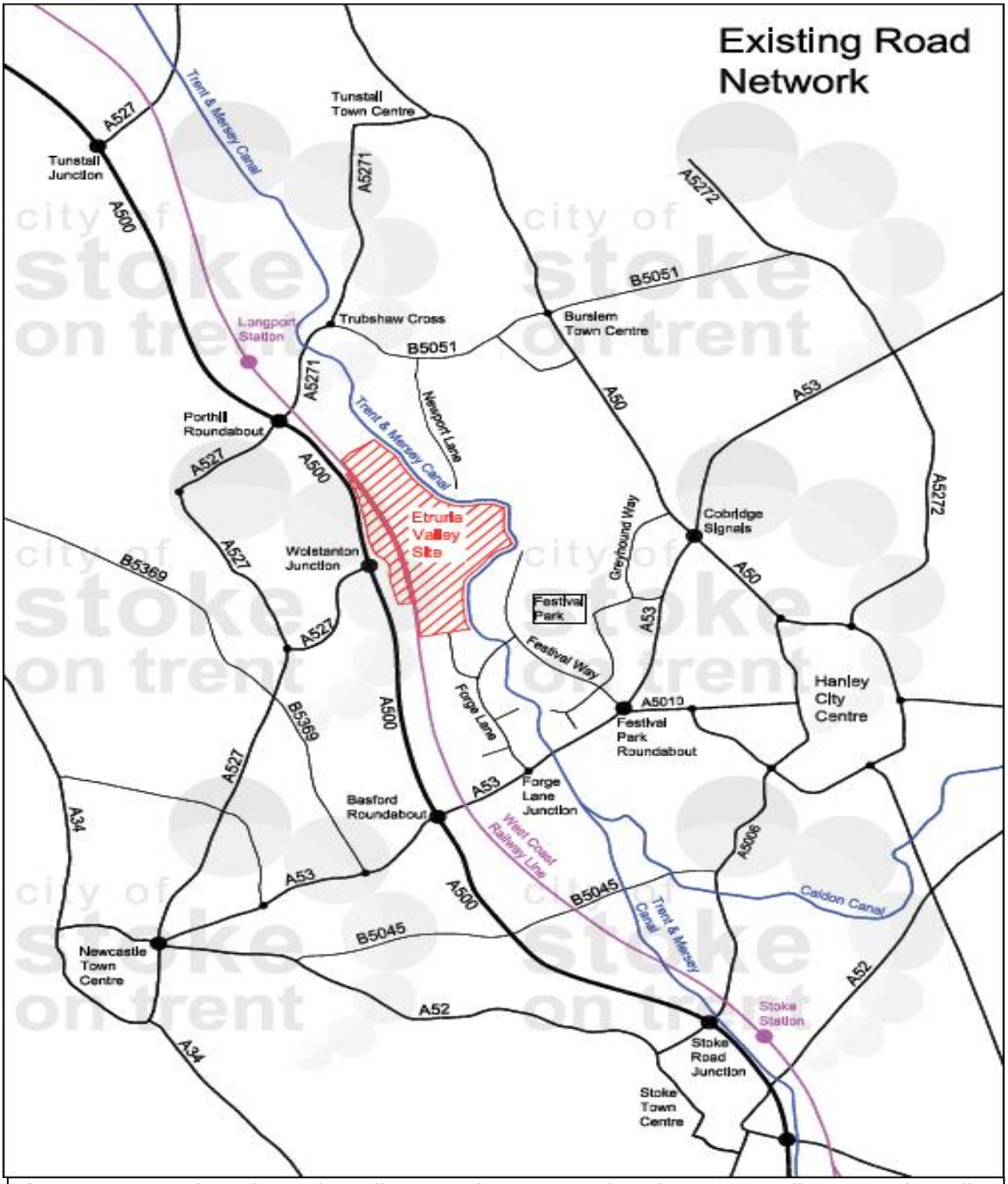

Figure 35: Location of Etruria Valley Development. Taken from Appendix 2, Etruria Valley Enterprise Area - Draft Supplementary Planning Document 2012. (www.stoke.gov.uk)

The entire borough of Stoke-on-Trent has been declared an AQMA due to breaches in annual and hourly mean Nitrogen Dioxide objectives across the area.

A traffic impact assessment and associated air quality impact assessment are to be conducted to determine whether this development will have an adverse impact on the air quality in both Stoke-on-Trent and Newcastle-Under-Lyme.

This issue has been considered in the 'Etruria Valley Enterprise Development – Supplementary Planning Document'.

Highways England is proposing to increase the A500 carriageway to three lanes between junctions. This scheme is programmed to start in 2020. Further details will be found in future reports.

As neither scheme has been finalised and as site works are not due to begin for some time, it is unnecessary to proceed to a Detailed Assessment of these developments at this time.

Newcastle-under-Lyme Borough Council has assessed new/proposed roads meeting the criteria in Section A.5 of Box 5.3 in TG(09), and concluded that it will not be necessary to proceed to a Detailed Assessment.

3.6 Roads with Significantly Changed Traffic Flows

An assessment has been made to identify any roads with significantly changed traffic flows, i.e. an increase of more than 25% in traffic flow, which had not been previously assessed.

It was found that there are no roads that have experienced a significant increase in traffic flow, therefore there is no need to progress to a Detailed Assessment.

Newcastle-Under-Lyme Borough Council confirms that there are no new/newly identified roads with significantly changed traffic flows.

3.7 Bus and Coach Stations

Newcastle-Under-Lyme Town Centre bus station is situated to the west of Barracks Road, and has an open layout (there are no enclosed areas). There are no residential properties in the vicinity of the bus station.

Newcastle-under-Lyme Borough Council confirms that there are no relevant bus stations in the Local Authority area.

4 Other Transport Sources

4.1 Airports

Newcastle-Under-Lyme Borough Council confirms that there are no airports in the Local Authority area.

4.2 Railways (Diesel and Steam Trains)

4.2.1 Stationary Trains

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

4.2.2 Moving Trains

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

4.3 Ports (Shipping)

Newcastle-Under-Lyme Borough Council confirms that there are no ports or shipping that meet the specified criteria within the Local Authority area.

5 Industrial Sources

5.1 Industrial Installations

There are no further new or significantly changed installations in the Borough. There are no major fuel depots storing petrol in the local authority area. There are no new petrol stations in the local authority area. There are no poultry farms in the borough or in the neighbouring local authority areas.

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

Newcastle-Under-Lyme Borough Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

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

Newcastle-Under-Lyme Borough Council confirms that there are no industrial installations with substantially increased emissions or new relevant exposure in their vicinity within its area or nearby in a neighbouring authority.

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

Newcastle-Under-Lyme Borough Council confirms that there are no new or proposed industrial installations for which planning approval has been granted within its area or nearby in a neighbouring authority.

5.2 Major Fuel (Petrol) Storage Depots

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

5.3 Petrol Stations

Newcastle-under-Lyme Borough Council confirms that there are no petrol stations meeting the specified criteria**.**

5.4 Poultry Farms

Newcastle-under-Lyme Borough Council confirms that there are no poultry farms meeting the specified criteria.

6 Commercial and Domestic Sources

6.1 Biomass Combustion – Individual Installations

There are currently three known biomass installations operating within the Borough of Newcastle-under-Lyme, which are identified as burning biomass in 50kW to 20MW units. The location of these installations is shown in Figure 41. Table 15 provides further information on the nature of the installation.

Table 15: Biomass Installations within the Borough of Newcastle under Lyme

Name	Status	Grid Ref (SJ)	Generating Capacity	Maximum Emission Rate (g/sec)		Fuel Type	Air Quality Impact Assessment	Comments
				Pm10	NOx			
Lafarge Walley's Quarry	Operational	383309: 345822	2MW	0.00156 (a)	0.148 (a)	Methane extracted from landfill gas	Yes	Staffs County Council Planning Application Ref: N09/01/216MW
Sainsbury's Supermarket	Operational	384533: 346494	700Kw	0.1001 (b)	0.0637 (b)	Woodchip	Yes	Borough Council Planning Application Ref: 10/00552/OUT
Newcastle under Lyme College	Operational	384066: 346459		0.1001 (b)	0.0637 (b)	Rape seed oil	Yes	Borough Council Planning Application Ref: 10/00552/OUT
Loucetios Energy	Operational	383785: 348207	8.2MW	0.3 (c)	1.066	Natural Gas	Detailed assessment to be undertaken	-

Note

(a) Estimation of the emission rates for PM10 and NOx from this installation were calculated using the emission factors found in *EMEP/EEA Emission Inventory Guidance2013; Table 3-8 Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, using gaseous fuels*.

(b) Estimation of the emission rates for PM10 and NOx from this installation were calculated using the emission factors found in *EMEP/EEA Emission Inventory Guidance2013; Table 3-10 Tier 1 emission factors for NFR*

source category 1.A.4.a/c, 1.A.5.a, using biomass.

(c) Estimation of the emission values for PM10 and NOx from this installation were calculated using the maximum generating capacity (15MW), and the emission factors found in EMEP/EEA Emission Inventory Guidance2013; Table 3-9 Tier 1 emission factors for NFR source category 1.A.4.a/c, 1.A.5.a, using liquid fuels.

Background adjusted emission rates were calculated for each of the areas in which the above installations are situated, following the procedure set out in TG09.

6.1.1 - Lafarge Walley's Quarry, Sainsbury`s Supermarket & Newcastle under Lyme College

The planning applications for the Lafarge Walley's Quarry, Sainsbury's Supermarket, and Newcastle-under-Lyme College installations were accompanied by an air quality assessment which considered how the installation would be likely to affect nitrogen dioxide and PM_{10} concentrations in the immediate and surrounding areas. These assessments showed that there would be no exceedances of the relevant objectives for $N0_2$ and PM_{10} in the surrounding areas.

6.1.2 - Loucetios Energy

This site is used as a short term operating reserve for the National Grid balancing mechanism (STOR), with commercial operations beginning in April 2012. The site has a maximum generating capacity of 8.2MW and is powered by natural gas, which is composed mainly of methane.

The burning of natural gas produces nitrogen dioxide and carbon dioxide, but at a much lower level than burning coal or oil. Emissions of sulphur dioxide from burning natural gas are negligible.

The annual running hours for the installation is dependent upon the needs of the local electricity grid. In 2014/ 2015 the installation operated for a total of 160 hours across the 12 month period.

Based on advice from the Air Quality Helpdesk, the Borough Council will undertake a Detailed Assessment of this installation for $N0_2$.

Newcastle-under-Lyme Borough Council has assessed the biomass combustion plant, and concluded that a detailed assessment is required for the Loucetios Energy Plant for $N0_2$.

6.2 Biomass Combustion – Combined Impacts

Newcastle-Under-Lyme Borough Council has assessed the biomass combustion plant, and concluded that it will not be necessary to proceed to a Detailed Assessment.

6.3 Domestic Solid-Fuel Burning

The urban districts of Newcastle-Under-Lyme Borough are within Smoke Control Areas, and as such specific controls are in place in these areas under the Clean Air Act 1993 which specify the type of fuels and appliances that can be used in such areas.

Since the last USA in 2012, there has continued to be an uptake in the use of solid fuel burning as a method of heating domestic properties, particularly within the urban districts of Silverdale, Bignall End and Kidsgrove. This uptake has been attributed to the increasing gas and electricity prices.

In order to ensure that householders are aware of the restrictions imposed by the Smoke Control Areas, the Borough in collaboration with the Fire Service and Building Control are continuing to educate and assist the public in determining whether the solid fuel appliance/ fuel that they intend to use is appropriate. This is supplemented by appropriate advice and enforcement action under the Clean Air Act 1993 in respect of non-exempt appliances and unauthorised fuels and the Building Act 1984 in respect of chimney heights. Through undertaking such campaigns it is hoped that the impact on the local air quality of using such appliances/ fuels will be negligible.

Newcastle under Lyme Borough Council has assessed areas of significant domestic solid fuel use, and concluded that it will not be necessary to proceed to a Detailed Assessment.

7 Fugitive or Uncontrolled Sources

Newcastle-Under-Lyme Borough Council confirms that there are no potential sources of fugitive particulate matter emissions in the Local Authority area.

8 Significant Development Schemes

There are a number of significant development schemes which have either received planning permission or which are in the early stages of being devised which have the potential to be impacted upon or influence air quality.

8.1 Newcastle under Lyme Town Centre

A number of schemes have been identified or have the potential to be brought forward in the Newcastle under Lyme Town Centre Air Quality Management Area.

8.1.1 Office conversions into residential end use

The Council is receiving a number of applications for change of use of vacant offices into residential accommodation under the prior notification arrangements introduced under. To date all these sites have been located within the Town Centre Air Quality Management Area. A number of these developments are also located adjacent to congested roads and sit at the rear of the footway. The Council has no ability to require an assessment of the associated air quality impacts or to require measures to be introduced which will have a positive impact on air quality for example through the identification and facilitation of sustainable travel options.

The Council does however highlight the issue of poor air quality at the earliest available opportunity and encourages developers to take this into account in designing appropriate ventilation strategies and outdoor amenity space.

8.1.2 Ryecroft Redevelopment

Newcastle under Lyme Borough Council and Staffordshire County Council have drawn up proposals to regenerate the Rycecroft area of the town centre. Although no formal planning application has been submitted, discussions have been had with a developer concerning their potential vision for this area of the town. It is hoped that there will be a significant

increase in the provision of student living accommodation (circa 500 bed spaces) as part of the development as well as the replacement of the Civic Offices site with retail units and car parking. It is also planned to relocate the current Civic Offices to a new site on the former St Giles' and St Georges' site adjacent to the Ryecroft Ring Road.

Development partners are aware of the air quality issues in the town centre and have been advised that they will need to submit an appropriate air quality impact assessment to accompany the planning application. Given the pressures on town centre parking provision, sustainable travel arrangements are currently being worked through for the various elements.

Progress on development in this area and impacts on air quality will be reported in future reports.

8.1.3 Jubilee Pool Redevelopment

Planning permission has recently been granted for the demolition of the former Jubilee Pool site and for the construction of a 243 bedroomed student apartment complex. The application was accompanied by an air quality impact assessment which showed that there would be no exceedance of the air quality objectives on the site.

Green travel plans have been secured by condition along with a substantial on site secure cycle storage and limited car parking. The site is also located in close proximity to the town centre bus station which has direct links to Keele University and the city centre.

8.2 Kidsgrove Town Centre

8.2.1 Kidsgrove Railway Station Park and Ride

East Midlands Trains are planning to improve the park and ride provision at Kidsgrove railway station. Access to the station and the park and ride facilities will see patrons passing through the KIdsgrove Air Quality Management Area. The Borough Council is working with East Midlands Trains to ensure that the planned improvements do not exacerbate an existing issue with $N0_2$ in this area, with improvements to the existing highway network identified where appropriate.

8.2.2 Proposed replacement leisure centre for Kidsgrove

Both Newcastle under Lyme Borough Council and Staffordshire County Council are currently exploring sites within the Kidsgrove area for a new council lead leisure centre. One of the candidate sites is located on the site of a current working means club on Harding wood Road, within the Kidsgrove AQMA and adjacent to properties at 2 to 10 Liverpool Road which are currently experiencing exceedances of the N02 annual mean objective.

Progress on development in this area and impacts on air quality will be reported in future reports.

8.3 Maybank, Wolstanton and Porthill

8.3.1 Etruria Valley Highway and Connectivity Improvement Project

The Etruria Valley highways scheme is one of the largest infrastructure development projects in the city.

The new road network will significantly improve access in and around the Etruria Valley area, providing a link between the A500 and the city centre. It will also reduce congestion on existing roads, including the A53 (Etruria Road) as the main route in and out of the city centre.

This multi-million project is being funded by a number of funders led by the Staffordshire Growth Deal, agreed with Government, which was announced in July 2014.

The highways scheme is a key part of Stoke and Staffordshire Local Enterprise Partnership's (LEP) Strategic Economic Plan (SEP) which prioritises the development of Stoke on Trent as a core city

The improvements will also indirectly ensure the development of the Etruria Valley site and attract inward investment, with the opportunity to deliver a significant amount of jobs.

Stoke-on-Trent City Council has a dedicated team leading this project, with the support of expert advisors, partners and stakeholders, to maximise the benefits for the city and ensure value for money. The team is working very closely to ensure this flagship scheme is delivered successfully with the below funding.

The project is broken down into three phases:

Phase one will help to kick-start everything else. It consists of a new road network running south to north from Shelton Boulevard and linking west to east to Festival Way crossing over the Trent and Mersey Canal via a new canal bridge. It also includes a new route through the city's former Greenhouse 2000 site linking on to Festival Way.

Phase two involves the creation of new roads to create a route running south to north from the end of the first phase road to Newport Lane. There will also be second new canal bridge crossings at Newport Lane. A new bridge will then be built over the West Coast Mainline railway to link Phase 1 to the A500. The existing two roundabouts at the Wolstanton junction of the A500 will be enlarged and improved.

Phase three involves the creation of an extra lane in both the northbound and southbound directions between the Porthill junction and Wolstanton junction of the A500. This will increase the A500 capacity from two lanes to three lanes in each direction along this stretch. These improvements are being funded and delivered by Highways England. The city council is currently liaising with Highways England to confirm the exact timescales for the phase three work so that the phase two and phase three works can be fully co-ordinated.

The impact on air quality within Newcastle under Lyme has not yet been determined. It is however considered that these will be explored further in connection with the Environmental Impact Assessment for the road schemes.

9 Conclusions and Proposed Actions

9.1 Conclusions from New Monitoring Data

Exceedance of the Nitrogen Dioxide annual mean continue to be identified based on the results of diffusion tube monitoring. As these exceedance locations are located in the four existing Air Quality Management Areas (AQMA), there is no need to declare new air quality management areas or to extend the boundary of the existing air AQMA's.

There have been no actual or risk of exceedences identified for any of the other statutory air quality objectives within the Borough

Monitoring has not identified any new locations where exceedences of the air quality objectives are occurring and therefore there is no requirement to undertake a further detailed assessment based on monitoring data. Monitoring has not identified any locations outside of the current AQMA's which are exceeding the nitrogen dioxide objectives.

There is a general trend in the reduction of levels of nitrogen dioxide across the Borough; however there are also areas within the existing AQMA's where there is either a neutral trend or an increasing trend in nitrogen dioxide levels.

With regards to the four AQMA's in operation in the Borough, these will continue to be in operation for the foreseeable future until it can be established that the Nitrogen Dioxide Annual Mean is not being breached on a consistent basis.

9.2 Conclusions from Assessment of Sources

In respect of sources, the Council is undertaking a Detailed Assessment for the Loucetios Energy Plant at Holditch. The details of this study will be reported in the near future.

9.3 Proposed Actions

It is considered that the current nitrogen dioxide diffusion tube network is appropriate and this will continue to be maintained in its current form. The Queen's Gardens Air Quality Monitoring Station will be maintained in the current financial year.

The Borough Council is working with Stoke on Trent City Council and representatives from Staffordshire County Council, Highways England and other key stakeholders in the development of Air Quality Action Plans (AQAP's) in the four AQMA's within the Borough with the aim of reducing the levels of nitrogen dioxide exposure in the established AQMA's. It is hoped that the AQAP's will be in place by winter 2015. Further details will be reported in the 2016 Progress Report.

Both Newcastle under Lyme Borough Council and Stoke on Trent City Council are in the process of preparing a new joint Local Plan to guide development across the North Staffordshire Conurbation across the plan period. It is hoped that policies will be included in the plan which will help to secure improvements in air quality. In the meantime, the Council continues to have regard to the policies within the National Planning Policy Framework and accompanying documents with respect to air quality. Developers are also being encouraged to follow the latest guidance produced by EPUK and IAQM in assessing the air quality impacts of major development proposals.

It has been identified that the Council needs to undertake a Detailed Assessment for emissions associated with the Loucetios Energy Plant at Holditch Industrial Estate. This will be submitted to DEFRA as soon as it is available. The Council will also act on the findings of this assessment should it identify an exceedance of the relevant air quality objectives.

The Council is also working towards the completion of the 2016 Progress Report.

10 References

1. Part IV of the Environment Act 1995 – Local Air Quality Management; Technical Guidance LAQM.TG(09) (February 2009)
2. Air Quality (England) Regulations 2000 (SI 928), The Air Quality (England) (Amendment) Regulations 2002 (SI 3043)
3. http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html
4. http://laqm.defra.gov.uk/technical-guidance/index.html?d=page=38
5. http://www.londonair.org.uk
6. www.metoffice.gov.uk
7. http://www.environment-health.ac.uk/news/air-pollution
8. http://uk-air.defra.gov.uk/news?view=183
9. http://www.dft.gov.uk/traffic-counts/cp.php
10. Appendix 2, Etruria Valley Enterprise Area - Draft Supplementary Planning Document 2012. (www.stoke.gov.uk)
11. EMEP/EEA Emission Inventory Guidance2013

Appendices

Appendix A: QA/QC Procedures

Factor from Local Co-location Studies (if available)

No co-location studies were carried out.

Diffusion Tube Bias Adjustment Factors

Since January 2012, diffusion tubes have been supplied and analysed by Gradko Laboratories using the 20% TEA in water method.

Results were bias adjusted for 2014 by utilising the bias adjustment from the National Diffusion Tube Bias Adjustment Factors Spreadsheet for March 2015 (***Figure A1***) which yielded a bias adjustment factor of 0.95 for Gradko Laboratories 20% TEA in water.

National Diffusion Tube Bias Adjustment Factor Spreadsheet — Spreadsheet Version Number: 03/15

Follow the steps below **in the correct order** to show the results of **relevant** co-location studies
Data only apply to tubes exposed monthly and are not suitable for correcting individual short-term monitoring periods
Whenever presenting adjusted data, you should state the adjustment factor used and the version of the spreadsheet
This spreadhseet will be updated every few months: the factors may therefore be subject to change. This should not discourage their immediate use.

This spreadsheet will be updated at the end of June 2015

LAQM Helpdesk Website

The LAQM Helpdesk is operated on behalf of Defra and the Devolved Administrations by Bureau Veritas, in conjunction with contract partners AECOM and the National Physical Laboratory.

Spreadsheet maintained by the National Physical Laboratory. Original compiled by Air Quality Consultants Ltd.

Step 1:	Step 2:	Step 3:	Step 4:
Select the Laboratory that Analyses Your Tubes from the Drop-Down List	Select a Preparation Method from the Drop-Down List	Select a Year from the Drop-Down List	Where there is only one study for a chosen combination, you should use the adjustment factor shown with caution. Where there is more than one study, use the overall factor[3] shown in blue at the foot of the final column.
If a laboratory is not shown, we have no data for this laboratory.	If a preparation method is not shown, we have no data for this method at this laboratory.	If a year is not shown, we have no data[2]	If you have your own co-location study then see footnote[4]. If uncertain what to do then contact the Local Air Quality Management Helpdesk at LAQMHelpdesk@uk.bureauveritas.com or 0800 0327953

Analysed By[1]	Method (To undo your selection, choose (All) from the pop-up list)	Year[2] (To undo your selection, choose (All))	Site Type	Local Authority	Length of Study (months)	Diffusion Tube Mean Conc. (Dm) (µg/m³)	Automatic Monitor Mean Conc. (Cm) (µg/m³)	Bias (B)	Tube Precision[5]	Bias Adjustment Factor (A) (Cm/Dm)
Gradko	20% TEA in water	2014	R	Brighton & Hove City Council	12	55	48	15.2%	G	**0.87**
Gradko	20% TEA in water	2014	R	Brighton & Hove City Council	11	60	57	6.2%	G	**0.94**
Gradko	20% TEA in water	2014	R	Cheshire West and Chester	11	40	40	-1.0%	G	**1.01**
Gradko	20% TEA in water	2014	R	Dudley MBC	12	36	31	18.1%	G	**0.85**
Gradko	20% TEA in water	2014	UB	Dudley MBC	12	26	23	11.2%	G	**0.90**
Gradko	20% TEA in water	2014	R	Dudley MBC	12	41	35	15.2%	G	**0.87**
Gradko	20% TEA in water	2014	R	Dudley MBC	12	52	60	-12.6%	G	**1.14**
Gradko	20% TEA in water	2014	R	Gateshead Council	10	35	32	10.8%	G	**0.90**
Gradko	20% TEA in water	2014	R	Gateshead Council	12	36	36	-0.1%	G	**1.00**
Gradko	20% TEA in water	2014	R	Gateshead Council	12	34	32	6.4%	G	**0.94**
Gradko	20% TEA in water	2014	UB	Luton Borough Council	9	36	37	-4.0%	G	**1.04**
Gradko	20% TEA in water	2014	KS	Marylebone Road Intercomparison	12	115	80	42.8%	G	**0.70**
Gradko	20% TEA in water	2014	R	Monmouthshire County Council	10	42	38	10.1%	G	**0.91**
Gradko	20% TEA in water	2014	R	NOTTINGHAM CITY COUNCIL	12	44	39	14.9%	G	**0.87**
Gradko	20% TEA in water	2014		**Overall Factor[3] (16 studies)**				**Use**		**0.91**

Figure A1: National Diffusion Tube Bias Adjustment Factors Spreadsheet for March 2015 (http://laqm.defra.gov.uk/bias-adjustment-factors/national-bias.html)

Discussion of Choice of Factor to Use

There are no local correction factors therefore the national adjustment factors have been used. This is consistent with previous reports

PM Monitoring Adjustment

PM_{10} monitoring was completed using an un-heated MetOne1020 BAM monitor. To ensure gravimetric equivalence, data has been bias-adjusted by dividing by a factor of 1.2. This follows the advice given by DEFRA.

Short-term to Long-term Data Adjustment

Data adjustment was not required as the data was collected over the full 12month period with data capture being above 90% for both PM_{10} and NO_2.

1. QA/QC of Automatic Monitoring

Calibration Checks

The Chemiluminescence nitrogen oxide analyser has fortnightly calibration checks and maintenance visits which followed documented procedures.

These procedures were drawn up in accordance with equipment manuals and the manufacturer's instructions. During the calibration checks, a two point calibration is carried out using a zero air scrubber and Nitric Oxide calibration gas, supplied by BOC , to quantify the analyser 'zero' and 'span' response. The 'zero' response is the response of the analyser when the pollutant species being measured is not present in the sample air stream.

The 'span' response is the response of the analyser to a gas mixture of accurately known concentration. In addition to the fortnightly checks, ESU1 carried out six monthly reference calibrations.

Equipment service and maintenance

The Council has an ongoing service and maintenance contract with **ESU1** for the analysers. The contract provides the following cover:

- Routine six monthly service visits in accordance with the manufacturers'
- instructions
- Guaranteed breakdown call out response
- Written report showing work carried out and status of instrumentation
- All work and documentation is carried out in accordance with a BS ISO 9002 accredited system
- Dedicated telephone support in normal working hours

Data processing

Data management and ratification is handled by Air Quality Data Management (AQDM) with regular data downloads during the day.

The raw data collected has to be converted to more useful pollutant concentrations and this conversion is achieved using the 'zero' and 'span' responses that are recorded during the fortnightly visits. The 'zero' response, Vz, is the response in measurement units of the analyser when the pollutant species being measured is not present in the sample air stream.

The 'span' response, Vs, is the response of the analyser to an accurately known concentration, c, in ppb (parts per billion) of the pollutant species. The instrument 'zero' and 'span' factors are then calculated using these data as follows:

Instrument zero = Vz
Instrument span, F = c/(Vs-Vz)

Ambient pollution data are then calculated by applying these factors to logged output signals as follows:

Pollutant concentration (ppb) = F(Va-Vz)

Where Va is the recorded signal from the analyser sampling ambient air. The fortnightly calibration factors applied to the raw data are then filed.

Data validation and ratification

Once the calibration factors have been applied to the raw data, the data is screened, by visual examination to see if they contain any spurious and/or unusual measurements. Any suspicious data, such as large spikes or spurious high concentrations can be 'flagged' and investigated more fully.

This process is known as validation. Data validation is followed by data ratification, which is carried out at 3 – 6 month intervals. Steps in the ratification process include:

- Examination of calibration records to ensure correct application of calibration factors
- Examination of data for other pollutants and monitoring sites to highlight any anomalies
- Deletion of data shown i.e. spikes generated by the analyser
- Correction of any baseline drift as indicated by examination of daily calibration records
- Examination of any local scale changes to the site environment

When data verification has been completed then the data is ready for further statistical and critical examination for reporting purposes.

Table A1: Average Daily Queen's Gardens PM_{10} Automatic Monitoring data for 2014

Queens Gardens PM_{10} BAM Scaled data 2014					
Date		PM_{10}µg/m³	Date		PM_{10}µg/m³
January 2014	01/01/14	12	February 2014	01/02/14	11
	02/01/14	16		02/02/14	15
	03/01/14	15		03/02/14	17
	04/01/14	15		04/02/14	17
	05/01/14	11		05/02/14	10
	06/01/14	17		06/02/14	17
	07/01/14	13		07/02/14	15
	08/01/14	19		08/02/14	12
	09/01/14	12		09/02/14	9
	10/01/14	16		10/02/14	20
	11/01/14	18		11/02/14	12
	12/01/14	22		12/02/14	14
	13/01/14	16		13/02/14	12
	14/01/14	14		14/02/14	13
	15/01/14	17		15/02/14	9
	16/01/14	17		16/02/14	18
	17/01/14	13		17/02/14	19
	18/01/14	21		18/02/14	16
	19/01/14	16		19/02/14	13
	20/01/14	38		20/02/14	11
	21/01/14	26		21/02/14	12
	22/01/14	16		22/02/14	14
	23/01/14	17		23/02/14	14
	24/01/14	18		24/02/14	15
	25/01/14	16		25/02/14	14
	26/01/14	16		26/02/14	21
	27/01/14	/		27/02/14	16
	28/01/14	/		28/02/14	25
	29/01/14	19			
	30/01/14	31			
	31/01/14	19			

Queens Gardens PM_{10} BAM Scaled data 2014					
Date		PM_{10}µg/m³	Date		PM_{10}µg/m³
March 2014	01/03/14	28	April 2014	01/04/14	23
	02/03/14	12		02/04/14	50
	03/03/14	24		03/04/14	60
	04/03/14	27		04/04/14	30
	05/03/14	23		05/04/14	20
	06/03/14	18		06/04/14	/
	07/03/14	18		07/04/14	/
	08/03/14	30		08/04/14	13
	09/03/14	43		09/04/14	16
	10/03/14	21		10/04/14	18
	11/03/14	26		11/04/14	19
	12/03/14	43		12/04/14	15

	13/03/14	51
	14/03/14	43
	15/03/14	19
	16/03/14	15
	17/03/14	12
	18/03/14	12
	19/03/14	19
	20/03/14	22
	21/03/14	14
	22/03/14	10
	23/03/14	13
	24/03/14	25
	25/03/14	/
	26/03/14	/
	27/03/14	26
	28/03/14	36
	29/03/14	55
	30/03/14	59
	31/03/14	66

	13/04/14	15
	14/04/14	23
	15/04/14	20
	16/04/14	31
	17/04/14	25
	18/04/14	25
	19/04/14	22
	20/04/14	36
	21/04/14	46
	22/04/14	29
	23/04/14	27
	24/04/14	26
	25/04/14	26
	26/04/14	20
	27/04/14	20
	28/04/14	31
	29/04/14	44
	30/04/14	40

Queens Gardens PM_{10} BAM Scaled data 2014

	Date	PM_{10}µg/m³
May 2014	01/05/14	42
	02/05/14	23
	03/05/14	22
	04/05/14	27
	05/05/14	27
	06/05/14	16
	07/05/14	15
	08/05/14	17
	09/05/14	18
	10/05/14	17
	11/05/14	11
	12/05/14	13
	13/05/14	19
	14/05/14	16
	15/05/14	21
	16/05/14	24
	17/05/14	18
	18/05/14	25
	19/05/14	34
	20/05/14	38
	21/05/14	28
	22/05/14	25
	23/05/14	20
	24/05/14	22
	25/05/14	20
	26/05/14	19
	27/05/14	23
	28/05/14	21
	29/05/14	18
	30/05/14	31

	Date	PM_{10}µg/m³
June 2014	01/06/14	25
	02/06/14	16
	03/06/14	21
	04/06/14	/
	05/06/14	18
	06/06/14	24
	07/06/14	26
	08/06/14	19
	09/06/14	23
	10/06/14	19
	11/06/14	19
	12/06/14	23
	13/06/14	24
	14/06/14	/
	15/06/14	/
	16/06/14	/
	17/06/14	18
	18/06/14	26
	19/06/14	29
	20/06/14	23
	21/06/14	/
	22/06/14	/
	23/06/14	/
	24/06/14	/
	25/06/14	18
	26/06/14	20
	27/06/14	20
	28/06/14	/
	29/06/14	14
	30/06/14	20

	31/05/14	30

Queens Gardens PM_{10} BAM Scaled data 2014					
Date		PM_{10}µg/m³	Date		PM_{10}µg/m³
July 2014	01/07/14	23	August 2014	01/08/14	24
	02/07/14	17		02/08/14	/
	03/07/14	14		03/08/14	11
	04/07/14	13		04/08/14	14
	05/07/14	13		05/08/14	18
	06/07/14	13		06/08/14	12
	07/07/14	13		07/08/14	17
	08/07/14	17		08/08/14	26
	09/07/14	19		09/08/14	14
	10/07/14	16		10/08/14	11
	11/07/14	18		11/08/14	14
	12/07/14	14		12/08/14	13
	13/07/14	12		13/08/14	13
	14/07/14	12		14/08/14	16
	15/07/14	14		15/08/14	16
	16/07/14	14		16/08/14	11
	17/07/14	18		17/08/14	12
	18/07/14	25		18/08/14	13
	19/07/14	20		19/08/14	12
	20/07/14	18		20/08/14	12
	21/07/14	16		21/08/14	11
	22/07/14	19		22/08/14	11
	23/07/14	23		23/08/14	11
	24/07/14	21		24/08/14	13
	25/07/14	20		25/08/14	11
	26/07/14	21		26/08/14	19
	27/07/14	10		27/08/14	20
	28/07/14	14		28/08/14	17
	29/07/14	13		29/08/14	15
	30/07/14	17		30/08/14	12
	31/07/14	16		31/08/14	13

Queens Gardens PM_{10} BAM Scaled data 2014					
Date		PM_{10}µg/m³		Date	PM_{10}µg/m³
September 2014	01/09/14	17	October 2014	01/10/14	23
	02/09/14	24		02/10/14	27
	03/09/14	23		03/10/14	23
	04/09/14	31		04/10/14	18
	05/09/14	47		05/10/14	17
	06/09/14	22		06/10/14	23
	07/09/14	15		07/10/14	18
	08/09/14	22		08/10/14	21
	09/09/14	34		09/10/14	19
	10/09/14	/		10/10/14	19
	11/09/14	/		11/10/14	22

	12/09/14	/
	13/09/14	/
	14/09/14	/
	15/09/14	/
	16/09/14	/
	17/09/14	/
	18/09/14	54
	19/09/14	56
	20/09/14	39
	21/09/14	25
	22/09/14	32
	23/09/14	36
	24/09/14	23
	25/09/14	15
	26/09/14	22
	27/09/14	29
	28/09/14	26
	29/09/14	39
	30/09/14	28

12/10/14	22
13/10/14	20
14/10/14	17
15/10/14	22
16/10/14	28
17/10/14	30
18/10/14	26
19/10/14	19
20/10/14	15
21/10/14	16
22/10/14	22
23/10/14	17
24/10/14	14
25/10/14	14
26/10/14	12
27/10/14	22
28/10/14	25
29/10/14	23
30/10/14	31
31/10/14	43

Queens Gardens PM_{10} BAM Scaled data 2014

	Date	PM_{10}µg/m³
November 2013	01/11/14	19
	02/11/14	16
	03/11/14	15
	04/11/14	25
	05/11/14	61
	06/11/14	43
	07/11/14	15
	08/11/14	16
	09/11/14	29
	10/11/14	27
	11/11/14	20
	12/11/14	21
	13/11/14	21
	14/11/14	23
	15/11/14	32
	16/11/14	25
	17/11/14	23
	18/11/14	30
	19/11/14	40
	20/11/14	53
	21/11/14	36
	22/11/14	36
	23/11/14	/
	24/11/14	/
	25/11/14	/
	26/11/14	/
	27/11/14	/

	Date	PM_{10}µg/m³
December 2013	01/12/14	38
	02/12/14	/
	03/12/14	/
	04/12/14	39
	05/12/14	25
	06/12/14	26
	07/12/14	12
	08/12/14	13
	09/12/14	16
	10/12/14	15
	11/12/14	12
	12/12/14	12
	13/12/14	22
	14/12/14	13
	15/12/14	16
	16/12/14	14
	17/12/14	12
	18/12/14	12
	19/12/14	14
	20/12/14	14
	21/12/14	9
	22/12/14	17
	23/12/14	14
	24/12/14	13
	25/12/14	14
	26/12/14	14
	27/12/14	19

	28/11/14	33
	29/11/14	46
	30/11/14	31

	28/12/14	31
	29/12/14	27
	30/12/14	39
	31/12/14	34

2. QA/QC of Diffusion Tube Monitoring

The use of diffusion tubes follows the guidance produced by AEA Energy & Environment, in their publication Diffusion Tubes for Ambient NO_2 Monitoring: Practical Guidance for Laboratories and Users[2]

Diffusion tubes are supplied and analysed by Gradko Laboratories. They have confirmed that they employ the AEA Technology and Environment NO_2 QC solution to check the validity of their calibration curves derived from internal standards prepared from NIST certified nitrite standards.

Gradko's general statement on Defra Guidance Document that has been supplied to Local Authorities is as follows:

> *'Our NO2 diffusion tube procedures have been amended to follow the guidelines of the DEFRA Harmonisation document related to the preparation, extraction, analysis and calculation procedures for NO2 passive diffusion tubes. These amendments are minimal because we already carried the out most of the procedures before the introduction of the Guidelines. Our internal analysis procedures are assessed by U.K.A.S. on an annual basis for compliance to ISO17025'*

[2] http://uk-air.defra.gov.uk/reports/cat05/0802141004_NO2_WG_PracticalGuidance_Issue1a.pdf

Appendix B: Full passive Nitrogen dioxide diffusion tube data set for 2014

Table A2: Diffusion tube data for Newcastle-Under-Lyme Borough Council 2014 (Bias adjustment factor 0.91)

Newcastle under Lyme Borough Council Local Air Quality Management Nitrogen
Analysing Laboratory : Gradko
Bias Adjustment | 0.91
Source: National Diffusion Tube Bias Factors Spredsheet version 03/12

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Uncorrected Mean (n=(n-1)=3)	Corrected Mean (Bias Adjustment Factor applied) (n=(n-1)=3)	Easting	Northing	Tube height from road (m)	Distance tube to kerb (m)	Distance tube to receptor (m)	Relevant Exposure? (Y/N according to LAQM. TG(09) Box 1.4	Site Type TG(03)
K1-A34 Holy Trinity	54.0	42.7	40.25	42.63	No Tube	39.28	35.31	40.18	41.14	55.41	53.12	49.73	45.5	41.4	385051	345726	3	3	22	N	Kerbside
K2-76 King St, N/C	39.8	34.5	36.98	31.59	32.60	28.60	27.00	27.14	38.30	37.95	43.16	36.55	34.5	31.4	385469	346362	2	3	0.2	N	Urban Centre
UB1-Wolstanton (Haritngton St)	No Tube	19.7	24.65	18.63	15.60	17.89	16.78	14.80	9.33	23.00	36.86	24.25	20.1	18.3	384739	348326	3	2	7	N	Kerbside
UB2-Westlands (4 Sneyd Crescent)	27.6	17.6	21.42	17.31	15.37	14.82	14.72	12.02	17.92	19.80	36.15	20.79	19.6	17.9	383916	345059	3	2	23	N	Kerbside
3-Madeley (Collingwood 3 Newcastle Rd)	43.9	50.7	43.50	39.89	40.50	30.47	32.05	39.48	28.60	37.71	40.38	50.77	39.9	36.3	378116	345488	-2	128	0.2	Y	Rural
6-Kidsgrove (106 Liverpool Rd)	50.1	42.3	50.34	43.65	45.21	44.98	40.65	38.93	45.98	50.82	53.75	20.30	44.5	40.5	384014	354429	3	4	0.2	Y	Suburban
9-32 Porthill Bank	46.8	42.7	43.35	46.77	43.72	38.31	35.57	31.00	36.86	36.81	43.31	44.85	40.9	37.2	385519	349055	3	6	0.2	Y	Suburban
11- 34 London Road, N/C	207.5	84.6	44.28	38.39	44.28	45.72	35.86	40.07	40.22	50.15	58.07	51.88	61.8	56.2	385112	345636	3	3	0.3	Y	Suburban
24-26 High St, May Bank	45.0	33.1	45.53	39.71	36.62	36.00	34.33	32.83	36.78	37.67	48.15	41.16	38.4	35.9	385574	347530	3	3	0.2	Y	Roadside
28-Limbrick Cottage Shraleybrook	14.6	73.0	37.98	31.77	36.01	28.64	30.05	34.19	29.14	34.55	34.60	51.35	36.3	33.1	377394	350105	6	45	0.3	Y	Rural
34-15 Barracks Road	39.7	36.2	44.57	36.40	31.16	40.28	30.52	30.85	39.85	38.71	45.92	41.66	38.0	34.6	385059	345840	3	4	1	Y	Urban Centre
39-4/6 Liverpool Road, Kidsgrove	43.2	34.1	44.12	43.55	36.58	38.25	35.20	31.23	41.38	35.48	53.06	37.00	39.4	35.9	383560	354739	3	2	0.2	Y	Suburban
40-Banktop Court, Porthill	38.5	38.3	40.19	33.34	34.70	45.03	28.05	30.45	37.25	33.22	46.70	38.71	37.0	33.7	385128	348611	5	20	0.2	Y	Suburban
42-Jubilee Baths, Newcastle	44.9	44.6	43.43	42.30	42.31	40.09	29.63	29.82	40.13	40.97	43.60	38.89	40.6	36.9	385086	346155	3	4	0.2	N	Urban Centre
46- 1 London Road (Trinity Court)	34.4	31.7	35.63	31.59	33.20	0.43	29.11	31.59	34.24	31.21	39.29	26.86	29.9	27.2	385073	345685	3	5	0.3	Y	Urban Centre
47- 1 London Rd (Brook La)	39.1	29.4	38.35	36.22	35.70	42.68	32.11	24.60	41.84	33.40	48.65	31.63	36.1	32.9	385023	345678	3	6	0.3	Y	Urban Centre
49- 2 Vale View, Porthill	38.2	34.1	38.80	31.68	35.09	35.30	35.11	34.12	32.26	28.42	19.42	40.56	33.6	30.6	385595	349129	10	10	0.2	Y	Urban Centre
64 - Kidsgrove Carpets 57 - 59 Liverpool Road	46.2	40.9	45.37	38.10	37.18	32.63	33.28	35.47	39.47	45.50	43.70	46.53	41.0	37.3	383950	354445	3	3	0.2	Y	Roadside
72 - 134 High Street Newcastle	37.0	37.4	38.11	30.12	36.18	No Tube	26.82	28.33	33.96	36.34	45.85	39.69	35.4	32.2	384980	345787	3	4	0.2	Y	Roadside
73 - 21 London Road Newcastle	42.4	33.9	43.83	37.09	34.09	33.15	35.27	32.80	33.74	31.00	50.40	43.40	37.6	34.2	385070	345738	3	4	0.2	Y	Roadside
74 - 39 London Road Newcastle	42.0	33.2	46.37	39.88	37.36	35.02	30.40	34.30	39.24	36.34	46.37	38.27	38.4	35.0	385132	345640	3	2	0.2	Y	Roadside
76 - 11 Brunswick Street Newcastle	No tube	38.2	44.46	41.91	43.15	38.99	30.53	32.54	36.63	37.32	43.92	37.37	38.6	35.2	385226	346156	3	2	0.2	Y	Roadside
84 - 102 King Street Newcastle	49.9	47.1	45.98	42.31	48.56	41.80	34.46	35.42	36.44	43.14	52.24	42.96	43.4	39.5	385548	346400	3	5	0.2	Y	Urban Centre
85 - 106 King Street Newcastle	55.7	48.4	49.43	46.24	26.83	31.08	48.32	40.86	54.67	48.04	60.82	45.73	46.6	42.4	385575	346413	2	5	0.2	Y	Urban Centre
86 - Hassell C.P. School Barracks Road N/C	46.9	33.0	53.77	32.32	33.71	35.95	28.10	28.37	30.73	31.52	43.54	40.50	36.5	33.2	385075	345910	3	5	0.2	Y	Urban Centre
87 - Blue Chilli 1 King Street Newcastle	42.5	41.0	45.77	40.55	27.69	29.76	39.37	41.18	39.06	39.33	52.52	46.37	40.5	36.8	385105	346225	2	5	0.2	Y	Urban Centre
88 - 27 Lower Street Newcastle	40.7	36.6	37.31	35.06	44.18	34.84	28.42	32.89	32.35	38.09	40.65	41.46	36.9	33.6	384709	345881	3	5	0.2	Y	Urban Centre
89 - Queens Gardens Newcastle	42.8	33.8	41.37	41.41	34.12	31.77	30.36	22.64	18.35	37.25	55.69	32.29	35.2	32.0	385054	346134	1	5	1	Y	Urban Centre
90 - Queens Gardens Newcastle	44.6	36.7	42.73	37.28	34.19	34.28	31.26	27.77	34.20	39.10	50.11	32.58	37.1	33.7	385054	346134	1	5	1	Y	Urban Centre
91 - Queens Gardens, Newcastle	41.8	35.7	43.50	34.41	33.11	34.97	29.17	26.80	42.57	37.67	52.33	35.11	37.3	33.9	385054	346134	1	5	1	Y	Urban Centre
92 - 41/43 Liverpool Road Kidsgrove	51.3	35.5	43.26	39.20	35.44	33.61	27.89	29.63	41.84	43.88	55.34	37.72	39.6	36.0	383890	354461	3	2	0.2	Y	Urban Centre
93 - 118 Liverpool Road Kidsgrove	38.2	32.4	40.60	37.36	34.31	35.21	32.45	30.06	35.42	31.93	43.68	36.45	35.7	32.5	384056	354393	4	3	0.2	Y	Urban Centre
94 - 116 Liverpool Road Kidsgrove	44.9	30.1	41.50	40.99	39.50	34.01	34.59	33.87	35.66	36.56	48.17	36.95	38.1	34.6	384030	354416	4	4	0.2	Y	Urban Centre
95 - 76 London Road Newcastle	42.5	36.3	42.20	35.90	39.19	36.84	30.92	34.98	36.03	38.44	61.27	43.91	39.9	36.3	385171	345539	4	2	0.2	Y	Roadside
96 - 52/54 London Road Newcastle	52.1	43.4	No Tube	43.63	43.59	41.92	31.96	41.51	39.93	46.71	56.23	43.75	44.6	40.6	385131	345601	3	3	0.2	Y	Roadside
97 - Blackfriars/ Lower Street	50.5	35.3	46.22	36.70	37.92	35.58	35.18	30.17	36.87	37.87	54.27	31.12	39.0	35.5	384795	345796	2	2	0.2	N	Roadside
98 - Newcastle Taxis Brunswick Street	53.1	47.5	50.17	42.25	45.14	37.85	34.02	37.63	37.30	51.54	49.46	45.80	44.3	40.3	385274	346124	4	6	0.2	Y	RoadSide
99 12 Morston Drive Newcastle	No Tube	36.0	33.47	29.74	29.52	25.36	23.03	25.83	28.47	31.92	33.29	38.02	30.42	27.68	384784	342528	2	117	0.2	Y	Roadside

Appendix C: Diffusion Tube Co-location Study Summary Data

Table A3: Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Co-location Studies by Laboratory

Harwell Scientifics, 50% TEA in Acetone	
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2009	G
2009	G
2009	G
2009	G
2009	G
2009	G
2009	P
2009	G
2009	G
2009	G
2009	G
2009	G
2009	P
2009	G
2009	P
2009	G
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2009	P
2009	G
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2009	G
2009	G
2010	G
2010	P
2010	P
2010	G
2010	G
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2010	G
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2010	G
2010	G
2010	G
2010	G
2010	G
2010	G
2010	G
2010	G

Harwell Scientifics, 20% TEA in Water	
2010	G

ESG Didcot, 50% TEA in Acetone	
2011	G
2011	G
2011	G
2011	G
2011	G
2011	G
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2013	G
2013	P
2013	P
2013	P
2013	P
2013	P
2013	P
2013	P

ESG Didcot, 20% TEA in Water	
2011	G
2012	G
2012	G
2013	G
2013	G
2013	G
2014	G
2014	G
2014	G
2014	G
2014	P

Environmental Scientific Groups, 50% TEA in Acetone	
2010	G
2010	G
2010	G
2010	G

Environmental Scientific Groups, 20% TEA in Water	
2009	G
2009	G
2009	G
2009	P
2009	G
2009	G
2009	G
2009	G
2009	G
2010	P
2010	P
2010	G
2010	G
2010	G
2010	P
2010	P
2010	P
2010	G
2010	G

ESG Glasgow, 50% TEA in Acetone	
2011	G
2011	G
2011	G
2011	P
2012	G
2012	G
2012	G
2012	G
2013	G
2014	P

ESG Glasgow, 20% TEA in Water	
2011	G
2012	G
2013	G
2014	G

Gradko, 50% TEA in Acetone	
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	G
2008	P
2008	G
2008	G
2009	G
2009	G
2009	G
2009	G
2009	G
2009	G
2009	G
2009	G
2009	G
2009	G
2009	P
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2013	G
2013	G
2013	G
2013	G
2013	G
2013	P
2014	G
2014	G
2014	G
2014	G
2014	G
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2014	G
2014	P

Gradko, 20% TEA in Water	
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2011	G

Key	
P	Poor Precision
G	Good Precision
2008	Results of study carried out in 2008
2009	Results of study carried out in 2009
2010	Results of study carried out in 2010
2011	Results of study carried out in 2011
2012	Results of study carried out in 2012
2013	Results of study carried out in 2013
2014	Results of study carried out in 2014

Numerical results for this data are contained in the National Bias Adjustment Spreadsheet version 03/15.

South Yorkshire	
2008	G
2008	G
2008	G
2008	P
2008	G
2008	G
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2008	G
2008	G
2008	G
2009	G
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2009	G
2009	G
2009	G
2009	G
2009	G
2009	G
2010	G
2010	P
2010	G
2010	P
2010	G
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2012	G
2013	G
2013	G
2014	G

Somerset Council	
2012	P
2012	P
2013	G
2013	G
2013	G
2014	G
2014	G
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2014	G
2014	G
2014	G
2014	G
2014	G

Table A3 (cont.): Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Co-location Studies by Laboratory

Harwell Scientifics, 50% TEA in Acetone		Harwell Scientifics, 20% TEA in Water		ESG Didcot, 50% TEA in Acetone		ESG Didcot, 20% TEA in Water		Environmental Scientific Groups, 50% TEA in Acetone		Environmental Scientific Groups, 20% TEA in Water		ESG Glasgow, 50% TEA in Acetone		ESG Glasgow, 20% TEA in Water		Gradko, 50% TEA in Acetone		Gradko, 20% TEA in Water	
				2014	G													2011	P
				2014	G													2011	P
				2014	G													2012	G
				2014	G													2012	G
				2014	G													2012	G
				2014	G													2012	G
				2014	G													2012	G
				2014	G													2012	G
				2014	G													2012	G
				2014	G													2012	G
				2014	G													2012	G
				2014	G													2012	G
				2014	P													2012	G
				2014	P													2012	G
				2014	P													2012	G
				2014	P													2012	G
				2014	P													2012	G
				2014	P													2012	G
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Aberdeen CC		Kirklees County Scientific Services		Milton Keynes Council		Glasgow Scientific Services, 20% TEA in Water		Edinburgh Scientific Services	
2008	G	2008	G	2008	G	2008	P	2008	G
2008	G	2009	G	2008	G	2008	G	2008	G
2008	G	2010	G	2009	G	2008	P	2009	G
2008	G	2011	G	2009	G	2008	G	2009	G
2008	G	2011	G	2009	G	2009	P	2009	G
2009	G	2011	P	2010	G	2009	G	2009	G
2010	G	2012	G	2010	G	2009	P	2009	G
2010	G	2012	G	2010	G	2009	G	2010	G
2010	G	2012	G	2010	G	2010	G	2010	G
2010	P	2013	G	2010	G	2010	P	2010	G
2010	G	2014	G	2011	G	2010	P	2010	G
2011	G			2011	G	2010	P	2010	G
2011	G			2011	G	2010	G	2010	G
2011	G			2011	G	2010	P	2011	G
2011	G			2012	G	2011	G	2011	G
2011	G			2013	G	2011	G	2011	G
2011	G			2014	G	2011	G	2011	G
2012	G					2011	P	2011	G
2013	G					2011	P	2011	G
2014	G					2011	P	2011	G
						2011	P	2011	G
						2012	G	2012	G
						2012	G	2012	G
						2012	G	2012	G
						2012	P	2012	G
						2012	P	2012	G
						2012	P	2012	G
						2012	P	2012	G
						2012	P	2013	G
						2012	P	2013	G
						2012	P	2013	G
						2012	P	2013	G
						2013	G	2013	G
						2013	G	2013	G
						2013	G	2013	G
						2013	P	2014	G
						2013	P		
						2014	G		
						2014	P		

Table A3 (cont.): Summary of Precision Results for Nitrogen Dioxide Diffusion Tube Co-location Studies by Laboratory

Bristol Scientific Services,	
2008	G
2008	G
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Lancashire CC	
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2009	G
2010	P

Tayside SS	
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Lambeth Scientific Services	
2008	P
2008	G
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2008	P
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2014	G

Exova	
2008	P
2011	P
2012	P
2013	G

Northampton BC	
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Staffordshire Scientific Services	
2008	P
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West Yorkshire Analytical Services	
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2014	P

Walsall MBC	
2008	P
2009	P
2009	P
2009	P
2009	P
2009	P
2009	P

Cardiff Scientific	
2008	G
2008	G
2008	G
2008	G
2008	P
2008	P
2009	G
2009	G
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2011	P

Kent Scientific	
2008	G
2009	G
2010	G
2011	G
2012	G
2013	G

Appendix D: WASP/ NO2 summary data

Table A4: Laboratory Summery Performance for WASP/NO2 PT rounds 121 – 124 and AIR NO2 PT rounds AR001, 3, 4 and 6

The following table lists those UK laboratories undertaking LAQM activities that have participated in recent WASP/AIR NO_2 PT rounds and the percentage (%) of results submitted which were subsequently determined to be **satisfactory** based upon a z-score of ≤ ± 2 as defined above.

WASP Round	WASP R121	WASP R122	WASP R123	WASP R124	AIR PT AR001	AIR PT AR003	AIR PT AR004	AIR PT AR006
Round conducted in the period	April – June 2013	July – September 2013	October – December 2013	January – March 2014	April – May 2014	July – August 2014	October – November 2014	January – February 2015
Aberdeen Scientific Services	100 %	100 %	NR [2]	75 %	100 %	100 %	100 %	100 %
Cardiff Scientific Services	100 %	100 %	100 %	100 %	NR [3]	NR [3]	NR [3]	NR [3]
Edinburgh Scientific Services	100 %	75 %	100 %	100 %	100 %	100 %	100 %	75 %
Environmental Services Group, Didcot [1]	100 %	100 %	100 %	100 %	100 %	100 %	100 %	87.5 %
Exova (formerly Clyde Analytical)	NR [2]	NR [2]	NR [2]	50 %	NR [3]	NR [3]	NR [3]	NR [3]
Glasgow Scientific Services	25 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Gradko International [1]	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Kent Scientific Services	75 %	100 %	100 %	100 %	NR [3]	NR [3]	NR [3]	NR [3]
Kirklees MBC	100 %	100 %	100 %	100 %	100 %	100 %	100 %	75 %
Lambeth Scientific Services	0 %	50 %	75 %	25 %	50 %	100 %	100 %	25 %
Milton Keynes Council	100 %	75 %	75 %	75 %	100 %	100 %	75 %	100 %
Northampton Borough Council	100 %	100 %	100 %	100 %	100 %	0 %	0 %	100 %
Somerset Scientific Services	100 %	75 %	100 %	100 %	100 %	100 %	100 %	100 %
South Yorkshire Air Quality Samplers	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %
Staffordshire County Council	100 %	100 %	100 %	100 %	100 %	25 %	100%	100 %
Tayside Scientific Services (formerly Dundee CC)	100 %	100 %	100 %	100 %	NR [2]	100 %	100 %	100 %
West Yorkshire Analytical Services	100 %	50 %	100 %	75 %	75 %	100 %	75 %	100 %

[1] Participant subscribed to two sets of test samples (2 x 4 test samples) in each WASP/AIR PT round.
[2] NR No results reported
[3] Kent Scientific Services, Cardiff Scientific Services and Exova (formerly Clyde Analytical) no longer carry out NO2 diffusion tube monitoring and therefore did not submit results.

Appendix E: AADF Traffic Count Data

Table A5 – AADF Data for 2013

Road Name	Count Point ID	Easting/ Northing	Pedal Cycles	Motor Cycles	Cars & Taxis	Buses & Coaches	LGV's	Rigid HGV			Artic' HGV			All HGVs	All Motor Vehicles
								V2 Axle	V3 Axle	V4 or V5 Axle	V3 or v4 Axle	V5 Axle	V6 or more Axle		
London Road (A34)	74065	385310/ 345386	72	158	18033	109	1890	137	48	28	20	76	38	347	205537
Liverpool Road, Kidsgrove (A50)	46538	385000/ 353836	21	83	11058	219	2143	132	27	32	1	5	4	201	13704
King Street (A53)	6545	385625/ 346450	37	86	11727	158	1358	101	22	47	10	29	17	226	13555
Barracks Road (A527)	38303	385067/ 345956	26	115	19196	1009	1845	117	36	20	3	12	13	201	22366
Brunswick Street (A53)	75283	385290/ 346200	43	54	12716	339	1819	196	36	54	9	8	9	312	15240
Lower Street (A34)	48067	384700/ 345900	55	187	21216	108	2571	253	57	82	52	157	69	670	24752
High Street, Maybank (A527)	47276	385676/ 347852	73	72	10722	188	1616	78	12	54	4	1	1	150	12748

Note. AADF figures listed are taken from the www.dft.gov.uk and give the number of vehicles that drove on that stretch of road on an average day during 2013