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LAQM Detailed Assessment

Technical Report April 2011.

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EXECUTIVE SUMMARY

This Detailed Assessment should be read in conjunction with the 2011 Progress Report submitted by Northumberland County Council.

Part IV of the Environment Act 1995 places a statutory duty on local authorities to review and assess the air quality within their area. For local authorities that have identified areas, within their Annual Progress Reports, where there is a potential risk of exceedance of the national Air Quality Objectives (AQO), a Detailed Assessment is required. This Detailed Assessment covers the assessment of monitoring results for 2009 which indicated an exceedance of the annual mean air quality objective for nitrogen dioxide (NO_2) in the western part of Cowpen Road (A193), Blyth and a review of the Air Quality Management Area (AQMA) in Blyth town centre. Neither the daily mean or annual mean air quality objective for particulate matter (PM_{10}) has been exceeded within the AQMA for seven years (up to 2010).

This detailed assessment has been undertaken in accordance with the Technical Guidance LAQM.TG (09).

The conclusions of the first round of local air quality review and assessment, commencing in 1998, were that all air quality objectives were expected to be met.

Following the Updating and Screening Assessment (USA) in May 2003, Blyth Valley Borough Council undertook a Detailed Assessment in 2004 for PM_{10} around the Blyth town centre, bus station and maintenance depot due to emissions from traffic.

An Air Quality Management Area (AQMA) was declared in Blyth town on 22 December 2004 for particulates (PM_{10}) as the national air quality objective for PM_{10} was being exceeded. The AQMA reference is 211204.

The USA in 2006 concluded that all objectives would be met outside and within the Blyth AQMA.

Ongoing detailed monitoring has been undertaken for NO_2 and PM_{10} at specific points in Blyth and Cowpen, in particular adjacent to the junction with the A193 (Cowpen Road) and U9500 (Coniston Road) and within the Blyth AQMA on the B1328 (Bridge Street). Real time monitors are located at these two locations and a number of co-located and local background NO_x diffusion tubes.

Based on this detailed assessment and review of the monitoring data within the areas under assessment, the following recommendations are made for Northumberland County Council:

- To consider revoking the Air Quality Management Area Ref: 211204 in the vicinity of the Blyth town centre, on the basis of PM_{10} levels having shown no exceedences of the annual mean objective or number of annual exceedences at relevant receptor locations and are there is no indication that they would do so in the foreseeable future;
- To take no further action towards declaration of an AQMA around Cowpen Road air quality monitoring site. There has only been one years' annual mean concentration of NO_2 have been in breach of the national Air Quality Objectives;
- To continue monitoring NO_2 and PM_{10} at the current monitoring locations in Blyth town centre and Cowpen Road for a further two years.

1. Introduction

1.1. Project Background

This Detailed Assessment for nitrogen dioxide and particulates (NO_2 & PM_{10}) is required following the conclusions of the 2010 Progress Report on air quality. The 2010 Progress Report identified a potential exceedance of the annual mean objective for NO_2 at the Cowpen Road Site (CRS) and non-exceedences for either objective for PM_{10} in the AQMA at the Blyth Town Centre Site (BTCS).

1.2. Legislative Background

1.2.1. Air Quality Strategy Objectives

The Air Quality Strategy (AQS) (July 2007) provides the over-arching strategic framework for air quality management in the UK and contains national air quality standards and objectives established by the Government to protect human health. The objectives for ten pollutants (benzene, 1,3-butadiene, carbon monoxide, lead, nitrogen dioxide, sulphur dioxide particulates - PM_{10}, $PM_{2.5}$ and ozone) have been prescribed within the Air Quality Strategy based on The Air Quality Standards (England) Regulations 2010. The Objectives set out in the AQS for the protection of human health are presented in Table 1.1.

The Air Quality Standards (England) Regulations 2010 brings together the Government's requirements to fulfil separate EU Daughter Directives through a single consolidated statutory instrument, which is fully aligned with proposed EU Air Quality Directive (CAFE – Clean Air For Europe). The Regulations include objectives for Arsenic, Cadmium and Nickel. These are required to be assessed by member states in response to the proposed Air Quality Daughter Directive (CAFE), however, the AQS does not contain objectives for these pollutants and local authorities are not currently required to assess them. The Environment Act 1995 gives local authorities duties and responsibilities that are designed to secure improvements in air quality at local level. Part IV of the Act requires each local authority within the UK to periodically review and assess air quality in its area, and determine whether the prescribed objectives are likely to be achieved.

The AQS objectives take into account EU Directives that set limit values which member states are legally required to achieve by their target dates. The UK's AQS objectives are equal to, or more stringent than, the EU limit values.

The locations where the AQS objectives apply are defined as locations outside buildings or other natural or manufactured structures above or below ground where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over a relevant averaging period. Typically these include residential properties and schools/care homes for longer period (i.e. annual mean) pollutant objectives and high streets for short-term (i.e. 1-hour) pollutant objectives.

This detailed assessment considers the NO_2 and PM_{10} objectives.

Table 1.1. AQS Objectives in Regulations for England

Pollutant	Objective	Concentration measured as	Date to be achieved by and maintained thereafter
Benzene	16.25 µg/m^3	running annual mean	31st December 2003
	5 µg/m^3	running annual mean	31st December 2003
1,3-Butadiene	2.25 µg/m^3	running annual mean	31st December 2003
Carbon monoxide	10 mg/ m^3	maximum daily running 8 hour mean	31st December 2003
Lead	0.5 µg/m^3	annual mean	31st December 2004
	0.25 µg/m^3	annual mean	31st December 2008
Nitrogen dioxide	200 µg/m^3, not to be exceeded more than 18 times a year	hourly mean	31st December 2005
	40 µg/m^3	annual mean	December 2005
Particles (PM_{10})	50 µg/m^3, not to be exceeded more than 35 times a year	24 hour mean	31st December 2004
	40 µg/m^3	annual mean	31st December 2004
Particles ($PM_{2.5}$)[a]	25g/m^3	Annual mean	2020
	Target of 15% reduction in concentrations at urban background[1]	Annual mean	In urban areas between 2010 and 2020
Sulphur dioxide	266 µg/m^3, not to be exceeded more than 35 times a year	15 minute mean	31st December 2005
	350 µg/m^3, not to be exceeded more than 24 times a year	hourly mean	31st December 2004
	125 µg/m^3, not to be exceeded more than 3 times a year	24 hour mean	31st December 2004
Polycyclic aromatic Hydrocarbons [a]	0.25 ng/m^3 B(a)P[2]	Annual average	31st December
Ozone [a]	100 µg/m^3, not to be exceeded more than 10 times a year	8 hour mean	31 December 2005

(a) Not prescribed for Local Air Quality Management

1.2.2. Local Air Quality Management

Part IV of the Environment Act places a statutory duty on local authorities to periodically 'review and assess' the air quality within their area under the Local Air Quality Management (LAQM) regime. This involves consideration of present and likely future air quality against the AQS objectives prescribed within the Air Quality Regulations.

and Assessment process finds that pollutant concentrations are unlikely to meet the AQS objectives by their target dates, the Local Authority are required to declare an Air Quality Management Area (AQMA) under Section 83(1) of the Environment Act 1995. The areas in which the AQS objectives apply are defined in the AQS as locations outside buildings or other natural or man-made structures above or below ground where members of the public are regularly present and might reasonably be expected to be exposed to pollutant concentrations over the relevant averaging period of the AQS objective.

[1] 25 µg/m^3 is a concentration cap combined with 15% reduction

[2] Benzo(a)Pyrene

Guidelines for the 'Review and Assessment' of local air quality were first published in the 1997 National Air Quality Strategy (NAQS)[3] along with associated policy guidance and technical guidance. The First Round of Review and Assessment recommended that local authorities fulfil their statutory duty under the LAQM regime by undertaking a three-stage assessment, increasing in detail at each stage.

In 2000, Government reviewed the NAQS and published the revised AQS, to which an addendum was issued in February 2003. Associated revised LAQM Technical Guidance (LAQM.TG(09))[4] and Policy Guidance (LAQM.PG(09))[5] were issued on behalf of DEFRA in 2009. This guidance set the framework for the requirements of review and assessment for future years, taking account of experiences from the previous rounds of review and assessment. This current framework for review and assessment begins with an Updating and Screening Assessment (USA) that considers the likelihood of all the AQS objectives being achieved across the Local Authority's administrative area. If the USA identifies that an AQS objective may not be met, then the Local Authority must proceed to a Detailed Assessment for that pollutant. If the results of the Detailed Assessment confirm that, an AQS objective is unlikely to be met they are required to declare an AQMA.

Having declared an AQMA the authority is required to confirm the findings of the Detailed Assessment work through further monitoring or modelling assessments. This further Assessment should provide information on the source-apportionment of the pollutant emissions in order to identify the level of pollutant reduction required for the attainment of relevant air quality objectives. Additionally, consideration should be made to evaluating local management practices that could be used to improve air quality, and feed into the formulation of an Action Plan.

The Review and Assessment (2003-2005) provided an opportunity for local authorities to update the findings of their first round of review and assessment. In doing so, local authorities were to take into consideration changes in AQS Objectives and revised Technical Guidance, new emission sources, and any significant proposed planning developments due to take place before the relevant AQS Objective target date.

Currently there are over 200 separate AQMAs across the UK. Road traffic emissions are the main cause of exceedences of particulates (PM_{10}) and nitrogen dioxide (NO_2). Whilst other pollutants such as carbon monoxide (CO) and benzene are associated with road traffic emissions, the latest national perspective on the occurrence of each of these pollutants suggests that these are no longer a problem at roadside locations across the UK.

2. Summary of the Review and Assessment by Blyth Valley Borough Council and Progress Report of Northumberland County Council

The conclusions of the local air quality review and assessment (1998), were that ALL air quality objectives were expected to be met.

Following Updating and Screening Assessment (USA) in May 2003, Blyth Valley Borough Council undertook a Detailed Assessment in 2004 for Particulate Matter (PM_{10}) around the Blyth Valley town centre/bus station and depot due to emissions from traffic.

[3] DoE (1997) The United Kingdom Nation Air Quality Strategy The Stationery Office

[4] Defra (2009) Technical Guidance LAQM.TG(09), Part IV of the Environment Act 1995, Local Air Quality Management, The Stationery Office

[5] Defra (2009) Policyl Guidance LAQM.PG(09), Part IV of the Environment Act 1995, Local Air Quality Management, The Stationery Office

As a result an Air Quality Management Area (AQMA) was declared in Blyth town on 22 December 2004 for particulates (PM_{10}). The AQMA reference is 211204.

The Updating and Screening Assessment (USA) for 2009 considered monitoring data for 2008. The conclusions of the USA were that the particulate objectives might be met at the nearest receptors to the bus station in the town centre.

The first combined Progress Report from the unitary Northumberland County Council, composed of the former districts, boroughs and county council of Northumberland was prepared in 2010. That report concluded that there had been no exceedences of the national air quality objective for NO_2 or PM_{10} in the AQMA. However, there had been exceedences of the national air quality objective for NO_2 in the Cowpen Road area of Blyth; in that the annual mean objective for NO_2 had been exceeded for that year (2009).

3. Scope and Methodology of the Detailed Assessment

The scope of this report is to:

i). Assess the impact and significance of the single exceedence of the annual mean objective at Cowpen Road in 2009 and to review the data and rationale for maintaining the AQMA in Blyth town centre.

The NO_2 concentrations from the real-time monitor located on Cowpen Road, co-located and local background diffusion tubes have been re-examined and evaluated in relation to data from previous years and 2010. This is to view the significance of the exceedance of the annual mean objective for one year in isolation.

In relation to this, a simplified model has been used to assess the impact of NO_2 concentrations on receptors along Cowpen Road (A193) using the nitrogen dioxide fall off with distance calculator and the number of receptors along the road, determined from the Council's property gazetteer.

And;

ii). To review the data and rationale for the Blyth town centre AQMA to determine whether maintaining the existing AQMA here is still required.

The report will deal with these two issues in separate sections.

4. Nitrogen Dioxide Assessment for Cowpen Road

4.1. Baseline Information

The Cowpen Road Site (CRS) was re-screened in accordance with the Updating and Screening Methodology for NO_x.

Data from the real-time NO_2 monitor, co-located diffusion tube and four local background diffusion tubes was re-examined up to 2010.

4.2. Road Traffic Data

Cowpen Road is one of two main arterial roads into Blyth town centre from the A189 (Spine Road). It serves traffic coming from the north and west. It also carries a significant amount of public transport and commercial traffic to industrial estates / retail parks as well as commercial traffic into the town centre. See Fig 4.1.

The CRS has with a high flow of buses and heavy goods vehicles (HDV); with no residential properties within 2 metres of the kerb.

Traffic data for CRS was obtained from the DfT Matrix website for 2009. The two sample locations are shown in Fig 4.1; the “Bebside ASDA” site is at the western end of Cowpen Road (near the overpass with the A189 and the “Near TA Centre” is at the eastern end of the road.

Where speed data has not been made available, speeds have been based on speed limits, modified according to local conditions to take account of congestion and stop/start vehicle movements at junctions. Speeds were reduced at busy junctions to 20kph to reflect the higher emissions of queuing traffic.

4.3. Bus and Coach Stations

Although there are a number of bus stops on Cowpen Road, there is no bus or coach station in the vicinity.

4.4. Source Apportionment/Emission Factors

This was produced using Defra’s Emission Factor Toolkit – EFT (v4.2.2) using data for Cowpen Road (A193) obtained from the DfT Matrix website.

4.5. Automatic Air Quality Monitoring

Nitrogen dioxide levels are monitored using an API/Teledyne M200E Chemiluminescent NO_x Analyser and particulate matter is measured using a Met One Beta Attenuation Monitor (BAM) at the Cowpen Road site. The monitors are located in an air quality monitoring station at the western junction of Cowpen Road and Coniston Road (see Fig 4.2). The monitoring stations are serviced and calibrated by the environmental engineering company, SupportingU.

This monitoring station has collected full annual data since 2007 and is still operational.

The nearest residential receptor from this station is approximately 15 metres to the façade of the building and approximately 17 metres from the kerbside of Cowpen Road.

The Quality Assurance/Quality Control (QA/QC) procedures for the NCC network are equivalent to the UK Automatic Urban and Rural Network (AURN) procedures.

In March 2011 the 2010 data was ratified by AEA and the automatic monitors QA/QC audited to the AURN standard.

4.6. Non-Automatic Air Quality Monitoring

A NOx diffusion tube is co-located with the real-time monitoring station on Cowpen Road (B3) and there are four other diffusion tubes in the vicinity, some measuring local background (B7, B8 & B9) and one located on Cowpen Road about one kilometre to the east (B5). See Table 5.3 & 5.4.

These tubes have been operated since the late 1990s although in March/April 2010 tubes B7 and B9 were decommissioned.

Locations of these tubes are shown on Fig 5.4.

4.7. Cowpen Road Receptor Impact Modelling Methodology

Because of the anomalous annual mean NO_2 concentration in 2009 an attempt has been made to assess any impact from this upon receptors along Cowpen Road.

It was found that the NO2 concentration results at CRS in 2009 were unreliable, therefore, a simplified model has been used to predict the impact of NO_2 levels on Cowpen Road to the nearest residential receptors.

Multiple buffers were generated in a GIS system from the centreline of Cowpen Road for a substantial part of the road's length. Each buffer was five metres further from the previous one, to a maximum of 45 metres from the centreline. The first 5 metre buffer encompassed the width of Cowpen Road. See Fig 4.1 & 4.2.

Within each buffer a count of properties in the Councils property gazetteer dataset was made (and shown in Table 5.6).

Using the DEFRA guidance on predicting NO2 fall-off from a roadside (http://laqm.defra.gov.uk/tools-monitoring-data/no2-falloff.html), a predicted level of NO_2 was attributed to each of the buffers (Table 5.6). A count of properties within each buffer was then derived.

A number of assumptions have been made in the model, including:

- That the kerbside concentration is the same on the entire length of road modelled,
- and, consequently traffic levels or composition does not change along the length of road modelled
- There is no impact from morphology/topography (terrain, trees, buildings etc.) upon concentrations near the road.
- Property counts have been made upon the address point of the property, not an exterior wall or garden. The address point will normally be located within the boundary of the actual building it refers to.

Fig 4.1 Five metre buffers along section of Cowpen Road used in modelling receptor impacts

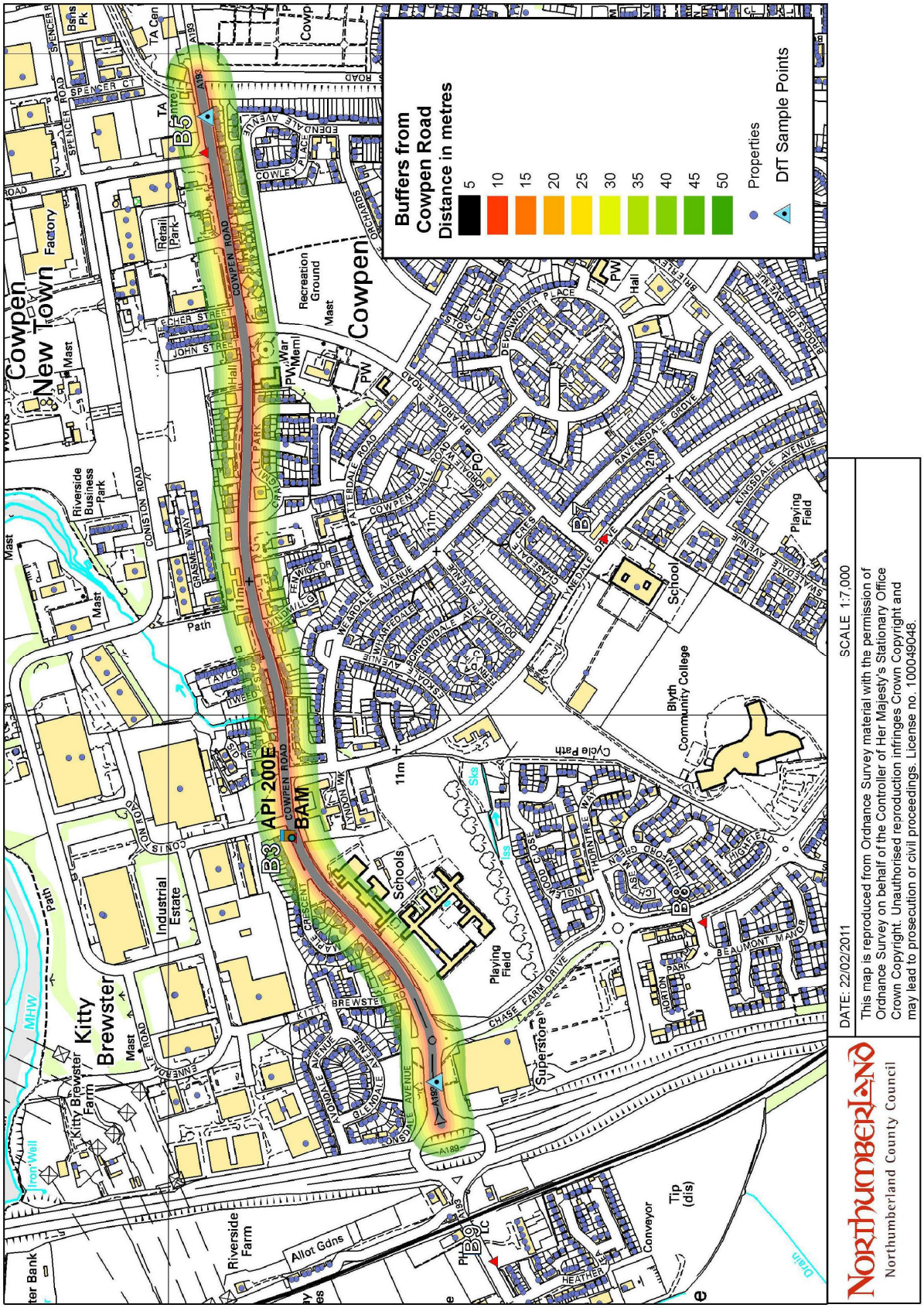


Fig 4.2 Details of buffers around the air quality station on Cowpen Road showing the approximate location of monitors and diffusion tube

5. Nitrogen Dioxide Assessment for Cowpen Road - Results

5.1. Road Traffic Data

Table 4.1 shows the traffic figures for Cowpen Road and it can be seen that there is almost a 10 percent drop in overall traffic from the west to the east sample locations. This is as a result of traffic departing Cowpen Road for destinations other than the centre of town.

Table 4.1. AADT Figures for Cowpen Road (A193) for 2009

Road	Year	Street	Location	Motor-cycles	Car	Bus	LGV	HGV	HDV	All Vehicles
A193	2009	Cowpen Road	Beside ASDA	237	15285	190	2223	373	2786	18308
A193	2009	Cowpen Road	Near TA Centre	216	13909	173	2023	338	2534	16659

Source: http://www.dft.gov.uk/matrix/

The traffic counts at the Bebside ASDA sample location may be slightly higher than at the air quality monitoring station as it is possible that traffic leaves the Spine Road (A189) onto Cowpen Road (A193) to go to ASDA and leave by the same route, never passing the air quality monitoring station.

5.2. Bus and Coach Station

Table 4.1 showing the AADT data for Cowpen Road. It can be seen that there are in the region of 170 – 190 bus movements on this road in an average day.

5.3. Source Apportionment/Emission Factors

The main contributor to NO_X levels on Cowpen Road is from traffic on this and surrounding roads. The total contribution from road sources being 32.7 percent.

Table 5.5. 2009 NO_x background level predicted at 20μg/m^3 for the Cowpen Road site from the DEFRA background maps

Source	μg/m^3	Percent
Motorway Inside Grid	0.00	0.0
Motorway Out Grid	0.00	0.0
Trunk Road Inside Grid	0.00	0.0
Trunk Road Outside Grid	0.31	1.5
Primary Road Inside Grid	3.27	16.4
Primary Road Outside grid	1.42	7.1
Minor Road Inside Grid	0.60	3.0
Minor Road Outside grid	0.95	4.7
Industry Inside grid	0.64	3.2
Industry Outside grid	0.85	4.2
Domestic Inside Grid	0.64	3.2
Domestic Outside grid	1.44	7.2
Aircraft Inside Grid	0.00	0.0
Aircraft Outside Grid	0.00	0.0
Rail Inside Grid	0.00	0.0
Rail Outside Grid	0.17	0.9
Other Inside Grid	2.84	14.2
Other Outside Grid	1.29	6.4
Point Sources	0.28	1.4
Regional Rural Concentration	5.28	26.4
Total NO_x	**20.02**	**100**

Source: http://laqm.defra.gov.uk/maps/maps2008.html

Source apportionment using Defra's Emission Factor Toolkit is presented in the appendices and shows the breakdown of the traffic contribution to NO_x (and PM_{10}).

The source apportionment shows that the main contributors of NOx on Cowpen Road are buses (36%), rigid HGVs (34.1%) and articulated HGVs (10.9%). Diesel and petrol cars only contribute 13.6% combined to the NOx levels on Cowpen Road.

5.4. Automatic Air Quality Monitoring

Table 5.1 shows the NO_2 annual mean and number of exceedences of the hourly mean objective for the Cowpen Road monitoring station. The annual mean for 2009 is 103 percent higher than the previous year, until then the highest concentration recorded.

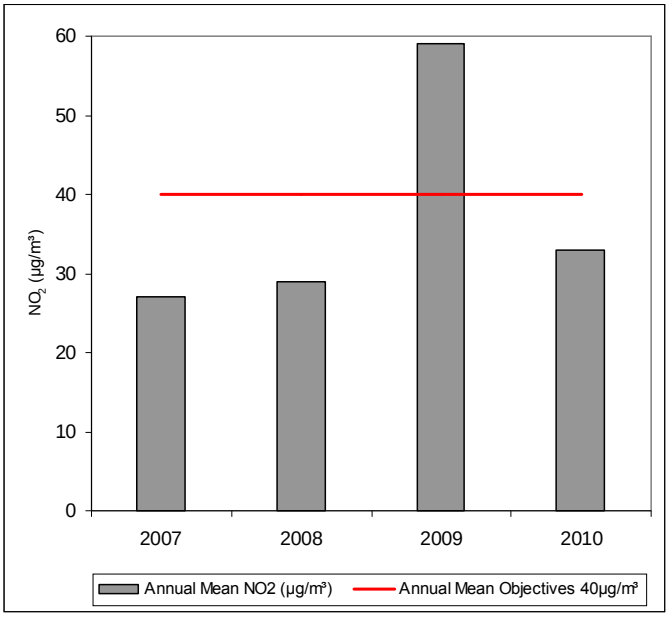
Table 5.1. Continuous nitrogen dioxide (NO2) monitoring results at the Cowpen Road site for 2007 to 2010 in $\mu g/m^3$

Year	Annual Mean	Number of exceedences of the hourly mean (200 $\mu g/m^3$)	% Data capture
2007	27	0 (104)*	69.5
2008	29	0	96.7
2009	59	0	95.9
2010	33	0 (126)*	11.0

Concentrations in µgm³. *99.8th Percentile

Fig 5.1 shows the 2009 result in relation to the previous two annual results and the 2010 annual mean. There have been no exceedences of the hourly objective for any year.

Fig 5.1 Annual mean NO2 levels at the Cowpen Road air quality station showing the 40 $\mu g/m^3$ annual mean objective



The Cowpen Road data for 2009 shows a breech of the annual mean objective but no exceedences of the hourly objective. This indicates that the annual mean was influenced by persistently higher concentrations which pushed the annual means above the objective limit, but all concentrations below the 200 $\mu g/m^3$ hourly objective concentration.

A breakdown of the data shows just over half (52.9%) of the total data in 2009 was above 40 $\mu g/m^3$. Previous years show that the percentage of data above 40 was much lower (17% in 2007 and 26% in 2008).

Table 5.2. Breakdown of the hourly NO_2 data into counts and percentages above certain concentrations

	2007 Cowpen Road		2008 Cowpen Road		2009 Cowpen Road	
µg/m³	Count	%	Count	%	Count	%
>10	4577	52.2	6064	69.2	5933	67.7
>20	3407	38.9	4402	50.3	5445	62.2
>30	2350	26.8	3266	37.3	4999	57.1
>40	1500	17.1	2316	26.4	4630	52.9
>50	869	9.9	1590	18.2	4205	48.0
>100	21	0.2	117	1.3	1040	11.9
	n = 6081		*n* = 8439		*n* = 6430	

It would appear that for some reason, recorded levels in 2009 were of a higher order than data from other years at this site.

5.5. Non-Automatic Air Quality Monitoring

These values have been taken from a number of co-located and local background NO_x diffusion tubes.

The tube co-located with the air quality station (B3) shows a fairly consistent pattern apart for the "step" between the 2007 and 2008 results. It does not show a marked increase for 2009.

Table 5.3. Results from co-located diffusion tube B3 (Cowpen Road air quality station)

Year	Annual Mean	% Data capture
2006	26	100
2007	26	100
2008	34	100
2009	33	100
2010	35	100

Concentrations in µgm³

Table 5.4. Results from local background diffusion tubes around Cowpen Road

	B5		B7		B8		B9	
Year	Annual Mean	% Data capture	Annual Mean	% Data capture	Annual Mean	% Data capture	Annual Mean	% Data capture
2006	17	100	15	100	15	100	15	100
2007	19	100	18	100	15	100	17	100
2008	20	100	19	100	17	100	20	100
2009	23	100	20	100	18	100	20	100
2010	23	100	27	25	21	100	30	25

Concentrations in µgm³. Sites with 25 percent data capture were decommissioned in this year.

Fig 5.2 Annual means for five diffusion tubes co-located or in the area of the Cowpen Road air quality station from 2006 to 2010 showing the annual mean objective at 40 µg/m³

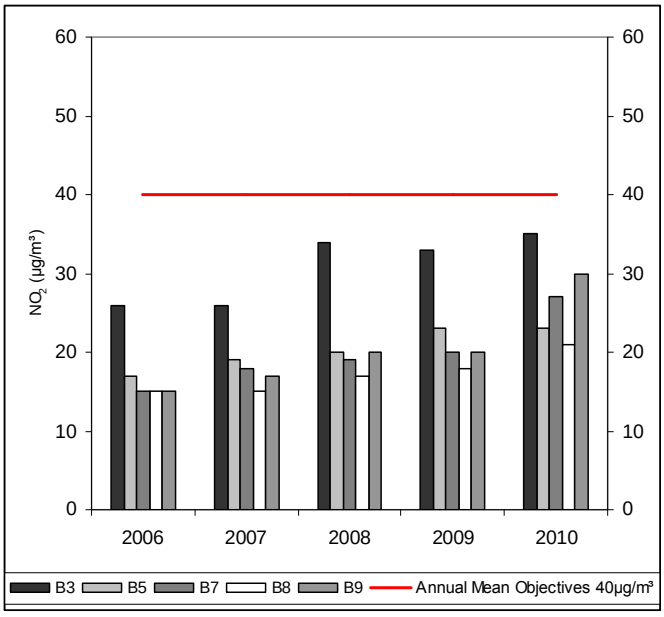


Fig 5.4 shows the annual background NO_2 levels from the diffusion tubes located in the vicinity of the Cowpen Road air quality station (co-located at the site of diffusion tube B3). The associated charts show the previous annual NO_2 levels This shows that although, diffusion tube data did show that NO_2 level for 2009 did average at 30 µg/m³, this level is not indicated at other sites in the area (including a site further to the east on Cowpen Road itself). It also shows that, for tube B3, this is not part of a trend of increasing NO_2 levels at this site.

5.6. Cowpen Road Receptor Impact Model

The modelling has shown that for the annual mean concentration of NO_2 at the Cowpen Road station recorded in 2009, the calculation of NO_2 fall-off indicates between some 68 to 135 properties being subjected to NO_2 concentrations above the National Air Quality Objective for annual mean concentration.

Table 5.6. Number of properties on modelled section of Cowpen Road within incremental five metre buffers showing the fall-off in NO2 at the annual objective concentration and the concentration measured in 2009

Distance from Centre Line (m)	Distance from Kerb (m)	No Residential Properties within Band	Cumulative No Residential Premises	Reduction Factor (%)	Measured Conc of 40µg/m³ at AQM Station	Conc of 59 µg/m³ at AQM Station
0-5		0	0	100.0	40.0	59.0
5-7	0-2	0	0	88.8	35.5	52.2
5-10	0-5	18	18	85.3	34.1	50.3
10-15	5-10	50	68	74.1	29.6	43.7
15-20	10-15	67	135	67.6	27.0	39.9
20-25	15-20	36	171	62.9	25.2	37.1
25-30	20-25	45	216	59.3	23.7	35.0
30-35	25-30	34	250	56.4	22.6	33.3
35-40	30-35	16	267	53.9	21.6	31.8
40-45	35-40	15	282	51.8	20.7	30.6

Background levels from the neighbouring diffusion tube sites give a background NO_2 level of 20 μg/m³ for 2009.

Previous results from the real-time monitor at the Cowpen Road air quality station have not shown an annual mean at this concentration or in the following year (2010).

The modelling shows that even at the reported NO_2 concentration for 2009 somewhere less than 135 properties were affected with concentrations above the AQO along Cowpen Road.

Such a concentration at the air quality station would not be evident along the whole of Cowpen Road. The diffusion tube at site B5 consistently shows lower NO2 levels (7 – 14 μg/m³ lower, 2006 – 2009) than B3 (the co-located tube with the air quality station).

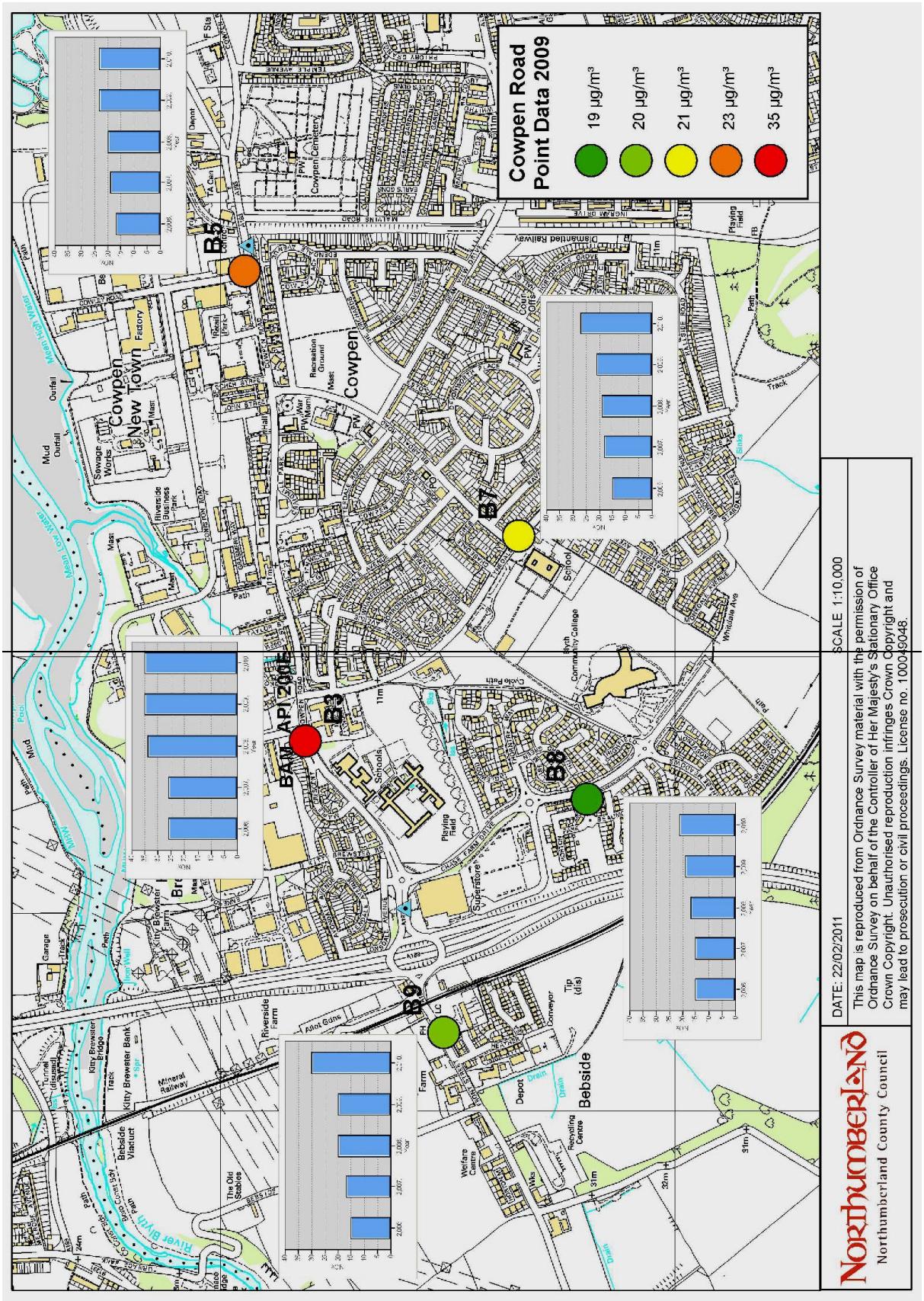
Most of the properties closest to Cowpen Road are at the eastern end of the section of road examined and include four blocks of flats and a number of pensioner's bungalows neither of which have gardens facing onto Cowpen Road. The data suggests these properties will receive much lower concentrations than those measured at the air quality station. Even in a situation where the real-time monitors shows an annual average of 59 μg/m³, the estimated level at the properties at this end of Cowpen Road will be some 16 – 23 µg/m³ lower (36 μg/m³ to 43 μg/m³). This is accounting for the drop in NO_2 concentration to the east of Cowpen Road and the fall-off from the road.

It would appear that any impact of this anomalous annual mean NO_2 concentration on Cowpen Road would have had little impact. Taking the annual mean of 59 μg/m³, at the

nearest receptor to the Cowpen Road monitoring station, the predicted concentration would be below the AQO. From the known drop in NO_2 concentration with distance to the east of Cowpen Road, any impact is marginal (an estimated maximum of 3 $\mu g/m^3$ over the AQO for one isolated year) affecting less than 135 properties.

The NO_2 concentrations measred at the Cowpen Road monitoring station show that in all years excluding 2009 the AQO was never breached for any receptor.

Fig 5.4. Location of diffusion tubes around the Cowpen Road air quality station in 2009 showing the 2009 annual mean measured concentrations and trend charts for each site.



6. Particulate Matter (PM_{10}) Assessment for Blyth AQMA

6.1 Baseline Information

The AQMA was re-screened in accordance with the Updating and Screening Methodology for PM_{10}.

6.2. Road Traffic Data

Bridge Street is the remaining "through road" in Blyth town centre. In the latter half of the 1970s an inner relief road was built which allowed traffic to bypass the town centre when travelling to and from the north and south of the town.

There are and no residential properties within 2 metres of the kerb, but may be congested with an average speed of less than 25kph. The flow of HDV is less than 2,500 per day.

The only traffic data available are absolute counts produced by Northumberland County Council's Highways Department. In 2000, a week-long survey was carried out on Bridge Street, Blyth (B1329). In this year there were more than 5,000 vehicle movements per day (excluding Sunday) and averaged for a 5 or 7-day week.

Where speed data has not been made available, speeds have been based on speed limits, modified according to local conditions to take account of congestion and stop/start vehicle movements at junctions. Speeds were reduced at busy junctions to 20 kph to reflect the higher emissions of queuing traffic.

There is only limited, local data for the BTCS which is not suitable to use as any predictor or traffic contribution or traffic source apportionment.

6.3. Bus and Coach Stations

Number of bus movements were found through enquiries to Arrviva and a breakdown of the timetables for the Blyth bus station and was found to be less than 2,500 per day.

6.4. Source Apportionment/Emission Factors

There is limited traffic data for Bridge Street, therefore traffic apportionment was not possible. Source apportionment from industry are included. This data was obtained from the DEFRA background air pollutant maps (http://laqm.defra.gov.uk/maps/maps2008.html).

6.5. Automatic Air Quality Monitoring

An air quality station is located on Bridge Street and contains a Met One Beta Attenuation Monitor (BAM) particulate monitor and an API/Teledyne 200E Chemiluminescent NOx analyser. The monitoring station is serviced and calibrated by the environmental engineering company, SupportingU.

This monitoring station has collected full annual data since 2004 and is still operational.

The nearest residential receptor some 25 metres from this station (measured to the façade of the building) and some 32 metres from the kerbside of Bridge Street.

The Quality Assurance/Quality Control (QA/QC) procedures for the NCC network are equivalent to the UK Automatic Urban and Rural Network (AURN) procedures.

In March 2011 the 2010 data was ratified by AEA and the automatic monitors QA/QC audited to the AURN standard.

6.6. Non-Automatic Air Quality Monitoring

No other monitoring for PM_{10} is carried out in the location of the AQMA. Several NO_X diffusion tubes are maintained in this area to continue to monitor nitrogen dioxide levels – none of these have ever breached the AQO.

7. Particulate Matter (PM_{10}) Assessment for Blyth AQMA - Results

7.1. Road Traffic Data

Table 6.1 Road traffic data for Bridge Street, Blyth showing 24 counts for a seven day period

Road	Year	Street	10/4/00	11/4/00	12/4/00	13/4/00	14/4/00	15/4/00	15/4/00	5-Day	7-Day
B1329	2000	Bridge Street	6249	6057	5688	6373	7253	7343	2889	6324	5979

Source: Highways Department, Northumberland County Council

7.2. Bus and Coach Stations

The bus station has less than 2,500 bus movements per day. The actual numbers are slightly less than 400 movements on a weekday, just under 300 on a Saturday and just above 100 on a Sunday.

7.3. Source Apportionment/Emission Factors

The industry apportionment included in the DEFRA background maps indicates that the main contributors to background PM_{10} levels in the area of the AQMA is not from road traffic. The contribution from road traffic is approximately 2 percent.

Table 6.2. 2009 PM_{10} background level predicted at 11μg/m^3 for the Blyth town centre siteand AQMA from the DEFRA background maps

Source	μg/m^3	Percent
Motorway Inside Grid	0.00	0.0
Motorway Out Grid	0.00	0.0
Trunk Road Inside Grid	0.00	0.0
Trunk Road Outside Grid	0.01	0.1
Primary Road Inside Grid	0.00	0.0
Primary Road Outside grid	0.05	0.4
Minor Road Inside Grid	0.17	1.6
Minor Road Outside grid	0.07	0.6
Brake & Tyre Wear Inside Grid	0.07	0.7
Brake & Tyre Wear Outside grid	0.10	0.9
Industry Inside grid	0.25	2.2
Industry Outside grid	0.24	2.2
Domestic Inside Grid	0.03	0.2
Domestic Outside grid	0.20	1.8
Rail Inside Grid	0.00	0.0
Rail Outside Grid	0.00	0.0
Other Inside Grid	0.14	1.2
Other Outside Grid	0.20	1.8
Secondary PM (inorganic & organic)	3.64	32.7
Residual & Salt	5.90	53.0
Point Sources	0.00	0.0
Total PM_{10}	**11.13**	**100**

Source: http://laqm.defra.gov.uk/maps/maps2008.html

The main source for this background level PM_{10} is attributed to secondary PM_{10} (inorganic and organic) – 53.0 percent and residual and salt – 32.7 percent. Only 2.2 percent is attributed to traffic directly and 1.6 percent to brake and tyre wear. The total contribution from road traffic is only 4.3 percent.

7.4. Automatic Air Quality Monitoring

Table 7.1. Continuous particulate (PM10) monitoring at Blyth Town Centre, results for 2004 to 2010 in μg/m³

Year	Annual Mean	Number of exceedences of the daily mean (50 μg/m³)	% Data capture
2004	23	1	N/K
2005	28	8	N/K
2006	31	6	99.8
2007	29	0	97.9
2008	30	16	97.3
2009	24	6	96.3
2010	25 (38*)	3	54.2

*** 90th Percentile**

Fig 7.1. Annual mean PM10 levels at the Blyth town centre air quality station showing the 40 μg/m³ annual mean objective

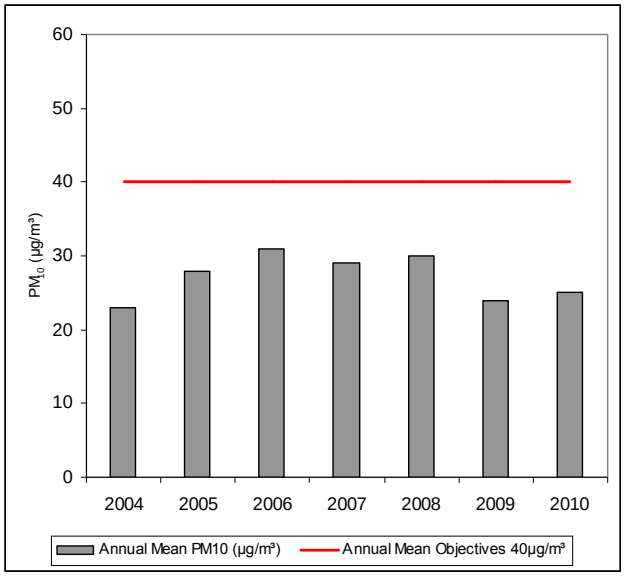
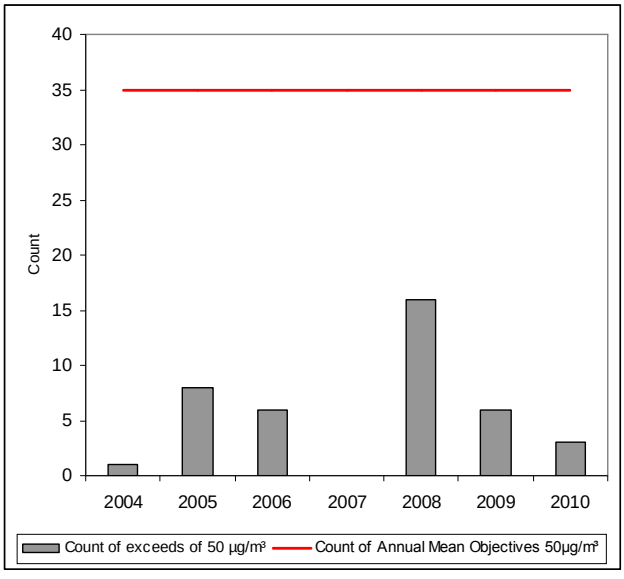


Fig 7.2 Counts of exceedences of the hourly objective for PM_{10} at the Blyth town centre air quality station showing the maximum 35 hourly mean count level (at 50 μg/m³)



7.5. Non-Automatic Monitoring

The AQMA is located entirely within one of the 1km grid squares (431500, 581500) of predicted background levels and for 2009 this level was predicted at 11.1 $\mu g/m^3$. Concentrations predicted for the surrounding grids vary between 10.2 $\mu g/m^3$ and 11.5 $\mu g/m^3$. (http://laqm.defra.gov.uk/maps/maps2008.html)

8 Conclusions and Recommendations

8.1. Conclusions

Real-time data for Cowpen Road shows that with the exception of 2009 there have been no exceedences of the NO_2 annual mean objective for the previous two years. In a four year period (2007 – 2010) there has been no exceedance of the hourly objective.

Data from co-located and local background diffusion tubes do not mirror this high annual mean for 2009.

Due to LGR, no checks have been possible on previous data submissions.

Real-time data for BTCS shows the annual mean to always have been well within the AQO and with the exception of 2009; exceedences of the hourly mean objective are few.

The high annual mean of NO_2 at the CRS in 2009 appears to be anomalous when compared to data from this analyser before and since 2009 and does not correspond to concentrations recorded by the co-located diffusion tubes or those sited nearby. Because of data collection issues prior to Local Government Reorganisation (LGR) and an inability to check previous QA/QC, it has been decided to continue monitoring at this time to build a set of high quality data which can be used to evaluate this isolated year and eliminate it as a trend at this site. It is particularly important to point out that this exceedance of the AQO was for the annual mean objective alone and not for the hourly mean objective.

There is little data to support the continuation of the AQMA in Blyth town centre. However, it is envisaged that data collection will continue for the next few years to build a verifiable dataset of PM_{10} in BTCS with.

8.2. Recommendations

Based on this detailed assessment and review of the monitoring data the following recommendations are made for Northumberland County Council:

- Not declare an AQMA for the Cowpen Road Site
- Revoke the Blyth Town Centre Site AQMA following stakeholder consultation
- Monitoring of both sites to continue for a minimum of two years to adequately assure the situation at the Cowpen Road Site the former Blyth Town Centre Site AQMA.

APPENDICES

Source Apportionment for Vehicles on Cowpen Road

This was done using Defra's Emision Factor Toolkit – EFT (v4.2.2) and data for Cowpen Road (A193) from the DfT Matrix website

The data is predicted for 2010

Source Name	Pollutant _Name	Emission Rates (g/km/s)	Emission Rates (g/km)	Motorcycles (g/km)	Petrol Cars (g/km)	Diesel Cars (g/km)	Taxi (g/km)	Petrol LGV (g/km)	Diesel LGV (g/km)	Rigid HGV (g/km)	Artic HGV (g/km)	Buses (g/km)	%LDV	%HDV
Cowpen Road	NOx	0.8	2709.4	2.1	136.9	229.4	0.0	7.0	140.7	922.7	294.5	976.2	19.0	81.0
Cowpen Road	PM10	0.0	125.3	0.4	20.6	18.4	1.6	0.7	16.9	32.3	9.3	25.1	46.8	53.2

Source Name	Pollutant_ Name	Emission Rates (g/km/s)	Emission Rates (g/km)	Motorcycles (%)	Petrol Cars (%)	Diesel Cars (%)	Taxi (%)	Petrol LGV (%)	Diesel LGV (%)	Rigid HGV (%)	Artic HGV (%)	Buses (%)
Cowpen Road	NOx	0.8	2709.4	0.1	5.1	8.5	0.0	0.3	5.2	34.1	10.9	36.0
Cowpen Road	PM10	0.0	125.3	0.3	16.5	14.7	1.3	0.5	13.5	25.8	7.4	20.0

Monthly Diffusion Tube Data for Selected Sites on Cowpen Road in 2009

2009 $\mu g/m^3$

Code	*Location*	*TYPE*	*x*	*y*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	Average	*Bias Factor*	*Bias Adjusted Average*	Data Capture
B3	Cowpen Road, west ent AQ station LP	Roadside	428815	581813	50	30	30	40	26	29	22	29	33	20	42	36	32.3	1.03	**33.2**	**100.0**
B5	Cowpen Road, east ent nr Tool Hire LP	Roadside	429850	581947	38	26	19	25	19	11	17	18	17	16	29	27	21.8	1.03	**22.5**	**100.0**
B7	Tynedale Drive, Briardale junction LP	Roadside	429267	581343	38	21	15	19	18	14	10	12	16	13	31	25	19.3	1.03	**19.9**	**100.0**
B8	Beaumont Manor (ASDA) LP & V6		428688	581193	27	24	15	21	13	12	10	12	15	11	25	24	17.4	1.03	**17.9**	**100.0**
B9	Bebside, opp Mansell Terr LP	Roadside	428172	581509	28	20	11	22	21	17	15	15	13	13	26	27	19.0	1.03	**19.6**	**100.0**

Monthly Real-Time Data for Air Quality Monitoring Station on Cowpen Road in 2007 - 2009

	Location	*TYPE*	*x*	*y*	*Jan*	*Feb*	*Mar*	*Apr*	*May*	*Jun*	*Jul*	*Aug*	*Sep*	*Oct*	*Nov*	*Dec*	Average	Data Capture
2007	Cowpen Road AQ station - groundhog	Roadside	428815	581813	21	37	30	33	31	24	18	18	17	31	35	37	*27*	69.5
2008	Cowpen Road AQ station - groundhog	Roadside	428815	581813	23	27	15	21	26	23	24	23	29	38	23	74	*29*	96.7
2009	Cowpen Road AQ station - groundhog	Roadside	428815	581813	88	82	80	84	40	44	No Data	20	23	68	78	63	59	95.9

µg/m3