

**WHO European Healthy Cities Network Annual Healthy Cities Business Meeting and Conference
1-3 March 2017, Pécs, Hungary**



**Carlisle – “Air Quality Management to improve the health and wellbeing of Carlisle residents.”
Abstract Number – 066**

Title: “Air Quality Management to improve the health and wellbeing of Carlisle residents.”

Context:

Carlisle has significant health inequalities which provide challenges to our health care services and structure, populations and more specifically individual residents. Life expectancy is 11.3 years lower for men and 6.2 years lower for women in the most deprived areas of Carlisle than in the least deprived areas.

This reinforces the necessity to take a multidisciplinary approach, where health becomes “*everyone’s responsibility*” and a variety of partners are involved, for greater impact. We need to put prevention at the top of our agenda and design our places for maximum benefit and broader designed public health improvement.

The Carlisle District covers an area of some 400 square miles with 69% of the population living within the urban area of the city itself. Carlisle is the most northerly city in England and the only city in Cumbria. It is situated less than ten miles from the Scottish border. Carlisle is the one of the largest English cities in terms of land, being designated as 'sparse rural', with a population of 108,000 (Office of National Statistics).

In 2004 Carlisle was identified as one of the UK Department for Health’s Spearhead Health Authorities. This meant that Carlisle featured in the bottom twenty per cent (of English Local Authority Areas) across four key health indicators - Male life expectancy at birth; Female life expectancy at birth; Cancer mortality rate in under 75s; and Cardio Vascular Disease mortality rate in under 75s. Since becoming a Healthy City in 2009 we have made positive steps to improve the health outcomes of our residents, but this is a journey that required long term commitment, especially though continued reforms and nationally challenges. The Carlisle Local Strategic Partnership and supporting subgroups (including the Carlisle Healthy City Steering

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Group) sought to develop a greater understanding of the health intelligence for Carlisle and worked to further drive this agenda forward, for maximal impact. Understand and promoting the links with the wider determinants of health has been a key agenda focus – which complements and as an outcome concludes with the title of this paper.

Air pollution is associated with a number of adverse health impacts and is a key feature with Barton and Grants (2010) model of the determinants of health and wellbeing in our neighbourhoods under the natural environment. It is recognised as a contributing factor in the onset of heart disease and cancer. Additionally, air pollution particularly affects the most vulnerable in society: children and older people, and those with heart and lung conditions. There is also often a strong correlation with equalities issues, because areas with poor air quality are also often the less affluent areas^{1,2}.

The annual health cost to society of the impacts of particulate matter alone in the UK is estimated to be around £16 billion³. Improving air quality can benefit those who may find their conditions are made worse through exposure to air pollution, for example people with heart or lung conditions or breathing problems.

The main issue in Carlisle is traffic derived NO₂. Traffic flow through the city depends on a number of main arterial routes. There are a total of three rivers flowing through the city centre as well as the West coast main railway line, each with a variety of crossing points. Historically this has concentrated traffic around key routes and junctions, as a result some of these junctions are often subject to frequent congestion. Some of these locations also have residential dwellings in the vicinity, which has necessitated the declaration of AQMA's.

Rationale:

The Secretary of State for Environment, Food and Rural Affairs has responsibility for meeting the environmental air quality limit values in England and the Department for Environment, Food and Rural Affairs (Defra) co-ordinates assessment and air quality plans for the UK as a whole.

The UK Government is required under the Environment Act 1995 to produce a national air quality Strategy. The Strategy sets out the UK's air quality objectives and recognizes that action at national, regional and local level may be needed, depending on the scale and nature of the air quality problem.

Part IV of the Environment Act 1995 requires Carlisle City Council to review air quality in the District and designate Air Quality Management Areas (AQMA's) if

¹ Environmental equity, air quality, socioeconomic status and respiratory health, 2010

² Air quality and social deprivation in the UK: an environmental inequalities analysis, 2006

³ Defra. Abatement cost guidance for valuing changes in air quality, May 2013

improvements are necessary. Where an air quality management area is designated, the City Council is also required to work towards the strategic objectives, prescribed in regulations, for that purpose. An Air Quality Action Plan (AQAP) describing the pollution reduction measures must be put in place. These plans contribute to the achievement of the air quality limit values at local level.

The finalised Air Quality Annual Status Report (ASR) is now also required to be signed off strategically by the Director of Public Health, before being submitted by the local authority. This demonstrates the significant links to the wider determinants of health and the public health agenda.

Carlisle City Council Local Air Quality Management. (LAQM):

The LAQM process places an obligation on all local authorities to regularly review and assess air quality in their areas, and to determine whether or not the air quality objectives are likely to be achieved. Where an exceedance is considered likely the local authority must declare an Air Quality Management Area (AQMA) and prepare an Air Quality Action Plan (AQAP) setting out the measures it intends to put in place in pursuit of the objectives. (See appendix 3)

Carlisle City Council's LAQM work has concluded that air quality within the Carlisle district is generally very good; however there are small pockets within the City where the annual mean objective for nitrogen dioxide (NO₂) is not being met due to road traffic emissions.

In Carlisle we have declared a total of 6 Air Quality Management Areas (AQMA) within the City. The maps showing the boundaries of these areas are contained in Appendix 1. As a consequence of these declarations an Air Quality Action Plan has been produced, setting out measures proposed to be taken to help reduce nitrogen dioxide levels within the AQMAs.

As part of the City Council's Air Quality Management Strategy we currently continuously monitor four principal pollutants: nitrogen dioxide (NO₂); particulate matter (PM10 and PM2.5), and Benzene. The fixed monitoring unit at Paddy's Market covers all 4 of the above pollutants.



The unit is positioned in the city centre at a crossroads consisting of two main arterial routes and an Industrial Estate. There is a major supermarket on the other side of the road as well as two nearby declared AQMA's. The junction is subject to almost continuous traffic and HGV's. The latest annual measurements for 2015/16 for NO₂, PM10, PM2.5 and Benzene show that levels remain consistently below the objective level, which is also a reflection of the results in recent years.

The real time data from the Carlisle Roadside automatic monitoring station feeds directly into the UK Air website operated by DEFRA. Here real time monitoring data and pollution forecasts can be accessed by members of the public:

Department for Environment Food & Rural Affairs

Site information - Defra, UK

Home About Air Pollution Data Archive Monitoring Networks Library Science & Research AQMAs

You are here: Home > Monitoring Networks > Site information search > Site information

UK-AIR

Monitoring Networks

- Site information search (compliance networks)
- Search for monitoring sites (all networks)
- Brief history
- Site environment types
- Automatic Networks
- Non-Automatic Networks
- Air Quality Monitoring Methods
- AURN Hub

Site Information for Carlisle Roadside (UKA00526)

Site Information Pollutants Measured Networks

Carlisle Roadside Information

The monitoring station is located within a self-contained, air-conditioned housing on the south side of the A595 Castle Way. The surrounding area is open, with residential dwellings and light industrial activities.

UK-AIR ID: UKA00526

EU Site ID: GB0925A

Environment Type: Urban Traffic

Altitude (metres): 11

Site Location

Site Address: Not available

Government Region: North West & Merseyside

Easting/Northing: 339469, 555976

Latitude/Longitude: 54.894834, -2.945307

The static map below shows where the monitoring site is located.

NEW TOWN INDUSTRIAL Carlisle Castle Castle Way Georgia

Site North East South West

15:08 09/02/2017

Since the adoption of the Environment Act 1995, Carlisle City Council has also developed and expanded the air quality monitoring network with the widespread use of Nitrogen dioxide diffusion tubes. There are currently 50 locations around the district where we expose these tubes to the open air. After 1 month of exposure the tubes are sent to the lab for analysis and each is replaced with a new one. An example of three tubes being utilised in one location for the purpose of precision and accuracy of the results can be seen in the following photo:

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This monitoring has shown overall that air quality is improving across the city and within most of the 6 designated air quality management areas. The results of some of the diffusion tube locations have consistently shown very low levels in recent years. As these results are significantly below the objective levels the latest plan is to cease monitoring in some of these locations and amend others.

Description:

The highest concentrations of nitrogen dioxide have been found in areas of congested, slow moving vehicles. Traffic derived air pollution is addressed through efforts to reduce dependency on private cars and in turn reduce congestion. Reducing HGV movements in built up areas, improving the road network and utilising cleaner engine technology will contribute to delivering air Quality objectives. A key aspect of this is active engagement with partners and public to provide a multidisciplinary targeted approach to improving air quality.

The Air Quality Action Plan details the measures that the City Council and its partners intend to take in order to improve air quality. (See appendix 3) Developers must have regard for the Air quality implications of new developments. Large new developments often require the preparation of an Air Quality Impact Assessment to accompany the planning application. Developers must consider all aspects of the development including emissions to air and the increased traffic volume that the

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development may create. Planning applications continue to include mitigation measures to offset the negative impacts and financial contributions may be necessary for further progression such as improvements to the local transport infrastructure.

The Carlisle Northern Development Route (CNDR) has been the single biggest change in the district after its completion in February 2012. The new road is a bypass around the north and west of the city, which opened in February 2012. The opening of the road has had a positive effect on traffic flow along a number of main routes through the city centre and can be seen in the following photo:

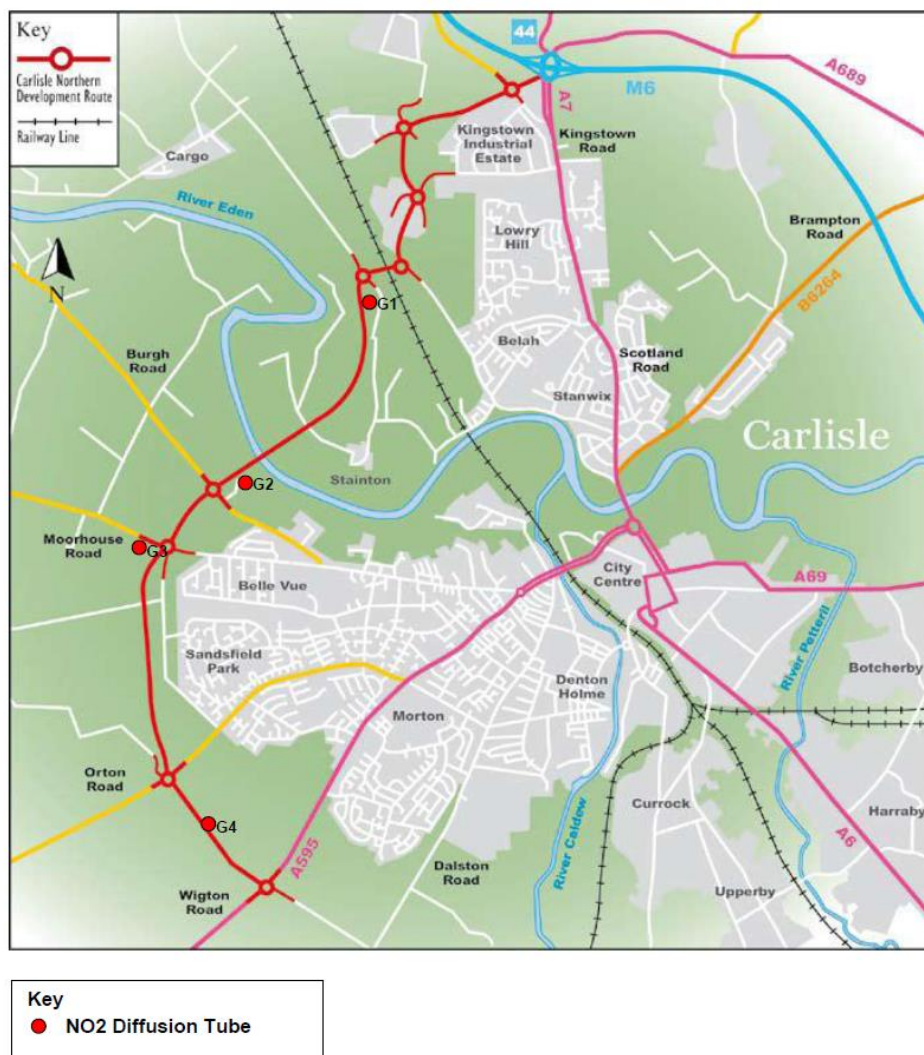


The CNDR route connects to the main arterial roads into and out of the city centre as well as a number of minor routes via a series of 9 small roundabouts. An example of the Orton Road junction can be seen in the following photo:



The following is a map of the route of the CNDR which shows how it directs traffic around the city centre:

Area G NO2 Diffusion Tube Monitoring Locations



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A webpage is dedicated on Carlisle City Council's website to promote Air Quality issues. Members of the public can use this to access details of the ongoing measures in the Air Quality Action Plan, as well as provide copies of all of the annual Review and Assessment reports and access monitoring data. <http://www.carlisle.gov.uk/Residents/Environmental-Problems/Pollution-and-Air-Quality>

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Downloadable Documents

2016 Air Quality Annual Status Report
Maps showing smoke control areas in Carlisle in PDF format
Biomass Boiler Information Request Form
Clean air act 1993

Think before you drive: for short trips, why check out walking and cycling routes around the city or use public transport?

Challenges:

In recent years there have been proposals for large numbers of new houses as well as industrial and commercial development. Air quality is given consideration when determining these developments, however it is rarely an overriding factor. In time this will inevitably add to the pressures on those areas where air quality problems are already known to be an issue.

Improvement measures other than those involving heavy investment in road network projects, such as the CNDR bypass, can be difficult to quantify or have little overall impact on annual average readings. Major junction improvements, road widening, bridges and infrastructure improvements, which can offer real improvement, not only depend on significant investment but can also be difficult in already built up locations.

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Achievements:

The Action Plan included a monitoring programme to establish the impact of the newly opened Carlisle Northern Development Route (CNDR). This was to enable accurate, before and after, comparisons to be drawn as to the long term impact of the CNDR. The monitoring network has remained unchanged until now. In the majority of locations within the City the monitored pollutants are now consistently now below the health based objective levels.

The main influencing factor in the overall improvement is undoubtedly the completion of the CNDR which has significantly reduced congestion and traffic volume on several of the key arterial routes into the City.

The latest Annual Status Report (June 2016) recommended the revocation of AQMA number 3 (See appendix 2), which covers a major junction and two main arterial routes into the city centre. This recommendation is based on monitoring data collected in this area. In February 2017 the Environmental Health Department recommended to the Executive Committee that Carlisle City Council revoke this Air Quality Management Area. This recommendation was subsequently accepted by the committee.

The rest of the monitoring data across the district has shown varying degrees of positive improvement since the opening of the CNDR. A number of the other AQMA's are now showing results below the objective levels and are expected to be amended or revoked in the near future. Carlisle City Council is awaiting further evidence to support further changes. (See appendix 2).

Future improvement may also be possible since The Carlisle District Local Plan 2015 – 2030 was adopted on 8th November 2016. Strategic Policy SP3 in the plan details the South of Carlisle as a broad location for growth. *'The broad location is of such a size that it would deliver a strategic number of houses and necessary supporting development such as schools, employment, retail and community facilities, open space and green and other infrastructure for the District'*. The policy also states: *'The potential for the future development of a southern relief road linking Junction 42 of the M6 with the southern end of the A689 will be an integral part of the masterplan'*. If implemented this relief road would extend the existing CNDR route around the south of the city and provide further reduction in traffic passing through the city centre. It also has the potential to offset the possible negative impact of development on the existing road network.

Contribution to the Carlisle Plan priorities:

Priority 5: Continue to improve the quality of our local environment and green spaces so that everyone can enjoy living, working in and visiting Carlisle. By continuing to monitor air quality we continue to ensure that, where necessary, steps are taken to ensure air quality is highlighted for improvement.

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Conclusion:

The positive impacts of major investment into the new CNDR 'City Bypass' route demonstrates that actual air quality improvement can be achieved by physically removing traffic from a specific area(s). For many motorists this alternative route will be more convenient and time saving but more importantly it results in reduced emissions in key areas of known high pollution concentrations. 'Softer measures' including education, publicity, green travel planning, passenger transport & cycleway improvements, energy efficiency and tree planting have all previously been used and will continue to be an important part of the Action Plan (See appendix 3). It has been shown, however, that clear improvements have been made possible only by physical intervention and investment in the development of the highway infrastructure.

The approval of the revocation of AQMA 3 and reduction of statutory monitoring is a positive reflection of the improvements to air quality in the area over recent years. The quality of the air is hugely important for our residents and visitors to the area, as poor air quality can affect all areas of our lives, including directly impacting on our physical and mental health and the surrounding natural environment. Air quality will continue to be monitored in the District and focussed on those areas which may require intervention.

References

- Carlisle City Council. The Carlisle District Local Plan (2015 – 2030)
- Carlisle City Council Air Quality Annual Status Report. (2016)
- Carlisle City Council. Air Quality Action Plan (2012)
- DEFRA. Part IV of the Environment Act 1995. Local Air Quality Management Technical Guidance LAQM.TG (16)
- Department of the Environment Transport and the Regions. (2000b) Air Quality Strategy for England, Scotland, Wales and Northern Ireland. (Revised 2007)
- The Air Quality (England) Regulations 2000 (as amended 2002)

Appendices

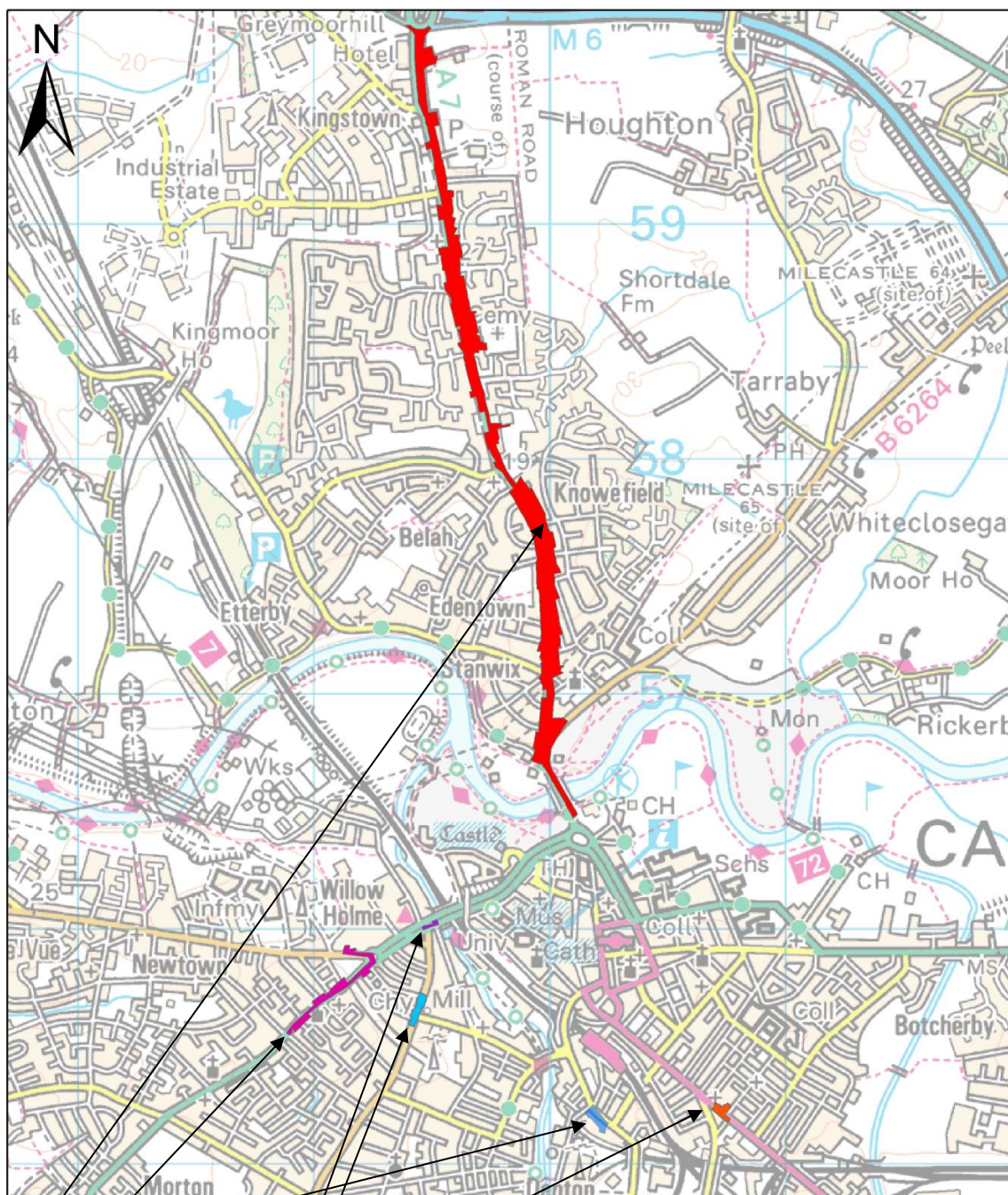
Appendix 1 – Map of the 6 Air Quality Management Areas in Carlisle

Appendix 2 – Air Quality Management Area latest recommendations

Appendix 3 – Summary of measures contained in the Air Quality Action Plan.

Appendix 1 - Map of the 6 Air Quality Management Areas in Carlisle

Location of Carlisle AQMAs.



- | | |
|--|---|
|  AQMA1 A7 |  AQMA4 Bridge St |
|  AQMA2 Currock Street |  AQMA5 Dalston Rd |
|  AQMA3 Wigton Road |  AQMA6 London Road |

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Appendix 2 - Air Quality Management Area, latest recommendations

AQMA Name	Pollutants and Air Quality Objectives	Description	Action Plan (Highest 2015 annual mean result for NO ₂ shown in brackets)
AQMA 1	NO ₂ annual mean objective (40 µg/m ³)	A7 between Hardwicke Circus and J44 of the M6, and Brampton Road for a distance of 100m from the Stanwix Bank junction	While there has been no exceedance of annual mean objective within last three years the concentrations at Brampton Road (35.9µg/m³) are sufficiently high to suggest there may be a risk of exceedance in future years Consider amendment of AQMA to include just Brampton Road
AQMA 2	NO ₂ annual mean objective (40 µg/m ³)	Currock Street and the properties immediately to the west of it, between the junction with James St/Water St and Crown St.	While no exceedances measured in last five years concentrations are sufficiently high (36.5 µg/m³) to suggest there may be a risk of exceedance in future years Keep AQMA
AQMA 3	NO ₂ annual mean objective (40 µg/m ³)	Wigton Road between Crummock Street and Caldewgate roundabout as well as properties on Caldcotes.	No exceedance within last three years (33 µg/m³). Clear downward trend Revoke AQMA
AQMA 4	NO ₂ annual mean objective (40 µg/m ³)	North side of the A595 at Bridge Street, northbound from the junction with Shaddongate.	Still exceeding air quality objective. (41.2 µg/m³) Keep AQMA
AQMA 5	NO ₂ annual mean objective (40 µg/m ³)	Junction of Dalston Road and Junction Street	Still exceeding air quality objective (41.0 µg/m³) Keep AQMA
AQMA 6	NO ₂ annual mean objective (40 µg/m ³)	London Road and properties on either side near the junction with Blake Street	While no exceedance within last three years concentrations are sufficiently high (35.5 µg/m³) to suggest there may be a risk of exceedance in future years Keep AQMA

Appendix 3 – Summary of measures contained in the Air Quality Action Plan.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator
1	A new major bypass, the 'Carlisle Northern Development Route,' to the west of the City will remove up to 25% of through traffic. The traffic and Air Quality impacts will be closely monitored and investigation made as to further network improvements to maximise the benefits.	Traffic Management	Other	Cumbria County Council & Carlisle City Council	Reduced NO ₂ levels at monitoring locations and within AQMA's.
2	Effective traffic management measures will be implemented to improve the existing road network and incorporate new developments.	Traffic Management	UTC, Congestion management, traffic reduction	Cumbria County Council	Reduced NO ₂ levels and standing traffic within AQMA's.
3	Environmental Health will continue to work with the Planning Department with regard to new developments and ensure that air quality implications are taken into consideration in the planning process.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Carlisle City Council	Improved links between EH and Planning. AQIA's submitted as necessary. Early consultation with applicant.
4	Work will continue to upgrade the passenger transport infrastructure to make it more convenient and widely accessible across the County. Arrangements for sustainable transport systems will be integrated into major new and proposed developments	Transport Planning and Infrastructure	Bus route improvements	Cumbria County Council	Improved bus service. Increased use of transport provided. Reduced NO ₂ along main routes

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator
5	Cycling and walking will be encouraged through reducing the impact of vehicle traffic in key areas of the city. New and improved pedestrian and cycle links including the Caldew and Lowry Hill Cycle ways and the River Petteril shared cycle/footway will be provided.	Transport Planning and Infrastructure	Cycle network	Cumbria County Council	Completion of proposed works and ongoing improvement of the cycle and pedestrian route network.
6	Travel plans will be required to be implemented and monitored through S106 agreements for all new developments that meet the criteria. Existing businesses will be encouraged to implement, monitor and review travel plans.	Promoting Travel Alternatives	Workplace Travel Planning	Cumbria County Council & Carlisle City Council	Increased number of participant businesses and more widespread use of alternative transport.
7	The City Council and the County Council will develop and implement a comprehensive 'Transport Overview and Joint Parking Policy'.	Policy Guidance and Development Control	Regional Groups Co-ordinating programmes to develop Area wide Strategies to reduce emissions and improve air quality	Cumbria County Council & Carlisle City Council	Approval and adoption of Transport Overview and Joint Parking Policy.
8	The City Council will continue to provide comprehensive control over emissions from all Part A2 and B Processes located within the local authority area.	Environmental Permits	Other measure through permit systems and economic instruments	Carlisle City Council	Risk based inspections showing that emission limits are being met and efforts are being made to improve on national objectives.

Measure No.	Measure	EU Category	EU Classification	Lead Authority	Key Performance Indicator
9	The City Council will continue to investigate complaints of black smoke and smoke nuisance as well as managing smokeless zones. Enforcement action will be taken as necessary.	Public Information	Other	Carlisle City Council	Reduction in the number of complaints from members of the public. Reduction in repeat offenders.
10	Energy savings advice and subsidised home insulation improvements will continue to be provided to the public. Uptake will be monitored.	Public Information	Other	Carlisle City Council	Improved energy efficiency of residential properties.
11	Environmental Health will work alongside the Neighbourhoods and Green Spaces team to investigate and implement the effective use of trees and green areas to offset traffic derived emissions in existing AQMA's and in new development areas.	Public Information	Other	Cumbria County Council & Carlisle City Council	Increase in trees and vegetation in visible locations. Increased public interest.
12	Joint working will be extended in order to include air quality improvement in all relevant City Council and County Council policies and strategies.	Policy Guidance and Development Control	Air Quality Planning and Policy Guidance	Cumbria County Council & Carlisle City Council	Increased awareness of air quality issues and consideration given by more council departments.
13	The City Council will undertake regular publicity events and actively promote air quality and sustainable transport issues. Up to date air quality information and monitoring data will be provided to the public.	Public Information	via the Internet	Carlisle City Council	Increased public awareness and participation in improving air quality.