2012 Air Quality Action Plan for *Carlisle City Council*

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

July 2012

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Executive Summary

Carlisle City Council's revised Air Quality Action Plan (AQAP) sets out measures that the Council, along with its partners, intends to take in order to achieve a reduction in nitrogen dioxide (NO_2) concentrations in Carlisle. A reduction in nitrogen dioxide concentrations is required in order to meet the annual average objectives for this pollutant set by the government. Particular attention has been paid to those 6 areas of the city where exceedences in the national objective level have been revealed.

The measures included in this AQAP are those which are currently considered to be the most cost effective and appropriate for Carlisle. These measures have been focussed on local initiatives which are realistic and achievable and are most likely to result in a significant improvement in NO_2.

The action plan measures seek to manage and continuously improve air quality at a local level whilst providing the level of access and development needed to maintain a vibrant, attractive and prosperous city.

Through the development and implementation of various policies and strategies including Local Transport Plan (LTP 3) and by monitoring the AQAP progress, both Carlisle City Council and Cumbria County Council will continue to address air quality issues across the district and seek to deliver the air quality objectives wherever possible.

There are many specific air quality improvement measures included in this AQAP, these relate to the following key action areas:

- Improvements to the road network and traffic management.
- Reducing overall emissions from road vehicles
- Implementation of land use and development control policies
- Reducing emissions from non-transport related sources
- Raising awareness of air quality issues
- Encouraging walking, cycling and the use of public transport

This action plan fulfils Carlisle City Council's responsibility to act in pursuit of the achievement of air quality objectives in the designated Air Quality Management Areas. The Council is not under any legal obligation to achieve the objectives, however through implementation of the local measures included in this AQAP and the continued improvement in vehicle emissions predicted nationally, it is believed that nitrogen dioxide concentrations within Carlisle will reduce to below the air quality standard in the future.

The Action Plan has been drawn up following consultation with key stakeholders, statutory consultees and the public. The formal consultation responses were taken into consideration during the completion of this final version of the action plan. The Action plan was approved by Carlisle City council's executive committee in July 2012.

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CHAPTER 1 - Introduction

Description of the Local Authority Area
Carlisle City Council is the most northerly of the 6 Cumbrian authorities and covers more than 400^2 miles.

The City of Carlisle supports the highest population concentration in Cumbria with over 70,000 people living within the urban area. The rural towns of Brampton and Longtown support the next two highest population concentrations, around 4000 and 2000 respectively.

Carlisle is remote from other centres of population being 300 miles from London, more than 120 miles from Manchester, more than 90 miles from Glasgow and Edinburgh, and 60 miles from Newcastle Upon Tyne. Consequently Carlisle is the regional, commercial, administrative and retail centre serving a catchment population of around 450,000 who live within an hours travelling time of the city.

Today's economy is characterised by food processing, agricultural support, automotive component manufactures and engineering. The dominant sectors are branch operation in warehousing, retailing, manufacturing, public administration and health services.

Carlisle is also a significant transport hub for rail services and the national road transport network.

Aims and Objectives
The main reason for this revised Action Plan is to deliver improved air quality across the district of Carlisle City Council, particularly in the 6 locations which have been designated as Air Quality Management Areas since 2005. This Action Plan replaces the first Action Plan produced by Carlisle City Council in 2007. In order to achieve improvement this Action Plan has the following aims and objectives:

- To ensure that air quality is integrated into other relevant City Council and County Council authority plans, strategies and activities
- To develop close relationships with organisations that can help deliver improved air quality.
- To encourage individuals to recognise that they can make choices which can lead to improved air quality.
- To outline a concise selection of clearly defined local measures from which air quality improvements can be realistically achieved.

The legal framework
The Environment Act 1995 established the current framework for the National Air Quality Strategy and placed statutory duties upon local authorities in respect of Local Air Quality Management (LAQM). Due to the health implications and costs associated with poor air quality, the government, through this strategy, have set health based air quality objectives for seven of the most common pollutants found in our cities. The air quality objectives are shown in Table 1. Every local authority in Britain has a duty to review and assess air quality against these objectives and to declare *Air Quality Management Areas* (AQMAs) in those locations where it is considered that the objectives are not likely to be met.

Once an AQMA has been declared the local authority has a duty to draw up an *Air Quality Action Plan (AQAP)* and to take positive steps to improve air quality.

Action planning is an essential part of the local air quality management process. It provides a practical opportunity for improving air quality in areas where the review and assessment process has revealed that national measures will be insufficient to meet one or more of the air quality objectives. Government guidance suggests that an air quality action plan should include the following:

- Quantification of the source contributions to the predicted exceedences of the relevant objectives. This allows the action plan measures to be effectively targeted.
- Evidence that all available options have been considered, on the grounds of cost and feasibility.
- How the local authority will use its powers and also work together in conjunction with other organisations in **pursuit** of the air quality objectives.
- Clear timescales within which the authority and other organisations propose to implement the measures contained in the plan.
- Where possible, quantification of the expected impacts of the proposed measures and an indication as to whether the measures will be sufficient to meet the air quality objectives. Where feasible data on emissions and concentrations could be included.
- How the local authority intends to monitor and evaluate the effectiveness of the plan.

These principles were followed in the development of both the original Air Quality Action Plan for Carlisle and in this revised version.

The air quality objectives applicable to Local Air Quality Management (LAQM) in England are set out in the Air Quality (England) Regulations 2000 (SI 928), and the Air Quality (England) (Amendment) Regulations 2002 (SI 3043). They are shown in Table 1. This table shows the objective concentrations in units of microgrammes per cubic metre $\mu g/m^3$ for each pollutant except carbon monoxide which is shown in milligrammes per cubic metre, mg/m^3. It also includes the number of permitted exceedences in any given year, where applicable.

Table 1- Air Quality Standard and Objectives

Pollutant	Concentration	Measured as	Date to be achieved by
Benzene	16.25 $\mu g/m^3$	Running annual mean	31.12.2003
	5.00 $\mu g/m^3$	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	Maximum daily 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 $\mu g/m^3$	Annual mean	31.12.2004
Sulphur dioxide	350 $\mu g/m^3$, not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125 $\mu g/m^3$, not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266 $\mu g/m^3$, not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

CHAPTER 2 – The Air Quality Situation in Carlisle

The impacts on health from poor air quality are felt mainly by the most vulnerable members of society, the very young, the elderly and those who are already suffering from existing respiratory conditions. Air pollution is also damaging to the economy. Poor air quality results in loss of working days and reduces productivity. It also makes the environment less attractive to visitors and can cause damage to buildings and monuments. This is of particular concern in an historic city such as Carlisle.

The Department for Environment Food and Rural Affairs (DEFRA) state on their website that: '*The economic cost from the impacts of air pollution in the UK is estimated at £9-19 billion every year. This is comparable to the economic cost of obesity (over £10 billion). Poor air quality is generally associated with poorer areas in England, which are often urban areas close to busy roads'.*

Since 1996 Carlisle City Council has been monitoring air pollution levels in Carlisle and comparing the results with the national air quality objectives. The current monitoring network consists of 50 passive diffusion tube locations which are strategically placed around the district to monitor Nitrogen Dioxide (NO_2) levels. There is one continuous analyser located to the north of the city centre which monitors NO_2 concentrations every hour. There is a second continuous analyser located to the west of the city centre which also monitors NO_2, as well as Particulate Matter (PM10 & PM 2.5) and Benzene. This site has been affiliated to the Automatic Urban and Rural Network (AURN) since 2008.

For the majority of pollutants the concentrations found across the district are well below the government's health based objectives and are not of concern. However the nitrogen dioxide (NO_2) annual average concentrations have been found to be currently above the health based objective level in 6 areas of the City.

As a result of the NO_2 exceedences there has been 6 Air Quality Management Areas (AQMAs) declared in Carlisle since 2005. The declaration of these AQMA's placed a duty on Carlisle City Council to draw up an AQAP this details the local measures which are most likely to help reduce nitrogen dioxide concentrations, particularly in these 6 areas of concern. The following map of Carlisle shows our AQMA's and illustrates their geographical location in relation to one another (figure 1). Individual close up maps of the areas in question can be found in figures 2 - 6 below:

Figure 1 – Location of AQMA's

Location of Carlisle AQMAs.

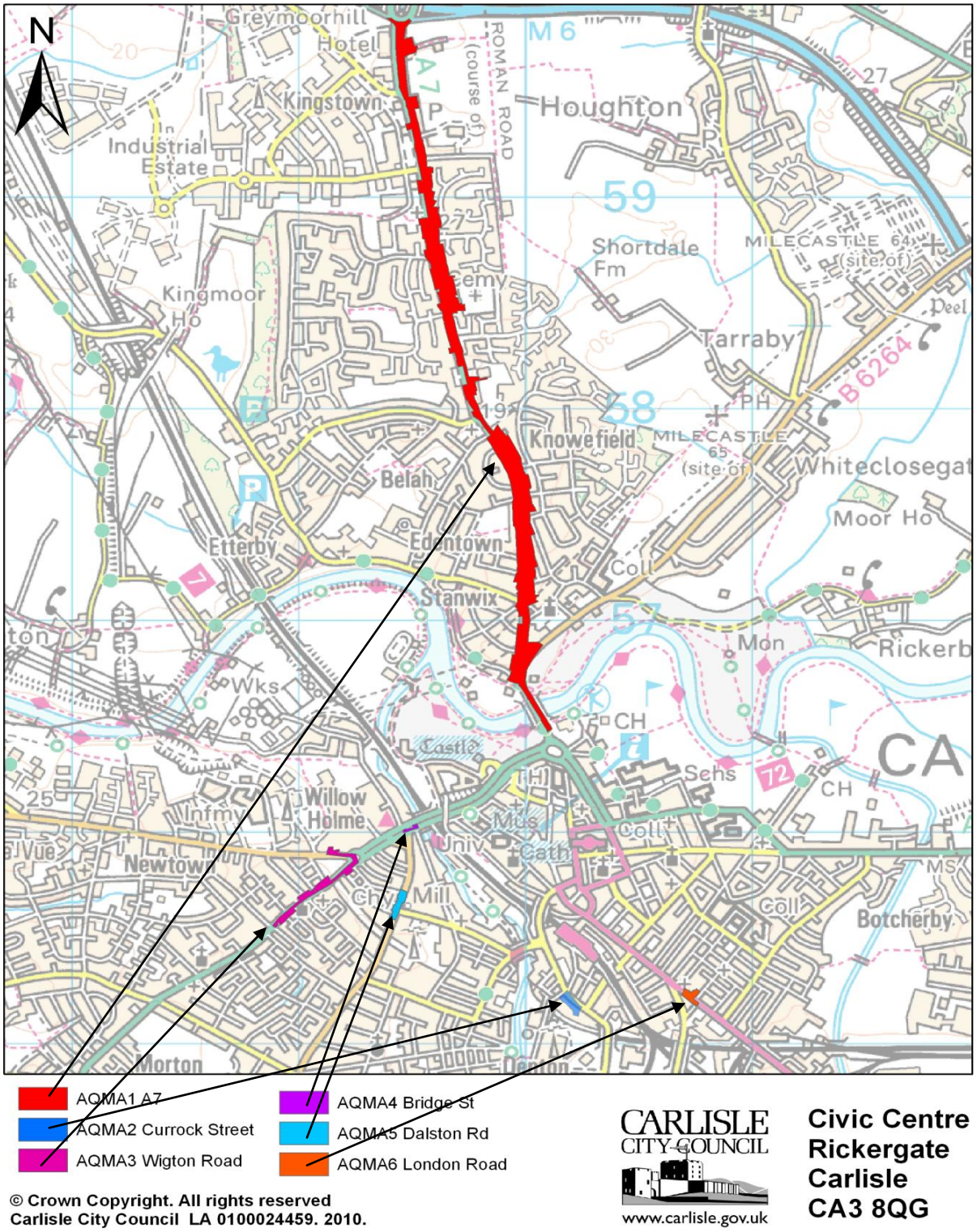

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Figure 2: Air Quality Management Area No 1

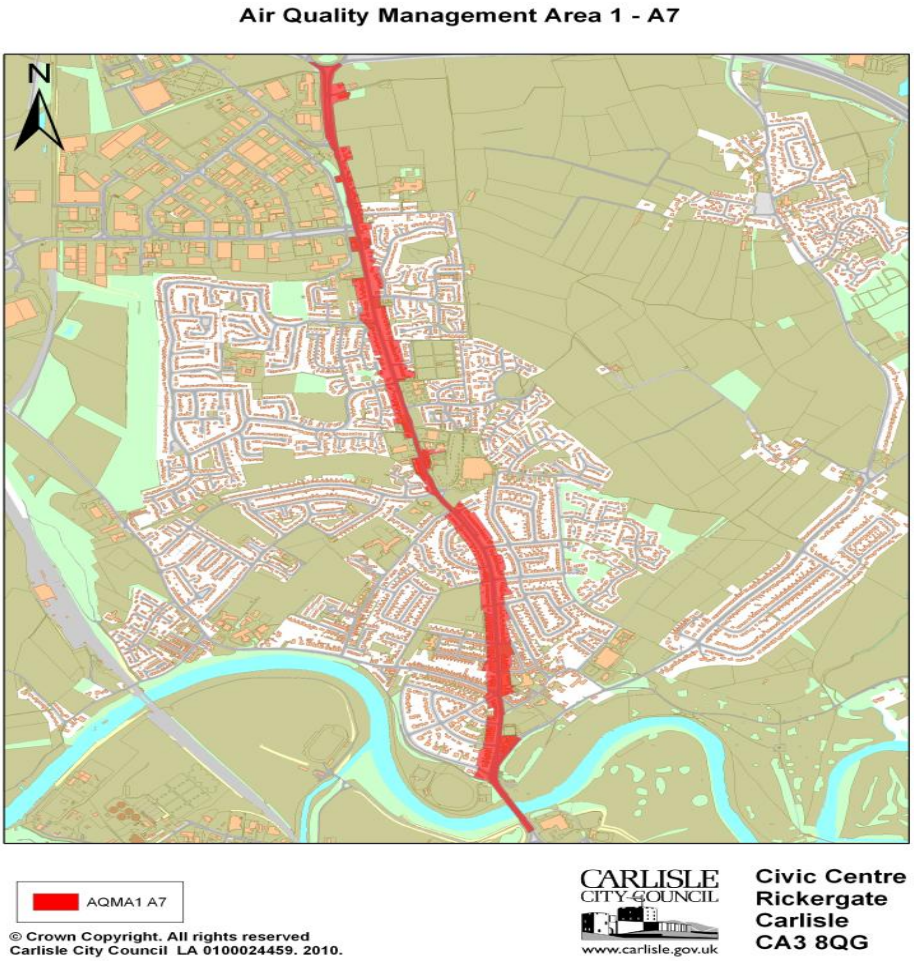


Figure 3: Air Quality Management Area No 2

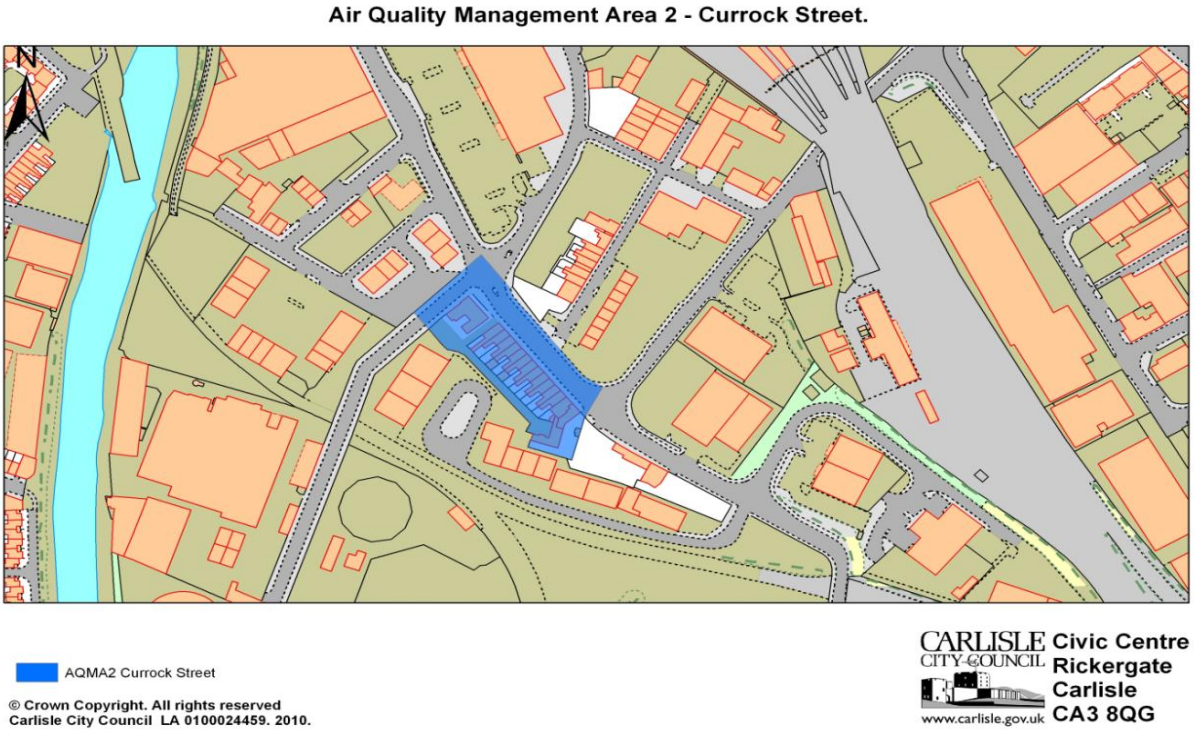


Figure 4: Air Quality Management Area No 3

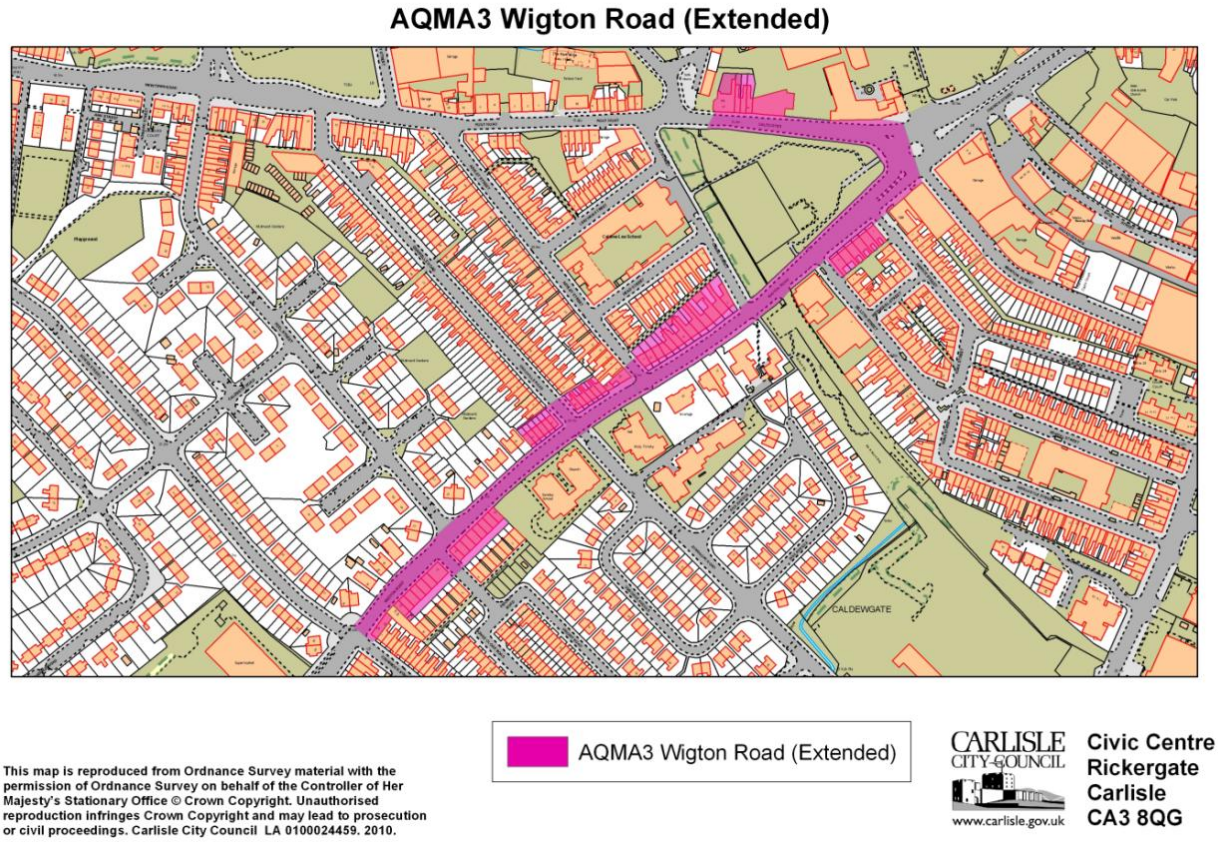


Figure 5: Air Quality Management Area No 4

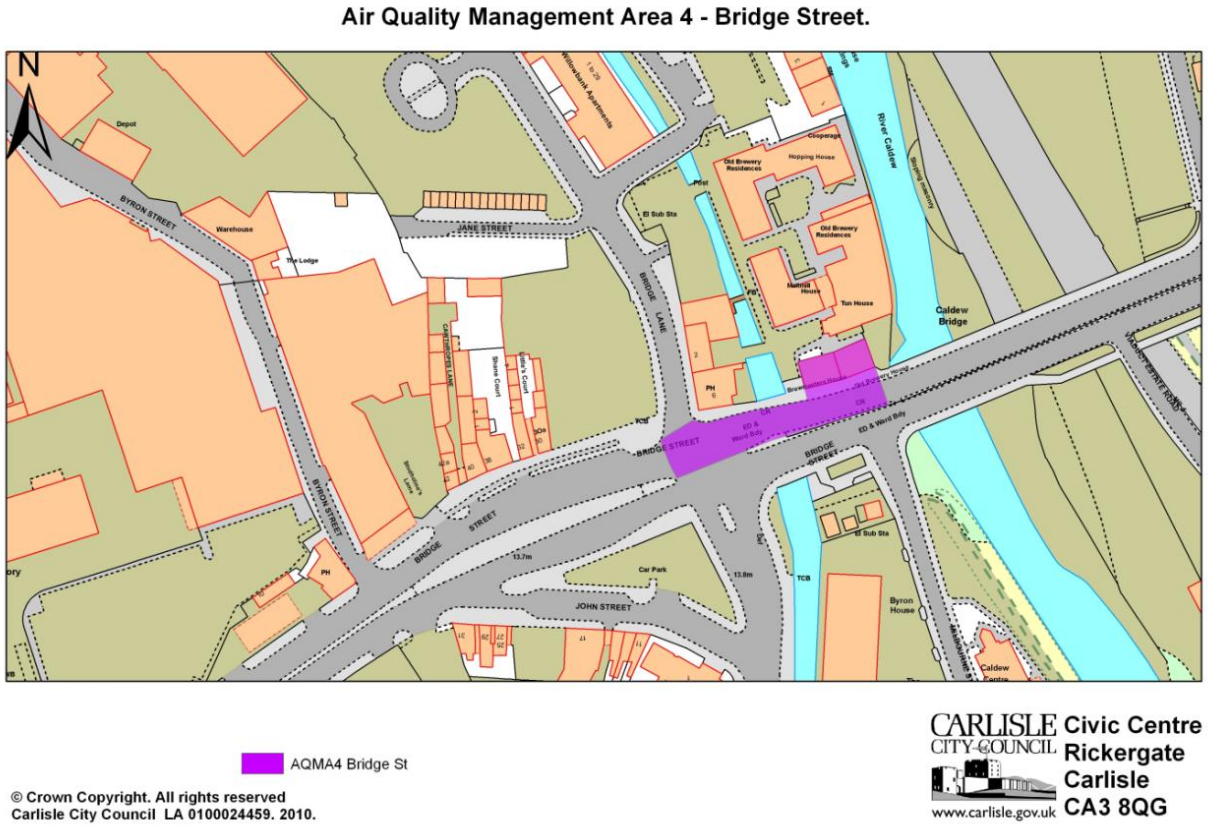
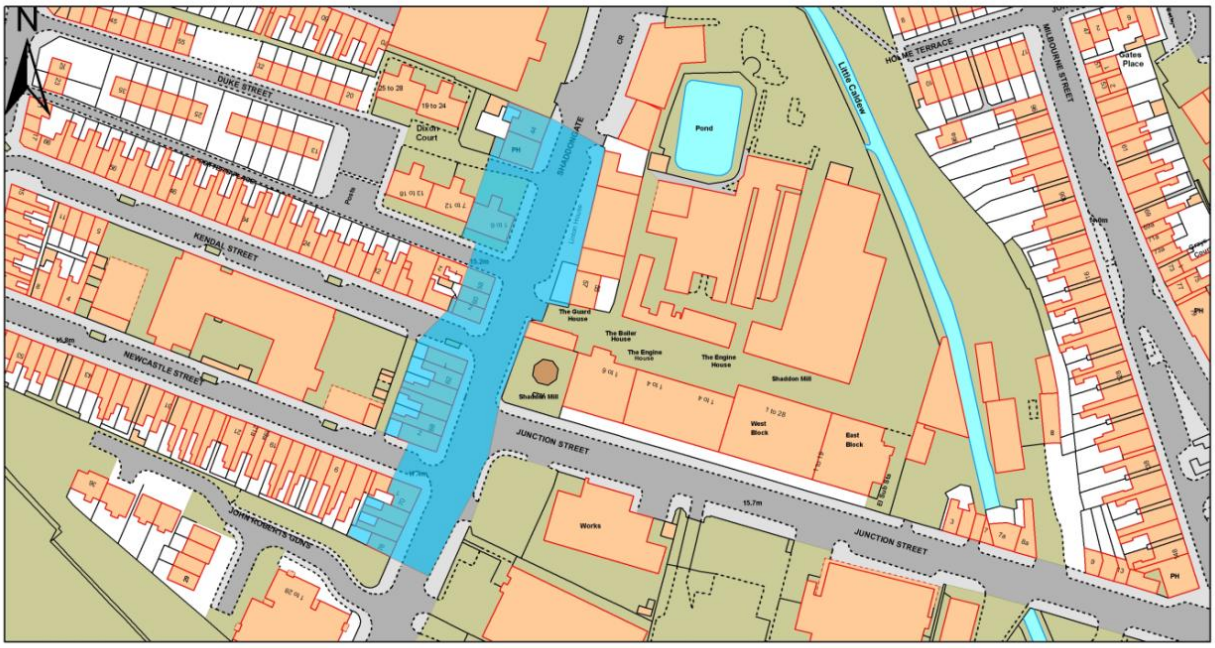


Figure 6: Air Quality Management Area No 5

Air Quality Management Area 5 - Dalston Road.



AQMA5 Dalston Rd

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Figure 7: Air Quality Management Area No 6

Air Quality Management Area 6 - London Road.

AQMA6 London Road

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More information about air quality monitoring in Carlisle and the declaration of the AQMA's can be found on the City Councils Website www.carlisle.gov.uk. Each of the following documents which have been created as part of the review and assessment process can also be found on the website under 'Air Quality':

Stage 1 Report 1996 - concluded that a stage 2 assessment would be required for nitrogen dioxide and particulates

Stage 2 Report 1998 - concluded that a detailed stage 3 assessment would be required in respect to nitrogen dioxide and particulates.

Stage 3 Report 2000 - concluded that it was unlikely that an air quality objective would be exceeded.

Updating and Screening Assessment 2003 – concluded that a detailed assessment would be required for nitrogen dioxide and particulates.

Detailed Assessment 2004 – concluded that it was likely that the annual mean objective for nitrogen dioxide would be exceeded at locations alongside the A7. As a consequence Air Quality Management Area No.1 was declared in 2005

Progress Report 2005 – concluded that it was likely that the annual mean objective for nitrogen dioxide would be exceeded at locations alongside Currock Street. As a consequence Air Quality Management Area No.2 was declared in Dec 2006

Updating and Screening Assessment 2006 - concluded that a detailed assessment would be required in respect to the annual mean nitrogen dioxide at 4 locations within the City i.e. Wigton Rd, Bridge St, London Rd and Dalston Rd.

Progress Report 2007 – update on air quality issues.

Detailed Assessment 2007 – concluded that it was likely that the annual mean objective for nitrogen dioxide would be exceeded at locations alongside Wigton Rd, Bridge St, London Rd and Dalston Rd. As a consequence Air Quality Management Areas No's. 3, 4, 5 and 6 were declared in 2008.

Further Assessment Report 2007 – confirmed that AQMA boundaries for AQMA No.1 and 2 were correct.

Progress Report 2008 – update on air quality issues

Further Assessment Report 2009 – confirmed that the boundaries AQMA's No's. 4- 6 are correct. It recommends that the boundary of AQMA No.3 be extended to the bottom of Caldewgate roundabout.

Updating and Screening Assessment 2009 - concludes that that the existing boundary of AQMA No.3 on Wigton Rd will need to be extended to the Caldewgate roundabout and include properties on Caldcotes.

Progress Report 2010 – update on Air Quality issues. Confirmed that the recent extension of AQMA No.3 had taken place and gave an update on progress with action plan measures.

Progress Report 2011 – update on Air Quality issues. Confirmed no further changes required to AQMA's and gave an update on progress with action plan measures.

Chapter 3 - Nitrogen Dioxide

The only pollutant of current concern in Carlisle is nitrogen dioxide. Nitrogen dioxide (NO_2) is one of two main gases, the other member of the group is nitric oxide (NO). Together these are referred to as nitrogen oxides (NO_X).

Oxides of nitrogen are formed whenever combustion takes place. During the combustion process the majority of the oxides of nitrogen (NO_X) released are in the form of nitric oxide (NO). Once released into the atmosphere nitric oxide (NO) can react with oxygen (O_2) and ozone (O_3) to produce nitrogen dioxide (NO_2). As the majority of nitrogen dioxide in the atmosphere has been formed from nitric oxide it is often referred to as a *"secondary"* pollutant.

Nitrogen dioxide gas acts as an irritant to the eyes, nose, throat and respiratory tract. It has both short term "acute" effects and long term 'chronic' effects.

Short term effects of nitrogen dioxide
The short term 'acute' effects of nitrogen dioxide include the irritation of the eyes, nose and throat. It can also increase the symptoms of existing respiratory conditions such as asthma, bronchitis and emphysema. Due to the short term health impacts the government has set a short term hourly objective level for nitrogen dioxide of 200ug/m^3, which must not be exceeded more than 18 times per year. The World Health Organisation factsheet on Air Quality and Health states that: *'at short term concentrations exceeding 200ug/m^3 it is a toxic gas which causes significant inflammation of the airways'.*

Currently the hourly concentrations of nitrogen dioxide measured in Carlisle are below the 200μg/m^3 objective level. Based on current medical evidence the short tern conditions of nitrogen dioxide found in Carlisle are unlikely to give rise to acute health impacts, even in the most vulnerable members of society.

Long term effects of nitrogen dioxide
The possibility of exposure to nitrogen dioxide causing long term 'chronic' health effects is less certain as the available information is more difficult to interpret. Some studies have suggested that those living areas with higher exposure levels to nitrogen dioxide have a poorer lung function:

The Committee on the Medical Effects of Air Pollutants (COMEAP) have stated that:
'A*t relatively high concentrations, NO_2 acts as an irritant causing inflammation of the airways and, by affecting the immune cells in the lungs, can increase susceptibility to respiratory infections'. 'Longer term exposure to nitrogen dioxide can increase the likelihood of respiratory illnesses in children'.* The World Health Organisation factsheet on Air Quality and Health states that: *'Epidemiological studies have shown that symptoms of Bronchitis in asthmatic children increase in association with long term exposure to NO_2'.*

Given the evidence for long term health effects, the government have set a long term annual average objective for nitrogen dioxide of 40μg/m^3 to be achieved by 31.12.2005. In Carlisle it is the longer term annual average nitrogen dioxide objective which has been found to be currently exceeded at a number of locations within the city.

Sources of nitrogen dioxide in Carlisle
Once a local authority has declared an Air Quality Management Area as a result of an exceedence of the national objective it then has a statutory duty to carry out a 'Further Assessment' to confirm the exceedence of the objectives within the areas declared. The Further Assessment is intended to supplement such information that the Council has in relation to the designated area in question. The Further Assessment should be sufficiently detailed to determine whether an existing AQMA needs amending or revoking and should also include source apportionment data and the emission reductions required to attain the objectives.

Further Assessment work has been undertaken for Carlisle City Council by our consultants 'AEA Technology', for all 6 Air Quality Management Areas. The first Further Assessment was completed in September 2007 and covers AQMA's 1 & 2. The most recent assessment was completed in April 2009 and covers AQMA's 3 - 6. This work concluded that the concentrations of nitrogen dioxide within the AQMA's had not changed substantially since they were declared.

The 2009 Further Assessment recommended that AQMA No.3 should be extended to cover residential properties along Wigton Rd and also properties on Caldcotes, due to exceedences of the annual mean objective level for nitrogen dioxide. The order to extend the AQMA came into force on 1st July 2010 following no objections from consultees.

All 6 of our AQMAs will currently remain unchanged because:

- Modelled and measured concentrations have not changed sufficiently enough since the AQMA was declared.

- Model predictions and measured data continues to show areas where members of the public will be exposed to nitrogen dioxide concentrations greater than the annual mean objective at relevant receptor locations.

- It remains possible, within the uncertainty of the modelling that exceedence of the objective will occur throughout most or all of the area of the AQMAs.

Source apportionment of 'base case' predictions
The nitrogen dioxide levels in Carlisle are the result of NO_X emissions from a variety of different sources. The main ones are:

- Localised point source emissions from large industrial chimney stacks, which can be quantified.

- Localised `line source` emissions. These are transport related emissions arising mainly from road transport but also including a small contribution from rail transport.

- Localised `area source` emissions. This covers all emissions arising from domestic and commercial space heating and any other source of emission which arise locally but cannot be easily quantified.

The 'Source apportionment' studies have been undertaken by AEA Technology for AQMAs where the annual average air quality objective for nitrogen dioxide is currently being exceeded. Source apportionment is the process whereby the contributions from the sources of a pollutant are determined. In Carlisle the relevant sources include; local background concentrations, traffic, industrial and domestic. Contributions from each source can even be broken down further. For example, the different types of vehicles such as cars, HGV's and buses as well as stationary vehicles in queues have been considered to highlight which class of vehicle is contributing most to the emissions from traffic. Source apportionment allows the most important source or sources to be identified and so enable options to effectively reduce ambient concentrations of pollutants to be considered and assessed.

Source Apportionment - The 'base case'

The base case in this source apportionment assessment is defined as the annual mean concentrations of NO_2 that are predicted in the absence of any measures to improve air quality in Carlisle City. They are the concentrations that were relevant in defining the extent of the Air Quality Management Areas.

Receptors considered

The receptors were selected inside the existing AQMAs for the purposes of the source apportionment exercise. These relevant receptors are generally residential properties and areas where relevant public exposure is most likely to occur. Many of these receptors are close to monitoring locations which allows comparison between modelled results and measured data.

Results

The results show that at each of the receptor sites, heavy-duty vehicles make a significant contribution to the total oxides of nitrogen concentrations. Stationary vehicles in queues also make a substantial contribution at each of the receptor sites. Overall source apportionment has determined that traffic congestion and heavy duty vehicle emissions make the largest contributions to nitrogen dioxide concentrations in all of the AQMA's. More detail in relation to these results can be found in chapter 9.

The further assessment reports can be found on our website www.carlisle.gov.uk

CHAPTER 4 - Reducing nitrogen dioxide levels

To achieve a reduction in NO_2 concentrations in Carlisle we need to reduce the amount of NO_x being emitted at a local level. This means implementing a range of measures to tackle the major sources of NO_x.

The emissions modelling, undertaken by AEA Technology, has confirmed that motorised road transport accounts for the majority of NO_x emissions in the City.

The main focus of the Air Quality Action plan therefore needs to be on transport related measures. Some consideration has been given to reducing emissions from businesses and households in recognition of the contribution they make to the overall problem.

Nationally there have already been a considerable number of policies introduced for the purposes of reducing emissions to air. Generally these measures are controlled by national legislation and are aimed at achieving the same standards across the UK.

Table 2 Examples of some of the main measures that have been introduced at a national level for the purposes of improving air quality.

Emission Source	National Measures to reduce emissions to air
Road Transport	• **Vehicle Emission Standards** - European legislation requires all new vehicles manufactured for sale in the UK to meet progressively cleaner emission standards - UK MOT certification system requires all vehicles over three years old to pass an emission test on an annual basis. • **Fuel Standards** - European legislation requires progressively cleaner fuels to be produced. This has resulted in the removal of lead from petrol and has significantly reduced the amount of sulphur and benzene in fuels. • **Tax based measures** - Fuel duty differentials have been put in place to encourage the use of cleaner fuels. - A graduated road tax system has been introduced to encourage the purchase of smaller, cleaner vehicles. - Company car tax has been graduated to encourage the use of more fuel efficient vehicles. • **Active promotion of cleaner fuels** - Programmes aimed at developing technology and a sustainable market for alternatively powered vehicles such as hydrogen and electric vehicles.
Industry	• **Local Air Pollution Prevention and Control (LAPPC)/Integrated Pollution Prevention and Control (IPPC)** - Local authorities control emissions to air from certain

	industrial processes under the provisions of the Pollution Prevention and Control Act 1999. • **Industrial smoke control** - Dark smoke emissions from industrial processes which fall outside LAPPC/IPPC can be controlled under the Clean Air Act. This Act also allows local authorities to control new furnace installations and chimney heights.
Area Sources	• **Smoke Control** - The Clean Air Act allows for the declaration of smoke control areas, which restricts smoke emissions from any premises within it.

Where national legislation already exists to control a particular type of emission it is difficult for a local authority to require higher standards at a local level.

In drawing up a local Air Quality Action Plan the emphasis has been placed on emission reduction measures which offer improvements at a local level but which at the same time are achievable or enforceable. These are the types of measures which have been included in this revised Air Quality Action Plan and are discussed in detail in chapters 7 and 8.

Chapter 5- Understanding the traffic issues within Carlisle

A series of transport movement issues and pressures have been identified within Carlisle, many of which have been created by either historical or physical constraint factors.

The 5 key types of movement patterns within the City include:

- Non detrimental strategic movements through and past Carlisle – primarily using the M6 motorway and West Coast Mainline railway, providing little benefit but having little adverse effect locally.

- Detrimental strategic through movement e.g. Southern Scotland towards West Cumbria which need to travel through the centre of Carlisle via the A7 (AQMA No.1) and A595 (Caldewgate, Wigton Road) creating significant impact upon these core areas of the City.

- Movements from the hinterland into Carlisle both from community/business activity and related to Carlisle's location as a key centre for the region culturally and socially.

- Movements from within Carlisle to the City Centre – those who live within Carlisle and seek to use the amenities.

- Movements across the City – increasingly over recent years decentralised development has taken place at the motorway hubs e.g. Kingmoor Park and business premises around M6 junction 43 creating traffic demand through the City Centre.

There are 2 physical issues that will always have a key influence on the way in which movement within Carlisle occurs. It should be noted that they also present key attributes of the City both environmentally and economically.

- The 3 rivers, with limited crossing points forming key constraints on the road networks, but with `green corridors' that create potential for movement,

- The railways – limited crossing points which presents significant barriers to movement, particularly to the south of the City.

Several core movement characteristics of the City have been identified and are summarised below:

- Congestion is particularly focused on some of the key pinch points and barriers related to the above physical constraints. This tends to be relatively localised, affecting key meeting points of the regional distributor roads.

- HGV's and larger vehicles create significant impacts on key locations within the City Centre, but mostly relate to through city movements or outlying industrial areas.

- Lack of western orbital route results in congested junctions in the west of the City i.e. Currock Street, Victoria Viaduct, Junction Street and Dalston Road.

- Traffic flows generally are tidal in nature with AM peaks reversing into PM peaks. This often leads to congestion in one direction, with free flowing traffic in the other.

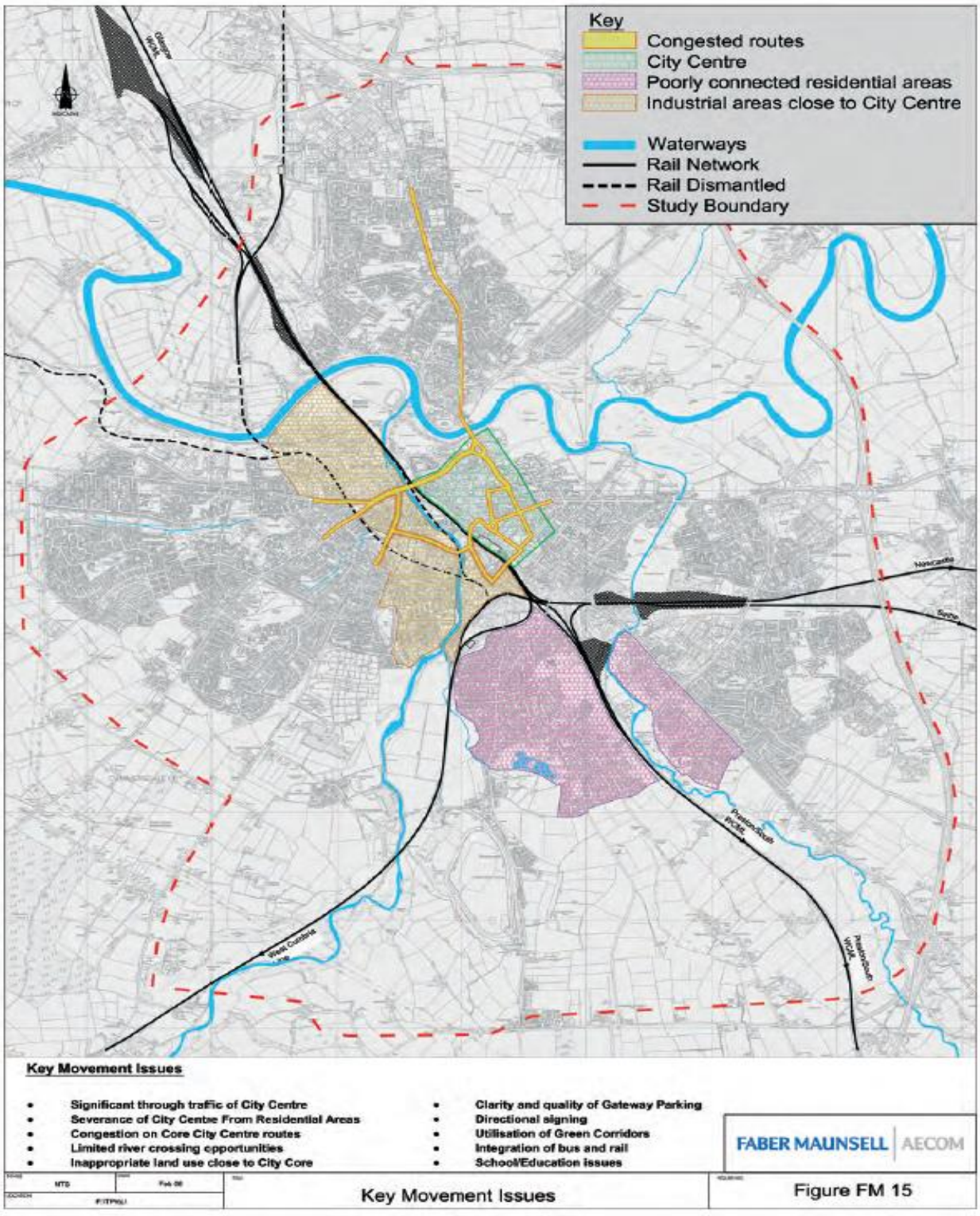
- There are particular issues occurring in relation to specific land uses, which due to the relatively small size of Carlisle can have a significant proportional impact on the City's movement capability.

- Areas such as Currock and Upperby tend to be isolated by the previously mentioned barriers despite their close proximity to the City Centre.

- Public transport provision is a strength of Carlisle – it has a relatively good bus network for a City of its size and a well placed high profile railway station. What is lacking is the ability to provide affective access from the wider hinterland by these modes of public transport and the volume of activity to ensure economic viability of services off peak.

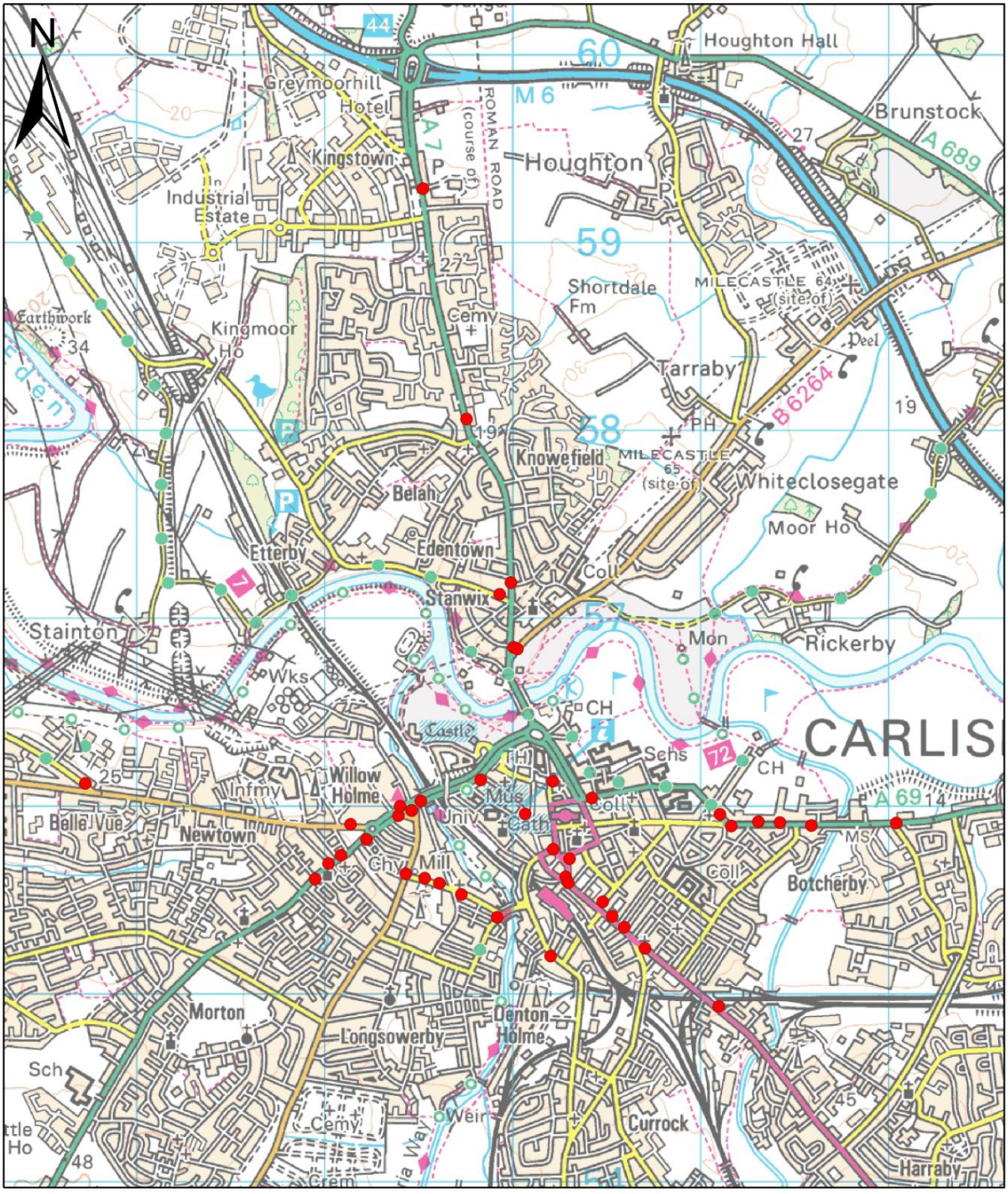
The city's movement issues are illustrated in Figure 8 below, this is followed by figure 9 which shows the majority of our diffusion tube network and the way in which this relates to the main arterial routes and congestion areas.

Figure 8 – Key Movement Issues in Carlisle



The following map shows the location of our NO_2 diffusion tube monitoring sites within the City. It can be clearly seen that the majority of monitoring is targeted at 'relevant locations' along the most congested routes identified above.

Figure 9 – Location of our NO_2 diffusion tube monitoring sites



NO2 Diffusion Tube Location Map

NO2 Tube

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CHAPTER 6 - Links to other plans and strategies

The measures contained within the AQAP will have positive impact on a number of policy objectives and key actions. Measures to reduce NO_x emissions must support and be supported by wider council and partnership policies. This can involve contributing towards the reduction of greenhouse gas emissions, alleviating congestion, promoting sustainable development, supporting sustainable transport and generally improving the air quality and safety of Carlisle's environment.

The AQAP is intrinsically linked to other important areas of work including the Local Transport Plan, Local Development Plan and Local Development Framework, Corporate Plan 2010-2013 and the Community Plan. Some of these links are highlighted below.

Corporate Plan 2010-13

The Corporate Plan sets out the key actions for delivering the two priorities of Local Environment and Economy. The AQAP has an impact on the following actions:

- Develop and deliver an area based approach to improve the quality of the local environment– including air quality, contaminated land, clean and well maintained streets and open spaces. (Local Environment)

- Work with partners to achieve the targets in the Healthy City, Health Improvement Action Plan. (Community Engagement)

- Work with key partners to deliver the outcomes of the Local Transport Plan (3). Focusing on key projects such as the refurbishment and recognition of Carlisle Station as an international gateway and transport hub to Cumbria.(Economic Development)

Carlisle City Council - Environmental Policy Statement

Carlisle City Council has signed up to the Nottingham Declaration on Climate change and have given our commitment to:

- Working with central government to contribute at a local level, to the delivery of the UK Climate Change Programme, the Kyoto Protocol and the target for carbon dioxide reduction by 2010.
- Participating in local and regional networks for support.
- Within the next two years developing plans with our partners and local communities to progressively address the causes and the impacts of climate change, according to our local priorities, securing maximum benefit for our communities.
- Publicly declaring within appropriate plans and strategies the commitment to achieve a significant reduction of greenhouse gas emissions from our own authorities operations especially energy sourcing and use, travel and transport, waste production and disposal and the purchasing of goods and services.
- Assessing the risk associated with climate change and the implications for our services and our communities of climate change impacts and adapt accordingly.

- Encouraging all sectors in our local community to take the opportunity to adapt to the impacts of climate change, to reduce their own greenhouse gas emissions and to make public their commitment to action.
- Monitoring the progress of our plans against the actions needed and publish the result.

Carlisle Partnership

The Carlisle Partnership is the organisation that brings together the City and County councils that serve Carlisle, the Health Service, Police and other public agencies, local businesses and voluntary and community organisations to improve the well being of Carlisle. **The Community Plan** produced by the Carlisle Partnership, sets the high level aims and ambitions for the area and ensures that they are achieved by the Partnership.

The AQAP is consistent with the following objectives of community plan:

- Improve health and wellbeing across Carlisle's communities and reduce health inequalities within our district.

Local Transport Plan 3 (2011 -2026)

The Local Transport Plan (LTP) is the statutory planning document that sets out the County Council's vision, strategy and policies for transport. It also describes the approaches and measures that will be taken to implement these policies in each Cumbrian Authority. The plan provides the framework to co-ordinate the local delivery of integrated transport and seeks improvements to our transport systems. One of the aims of the LTP is a high quality natural and built environment.

The current plan LTP(3) identifies that Carlisle suffers from traffic congestion at peak times and air quality problems on roads around the city centre. It goes on to state that:

'2012 will see the completion of the Carlisle Northern Development Route. This will provide the opportunity to improve ***air quality*** *as well as improving access to development sites.'*

For rural areas of the district the plan sets a priority to:

'The priority for rural Carlisle is to improve resident's ability to access jobs, services and healthcare. This will be based around developing demand responsive services and developing opportunities within local communities.'

The LTP(3) states that there will be a further document which, among other things, will address parking issues within the city centre of Carlisle:

'The Carlisle City Centre Transport Overview and Joint Parking Policy Statement which is being developed between the county and city council and local businesses will help to identify the transport improvements required to support the economic priorities.'

The County Council has also produced the draft LTP(3) Implementation Plan (2012 – 2015). This report seeks to inform members on the Carlisle section of the LTP(3) Implementation Plan. The Implementation Plan is a key part of the Cumbria Transport Plan (LTP3), setting out how the priorities of the recently approved LTP(3) Strategy will

be delivered. The three year Implementation Plan 2012 -2015, which will be rolled forward and reviewed annually will incorporate a transport statement for Carlisle setting out its key transport priorities and a schedule of proposed transport improvement schemes aimed at helping to deliver them.

The outcomes and any major change as a result of these emerging documents will be reported in due course during subsequent rounds of review and assessment.

The Green Infrastructure Strategy for Carlisle City and District (2011)

This document seeks to present a new vision and strategy for the City and the District. One of its key aims is to create healthy, active, cohesive, sustainable and bio-diverse communities, with a high quality of life and wellbeing. In particular a chapter relating to 'sustainability and resilience' views reducing air pollution as a direct benefit of implementing the green infrastructure strategy, it states that: *'Trees and woodlands absorb significant quantities of gaseous pollutants such as* SO^2*,* NO_x *and ozone from the atmosphere.'*

The report goes on to recommend actions to secure benefit in each area. The following actions are linked directly to air pollution and the benefits which the strategy can offer:

'Stakeholders should seek specialist support to identify those areas that currently have an issue with poor air quality created by traffic and work to ensure that street trees and other appropriate vegetation is retrofitted to contribute to resolving the issue.'

'Stakeholders should work together to ensure that routes that are likely to create additional air pollution as a result of the growing city and increased traffic are the focus of efforts to add new green spaces, street trees and vegetation.'

'Stakeholders should actively seek to create an active transport network to reduce traffic and reliance on private cars, and encourage walking, biking and use of public transport. These transport corridors can also provide invaluable green corridors for wildlife and other ecosystem services.'

Local Plan

The Carlisle District Local Plan, 2001 – 2016, (The Local Plan) is written with the objective of contributing to sustainable development. It sets out opportunities for development through specific site allocations, and development control policies on what will or will not be permitted. Planning decisions must be taken in accordance with the Local Plan unless material considerations indicate otherwise. The impact on air quality of a new development would be a material consideration.

The Council's Local Plan sets out a number of planning policies that are used when making decisions on planning applications for development. The policies relate to the location of development, traffic generation, accessibility to public transport and other sustainable modes of transport, which will contribute to protecting air quality. Examples of some of these policies are shown below:

- Policy CP13 Pollution
  Development will not be permitted where it would generate, either during construction or completion, significant levels of pollution (from contaminated

substances, odour, noise, dust, vibration, light, heat) which can not be satisfactorily mitigated within the development proposal or by means of planning conditions.

- Policy DP01 Sustainable Development Locations
  All proposals for development will be assessed against their ability to promote sustainable development.

- Policy DP05 - Trunk Roads
  Major development proposals will be assessed against their impact on the safe and efficient operation of the Trunk Road Network.

- Policy CP16 – Public Transport, Pedestrians and Cyclists
  New developments should offer a realistic choice of access by public transport, walking and cycling. Priority should be given to the provision for safe and convenient pedestrian and cycle access including secure cycle parking provision facilities, where appropriate, in all new developments accessible to the public.

- Policy CP16 – Public Transport, Pedestrians and Cyclists
  New developments should offer a realistic choice of access by public transport, walking and cycling. Priority should be given to the provision for safe and convenient pedestrian and cycle access including secure cycle parking provision facilities, where appropriate, in all new developments accessible to the public.

- Policy CP9 – Development, Energy Conservation and Efficiency
  Development proposals should take into account the needs for energy conservation in design layout and choice of materials.

- Policy IM1 Planning Obligation
  The Council will consider the use of planning obligations (S106 agreements) in order to provide for local or community needs....will cover a number of issues.....transport/traffic improvements

The Local Plan is being reviewed and a draft new Local Plan will available for consultation in 2013.

The air quality impacts of the current Local Plan are discussed in detail in chapter 7.

CHAPTER 7 - Actions to improve air quality

This chapter sets out the measures that will be introduced by Carlisle City Council and its partners to improve air quality. In this revised AQAP the measures have been focussed on those which are most likely to result in a significant improvement in NO_2 particularly in those 6 areas where exceedences in the national objective level have been revealed.

A number of measures have been removed from the original Action Plan because the schemes were rejected or expired and others were simply unlikely to have any significant impact on NO_2 levels within the city. In some cases the measures had been achieved and implemented therefore no further progress is necessary. Overall this new concise set of measures is designed to target the key areas of improvement, focus attention on the achievable and maximise the opportunities for real improvement.

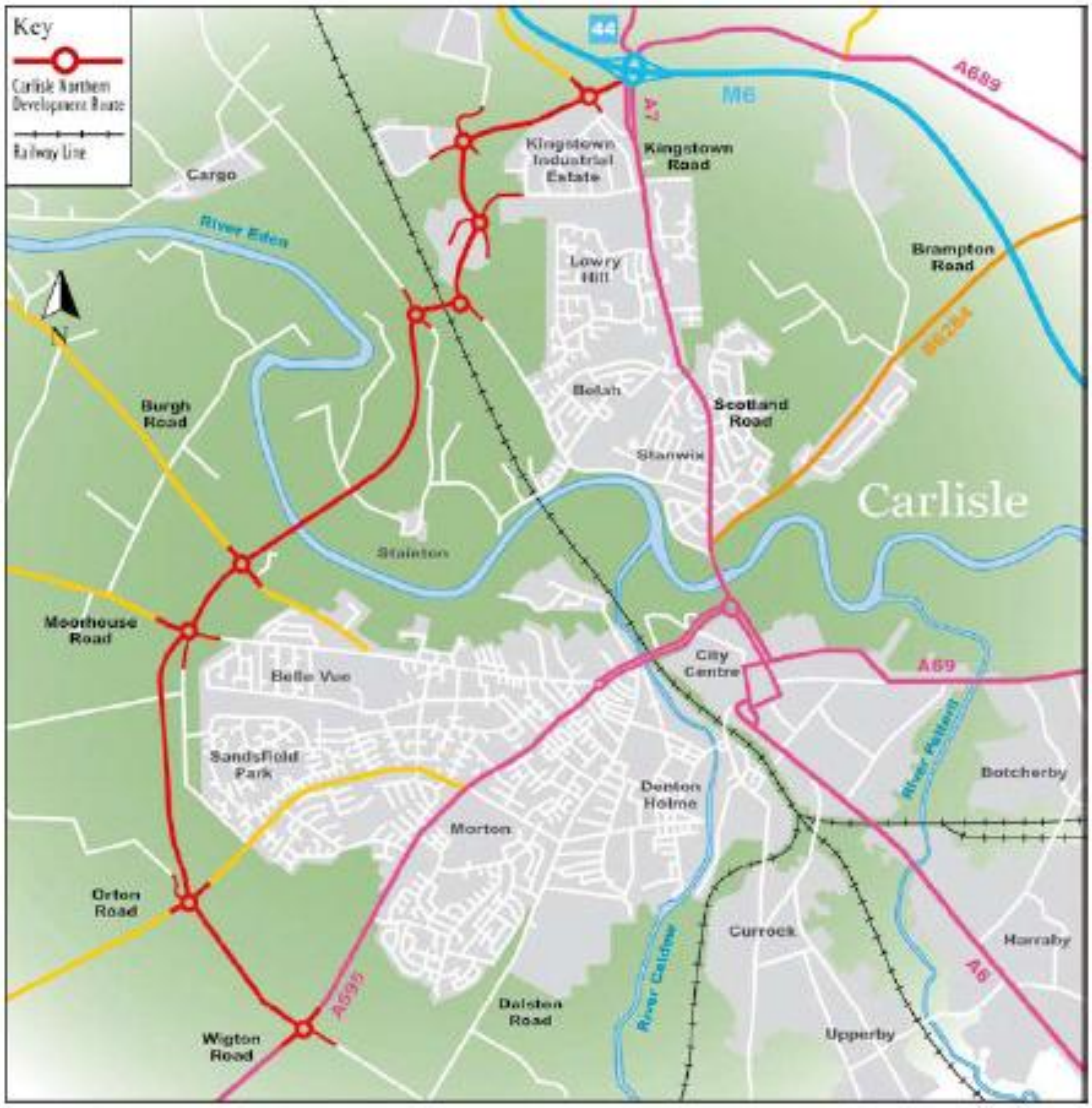
Many of the actions to be implemented in order to improve air quality are taking place through existing plans and strategies. Both Carlisle City Council and Cumbria County Council are committed to taking action to improve air quality in the area and it is believed that many of the actions contained in the Action Plan will also have a beneficial effect by improving the quality of life for residents and making activities in the area more sustainable.

Road Network Improvements

A new road known as the Carlisle Northern Development Route (CNDR) has now been built around Carlisle. The new road is just over 5 miles long. It passes by the west of the City from the A595 near Newby West to Junction 44 of the M6 near Kingmoor Park.

The CNDR is the major scheme detailed in the LTP (3) and provides the basis of improvement within this AQAP. The County Council and City Council were both fully committed to the project which has just been completed ahead of schedule. The finished road was opened on 14 February 2012. A map of the route can be seen below.

Figure 10 – Carlisle Northern Development Route



The CNDR scheme involved constructing three bridges including a brand new crossing over the River Eden. The route also has a footpath and cycle ways along its length.

The CNDR addresses one of the key issues facing Carlisle in that it enables traffic which is not bound for the city centre to avoid it entirely, this will subsequently reduce congestion across the city. It is expected to have a particular improvement on the radial

routes; A7 to the north (AQMA No 1) and A595 to the west (AQMA No's 3 & 4). It is anticipated that the CNDR will:

- Ease congestion (and improve journey times) in Carlisle by taking commercial and other through traffic out of the city.
- Improve overall air quality particularly along the A7 and the A595.
- Improve transport links between West Cumbria, Scotland and the north east by connecting the M6/A69/A74/A595 without sending traffic through Carlisle.

Both the City Council and County Council will monitor the traffic reduction derived from the introduction of the CNDR. Investigation will then be made into the potential for reallocating road space to buses and cycles on existing inner city roads. This could create further opportunity for improvements to the existing road network.

The predicated reductions in NO_x emissions that will result from the opening of the CNDR have been modelled by AEA Technology. The data is presented in Chapter 9 and indicates that it will result in a significant improvement in air quality within each of our AQMA's.

Action 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

An important factor influencing NO_2 concentrations is the degree of congestion faced by vehicles as they make their way through the city. Congestion results in stop/start driving, increasing emissions levels and the amount of time needed to complete a journey.

On a day to day basis the volume of traffic using the roads is the main cause of congestion. Additional factors such as road closures, broken down vehicles or road works can make the situation worse. Traffic management involves the use of traffic signals, signs and traffic regulations to minimise congestion and keep the network moving.

One of the key aims of the LTP(3) is to reduce traffic through the city centre; the management of traffic is an important factor in achieving this aim.

Proposals are in place to improve the existing Caldcotes / Wigton Road roundabout (AQMA 3). This would be implemented as part of the new Sainsbury's development on Caldewgate and the later stages of the proposed residential & employment developments at Morton, on the south western edge of the city.

Timescale: Schemes developed over the next five years.

The development of a new supermarket in the Caldewgate area (between AQMA 3 & 4) has begun and is likely to have an impact on traffic flow in this area. Major changes to the road layout will take place in order to ease congestion including a new junction and additional lanes. Progress on this development and the Air Quality impacts will be closely monitored and reported upon during review and assessment.

A county wide speed limit review has been undertaken as part of the of the government requirement set out in the Department for Transport circular 1/2006. The measures suggested include reduction of speed limits and extensions of the existing limits. These measures could help improve traffic flow and air quality in Carlisle.

Timescale: Over the next three years.
The estimated cost for this work is £65,600.

There is a proposal to complete the creation of the 20mph zone in Carlisle between Dalston Road, Dunmail Drive, Wigton Road and Stanhope Road. This could discourage drivers from taking these residential routes as a short cut and may help to improve air quality in these areas of the city (AQMA's 3 & 5 vicinity).

Timescale: Over the next 2 years
The estimated cost for this work is £30,000.

It is anticipated that the opening of the CNDR will result in a reduction of traffic travelling through the city, particularly on the A7 and A595. Once the benefit of the CNDR is understood, schemes will be developed to ensure that the benefits of the traffic reduction is maximised and locked into the city. It is likely that these schemes will include improvements to public transport, pedestrian facilities and cycle routes.

Action 2: Effective traffic management measures will be implemented to improve the existing road network and incorporate new developments.

Land Use and Development Management

Land use planning has a significant role to play in improving and protecting air quality within the city. Planning decisions can have a significant, long term impact on travel behaviour and traffic levels. The City Council through its function as a planning authority, can influence new development to ensure that it is designed and located so as to reduce the need to travel. It may also influence a range of travel options encouraging alternatives to car use in accordance with national policy. The integration of land use, transport and highways is key to the Council facilitating delivery of sustainability. Carlisle's main planning policies are set out in the adopted Carlisle District Local Plan, 2001 – 2016, (the Local Plan) as discussed in chapter 6.

Development Management
Air quality as a material consideration has now been incorporated into the local planning process. As part of the Council's planning application validation process, developers are required to submit an air quality impact assessment (AQIA), as follows:

When is it required?
Where the development is proposed inside, or adjacent to, an AQMA; where the development could in itself result in the designation of an AQMA; or where the grant of planning permission would conflict with, or render unworkable, elements of the local authority's air quality Action Plan.

What is required?
Any report should be detailed enough to enable the planning authority to determine, with a reasonable degree of certainty, the significance of any air quality impacts, and thereby the priority to be given to air quality concerns when deciding an application. The scope of an air quality assessment will depend on the nature of the proposed development and the likely impact.

Why is it required?
In compliance with Policy CP13 of the adopted Carlisle District Local Plan 2001 – 2016.

Specific guidance '*Air Quality Land Use Planning*, has been produced by Environmental Health and is routinely provided to both planners and developers to assist them with this requirement. It indicates the trigger criteria where a development has the potential for significant emissions of pollutants. In these circumstances an AQIA would be expected. The following are three examples of these trigger criteria:

- Residential development in excess of 100 units; or
- Employment uses in excess of 5,000 m^2 gross floor space; or
- Any developments that either generates in excess of 100 heavy goods vehicles per day or 100 vehicles movements in any hour.

Once submitted, the Environmental Health Department carry out an appraisal of the AQIA, and issue comments or recommendations to planners and developers as required.

The planning guidance will be revised as necessary to incorporate a checklist of mitigating measures which could be included in Section 106 agreements based on

emerging best practice. Examples of actions taken nationally to minimise adverse transport impacts on air quality include the requirements for travel plans and possible developer contributions for public transport infrastructure.

PPS23 outlines national policy on planning and pollution control, including the basis for applying a combination of planning conditions and legal obligations to address the environmental impacts of proposed developments. In particular, it notes that '*Section 106 Agreements can be used to improve air quality, make other environmental improvements […] or offset the subsequent environmental impact of a proposed development.*'

It is important to note that the Community Infrastructure Levy (CIL) exists separately from 106 agreements. The CIL is a new charge in which local authorities are empowered, but not required, to charge on most types of new development in their area. CIL charges will be based on simple formulae which relate the size of the charge to the size and character of the development paying it. The proceeds of the levy will be spent on local and sub-regional infrastructure to support the development of the area. As yet Carlisle has not drawn up a CIL.

Despite the need to enter into the above legal agreements where appropriate, conditions may also be imposed on any planning consent to achieve the following examples:

- Secure the submission of a full emissions inventory;
- Secure the submission of a scheme for monitoring air quality in areas affected by the development;
- To secure the submission of a Green Travel Plan and Transport Assessment;
- Encourage the use of clean fuels, secure bicycle parking and changing facilities;
- Promote the use of, and the securing of improvements to public transport, walking and cycling;
- Set targets for trips made by public transport;
- Encourage the implementation and use of Green Travel Plans, Environmental Management Plans and Air Quality Strategies;
- Require industrial processes to monitor and model their emissions;
- Require developers to monitor air quality before and after development.

More details of how the planning system has been and can be used to promote and improve air quality can be found in '*Low Emissions Strategies, using the planning system to reduce transport emissions, Good Practice Guidance',* (Defra January 2010).

Action 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.

Sustainable Public Transport

Buses are the most important public transport option for local journeys and are essential in providing an integrated transport system. By getting more people to use public transport as an alternative to car travel, total vehicle emissions can be reduced. The need to encourage and increase use of public transport is paramount in addressing air quality issues and will become even more essential as a tool to counteract potential rises in traffic volumes associated with future development.

One of the priorities of the LTP (3) is to improve the performance of the passenger transport service and encourage its use. Raised kerbs and bus boarders have been provided to improve bus accessibility in key locations. In addition there has been a programme to implement real time information panels along key routes and at key interchange points. This gives passengers accurate details of their next bus and any delays.

The County Council are continuing to improve bus ticketing arrangements including the ongoing development of contactless Smart Card ticketing. This is an electronic bus ticketing scheme, which allows passengers to present their Smart Card to a card reader at the start of the journey. The appropriate credit is then deducted from the passengers travel account. County wide Smart Card ticketing is intended to enhance the appeal and remove barriers to public transport. It is said to benefit passengers in terms of wider ticket availability, ease and speed of use.

Bus infrastructure improvements are intended as part of the proposed Morton residential & employment development which will help reduce its impact on air quality in the area. A bus only access point will be provided from the development on to Newlaithes Avenue. This will provide a route for buses separate from other traffic straight in to the middle of the new development; thus improving journey times and service reliability.

As a part of the first phase of the Morton development it is proposed to provide new bus shelters and passenger information at the bus stops on Newlaithes Avenue to improve facilities for users and encourage increased patronage. A new bus service will be provided to link between the development and Newlaithes Avenue and through to the city centre bus services. It is also planned to provide new bus stops on Wigton Road to serve the employment area of the Morton Development.

Timescale: The first phase is proposed to be provided in the next five years.
The estimated cost for this work is approximately £220,000 which has been allocated to the scheme.

Action 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.

Walking and Cycling

Those who use cycling and walking as a means of travel can contribute many environmental and health benefits to the local transport mix, as well as having a positive impact in terms of helping to reduce traffic congestion, pollution and noise. Cycling and walking are both a strong option for short local journeys, either on their own or in combination with public transport.

A significant amount of work has already been undertaken by the City Council and County Council to develop a Cycle Network providing better cross city cycle and pedestrian routes. However there are still gaps and obstacles identified in the pedestrian & cycle network that inhibit making journeys on foot or bike. A key aim identified in LTP (3) is to promote and encourage the use of sustainable transport in Carlisle. An important aspect of this is the promotion of walking and cycling in the area. Several new schemes are being developed to assist this:

A new bridge over the Cumbria Coastal railway is identified as a priority scheme in LTP(3). This bridge will provide a continuous off road cycle route between Currock in the south of the City and the City Centre it will provide a link between residential areas and key employment sites.

Timescale - 2012-2015, this is the highest priority scheme in LTP(3)
Funding has been allocated for the next year to develop the scheme.

A new shared cycle & footway is being developed along the River Petteril. This will provide improved access from the south east of the city to the city centre for pedestrians and cyclists and will promote modal shift.

Capital funding is available to improve cycle links from Kingmoor Park to Lowry Hill and improve route signing from Lowry Hill to the River Eden. This will form part of a cycle route north of the River Eden (AQMA 1) to key employment sites and large residential areas. This would improve conditions for cyclists and could encourage modal shift.

Timescale: This work is proposed to be implemented in the next five years.
The estimated cost for this work is approximately £281,000.

Lowther Street pedestrian improvements have been identified in LTP (3) as another priority scheme. Reducing the impact of traffic on Lowther Street will improve accessibility for pedestrians and cyclists and improve the economy of this area of the city centre.

Timescale- 2012-2015 for scheme commencement.
Funding has been allocated for the next year to develop the scheme.

West Walls in the city centre has been highlighted in LTP (3) as an area where vehicle dominance should be reduced favouring cyclists and pedestrians. This would form a link with the historic quarter and the city centre car parks.

Timescale- 2012-2015.
Funding has been allocated for the next year to develop the scheme.

As part of the new Sainsbury's development it is proposed to enhance cycle and pedestrian links between the city centre and the new store through improvements to the Caldew cycleway. The proposed improvements include a new ramp under Caldew Bridge to provide access to the north side of Bridge Street. This will provide a continuous link from Currock and Denton Home to Bitts Park and associated cycle links north of Castle Way. Any trips to the new development on foot or by bike will help reduce the negative impact on the nearby Air Quality Management Areas 3 & 4.

Timescale- This work is proposed to be implemented in the next five years.
The estimated cost for this work is approximately £370,000.

As part of the Morton Development it is proposed to provide pedestrian improvements including footway and street lighting along Wigton Road, Dalston Road and Peter Lane. As well as these measures it is proposed to improve pedestrian connectivity, to Disability Discrimination Act 1995 and The Equality Act 2010 standards, on Newlaithes Avenue, Westrigg Road and Stonegarth. All of these measures aim to improve pedestrian facilities and encourage modal shift.

Timescale- The scheme is currently at outline planning stage and will be progressed in the next five years.
The estimated cost for this scheme is approximately £100,000.

There is funding available to improve walking routes around the city to adhere to the above standards. This will involve the provision of dropped kerbs and the maintenance of footways.

Timescale: This is a rolling scheme which will be undertaken in the next five years.
The estimated cost for this work is approximately £10,000 a year.

The opening of the CNDR will provide a continuous off road cycle route from the north of the city to the west. This will add to the existing cycle infrastructure in the city and provide a key link for residents in the west accessing the employment and retail areas to the north of the city.

Action 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.

Since the previous AQAP the City Council and County Council have published a pocket sized cycling and walking guide in 2008. A pack of 'Doorstep walks' was also produced by the City Council detailing 10 recreational walk in and around the city. These include maps to encourage active transport and participation. Both are available free on request or from the City Council website.

Both Carlisle City Council and Cumbria County Council will ensure they set an example as a walking and cycle friendly employer by adopting a series of initiatives that are designed to encourage walking and cycling to work and when on business travel through their own travel plans.

Travel Plans

As discussed in Chapter 5, Carlisle's traffic movements tend to be tidal in nature with peak congestion occurring during work and school opening and closing times. One way of helping to deal with this trend is to implement and promote travel plans to schools, businesses and other organisations.

Workplace Travel Plans
A travel plan is typically a package of practical measures to reduce reliance on the car for journeys to work or during work. In addition to commuting and business travel, a travel plan can aim to reduce the environmental impact of travel by customers, visitors and vehicle fleets.

Travel plans should be tailored to a particular site and can include measures such as car sharing schemes, improvements to public transport services, offering cheaper public transport fares through subsidence or operator schemes, improving walking and cycling facilities, offering flexible working practices such as working from home, switching to alternate cleaner fuels, ensuring vehicles are regularly serviced, fitting emission reducing technology and offering driver training.

Cumbria County Council continue their commitment to the promotion of travel plans including the monitoring and development of work travel plans where required for fulfilling Section 106 agreements for planning approval. The City Council planning policies are in place to ensure that new developments encourage cycling, walking and use of public transport as an alternative to cars, as discussed in section 6. The promotion of work travel plans to all existing businesses in Carlisle will be an ongoing aim.

Action 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.

School Travel Plans
With a significant number of schools located within the city the school run is a significant contributor to morning and afternoon congestion problems. One of the main reasons for parents driving their children to school includes concerns about the safety of routes for children who could walk or cycle.

Throughout Carlisle a series of initiatives have been previously implemented to try to ease congestion and improve safety at schools by promoting walking, cycling and the use of public transport. Initiatives include traffic calming near schools, organised walking buses and cycling trains, training, education and promotional campaigns. Many of these successful initiatives were implemented through school travel plans and are still ongoing.

Better Ways to School was Cumbria County Council's 10 year programme to deliver school travel plans for all schools in Cumbria, this ended in 2010. At this time all schools in Carlisle had a School travel plan in place. There is no further school travel plan work planned at present but the Active Travel team continue to work with schools to promote sustainable travel to school.

Carlisle City Council: Green Travel Plan

As one of the major employers in the City, Carlisle City Council has developed a Green Travel Plan for staff and the organisation. Issues include improved facilities such as showers, changing facilities and storage to encourage walking and cycling to work. The plan leads to the growth of car share schemes, introducing car parking charges, reviewing staff mileage allowances, greater management control and planning of journeys, reviewing policy on use of public transport for longer journeys, flexible home working and procurement. The key aims as stated in the Green Travel Plan are to:

- Reduce the need to travel.
- Slow down the growth in car use, especially by drivers travelling alone
- Support policies to reduce congestion and accident rates
- Help to improve air quality in the city
- Manage and reduce our greenhouse gas emissions
- Manage demand for parking
- Encourage a healthy environment and workforce
- Demonstrate leadership in the development of travel plans

Reducing Emissions from Vehicles

Setting an Example - Council Vehicle Fleet

The City Council also has a role to play in reducing emissions from the Council vehicle fleet and has undergone a fleet review, with the help of the Energy Trust to set targets to reduce vehicle emissions.

Currently the council has a fleet of 121 vehicles ranging from cars to road sweepers. Around 75% of these vehicles are registered 2005 or later and most run on diesel with 5% biodiesel content as standard. The council refuse collection fleet includes:

- 9 refuse collection vehicles, 8 of which are euro 5 and 1 is euro 3 standard.
- 4 green waste vehicles all of euro 5 standard.
- 5 Recycling collection vehicles, 2 of which are Euro 5, 2 are Euro 4 and 1 is Euro 3 standard.

The budget for vehicle replacement has recently been drastically reduced therefore the scope for vehicle replacement will not remain as it has in previous years. At the same time the standard of council vehicles is relatively high and it appears likely that the fleet will continue to be reduced. For these reasons there seems to be little scope for further air quality improvement from this area, therefore this measure has been removed from this revised action plan. The council's policy on vehicle replacement will be monitored and any changes will be reported during the review and assessment process.

Targeting Specific Smoking Vehicles

Vehicles that are old or poorly maintained are prone to producing large quantities of thick, heavy dark smoke, in particular large diesel vehicles. This smoke can make buildings dirty and also increases the amount of small particles in the air.

Local authorities do not currently have direct powers to deal with these smoky vehicles however the Vehicle & Operator Services Agency (VOSA) does. The public can report a smoky diesel (lorry, bus, coach or other public service vehicle) by contacting Tel: 0300 123 9000. To make a report, the following details will be required:

1. The vehicle registration number (displayed on the number plate)
2. The type of vehicle (be as specific as possible)
3. The date, time and place where you saw the vehicle
4. The name of the vehicles operator (the company or owner)

It is now possible to download a form through the councils website which can be used to report a vehicle that has been seen to produce excessive smoke. However it is not currently possible to monitor the reports made in this way or quantify the air quality impacts that they have within the district

Car Parking Strategy

Car Parking Management is a powerful tool in influencing vehicle access into the city centre, it can reduce unnecessary emissions from cars circulating in pursuit of a parking space and can direct vehicles away from known congestion areas. Parking management can be controversial in that it can be seen as a mild form of congestion charging.

As stated in LTP(3) the City Council, in consultation with the highways authority, is currently preparing a comprehensive Parking Strategy for Carlisle. The emerging document is known as: '*The Carlisle City Centre Transport Overview and Joint Parking Policy Statement'*. As mentioned in chapter 6.

Once this document is developed any outcomes or changes as a result of it will be reported upon during the review and assessment process.

Action 7: The City Council and the County Council will develop and implement a comprehensive Transport Overview and Joint Parking Policy'.

Reducing Emissions from Non Transport Related Sources

Traffic is the main source of air pollution in Carlisle therefore the majority of the Air Quality Action Plan measures are aimed at reducing emissions from transport. There are however other sources of nitrogen dioxide in the city which need to be addressed within the Air Quality Action Plan.

Regulation of Part A and B Process in Integrated Pollution, Prevention and Control (IPPC) & Pollution Prevention and Control (PPC).
Emissions from the majority of large industrial processes in Carlisle are already subject to strict control under the Integrated Pollution Prevention and Control (IPPC) regime, the Pollution Prevention & Control Regulations 2000 and Environmental Permitting Regulations 2010. Under this regime certain industrial processes are required to be inspected on a regular basis by Carlisle City Council or the Environment Agency. The type and size of the process determines the relevant regulating authority.

Carlisle City Council currently permits 72 Part B and 2 A2 Processes. In addition there are 15 A1 processes located throughout the District regulated by the Environment Agency. As well as regular inspection, each process is required to operate in accordance with a set of permit conditions which includes controls on the level of emissions allowed and the type of abatement equipment to be used. Guidance notes are provided to regulating authorities to ensure a uniformed approach to emissions control across the UK.

Action 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.

Bonfires Statutory Nuisance Legislation – Environmental Protection Act 1990
Bonfires can be a nuisance to people living or working nearby primarily by adding to levels of fine particles (smoke) but also by releasing other pollutants and odours. The Environmental Quality section often receives complaints and can take enforcement action under the Environmental Protection Act 1990. Local Authorities have powers to deal with smoke emitted from premises that by definition is prejudicial to health or a nuisance.

Where a local authority is satisfied that a statutory nuisance exists, City Council enforcement officers have a duty to take enforcement action requiring the abatement of the nuisance. This applies to both domestic garden and commercial bonfires such as on building sites.

To discourage the disposal of garden waste on bonfires the Council promotes composting and offers free collection of garden waste. Composting bins are also available from the Council at a reduced price.

Information about these services is available to the public on the City Council website and through local campaigns.

Industrial Smoke Control – Clean Air Act 1993
Carlisle City Council also controls emissions from certain industrial processes or trade premises which fall outside the provisions of IPPC using the provisions of the Clean Air Act 1993 which includes powers to:

- Prohibit black smoke (Subject to certain exemptions)
- Require notification of installations of industrial furnaces
- Approve chimney height of certain installations

Smokeless Zones
Some areas of the city are subject to the requirements of smoke control orders that prevent the burning of certain solid fuels such as coal and wood inside premises on certain appliances. These orders were put in place by the City Council mainly during the 1970's to combat the smoke induced smogs that were commonplace prior to the widespread availability of electricity and natural gas for heating purposes.

There are 5 smoke control areas within the district, all of these are located within the city. In a smoke control area it is an offence to emit smoke from a chimney. It is also an offence to acquire for use, or sale any fuel, other than an authorised smokeless fuel unless it is to be burned on a fireplace exempted from the smoke control area.

The Environmental Health Department continues to give advice on smoke control areas and provides comprehensive information on the use of exempt appliances and fuels on the website. The enforcement powers can be implemented where an offence is deemed to have been committed.

Action 9: The City Council will continue to investigate complaints of black smoke and smoke nuisance as well as manage smokeless zones. Enforcement action will be taken as necessary.

Energy and Heating

Buildings contribute directly and indirectly to the consumption of energy and resources. This includes environmental pollution from the production of the materials used in construction and the waste generated during construction and demolition. Energy is required for heating, lighting and ventilation. Energy efficient buildings and those incorporating sustainable design principles are now recognised as important ways to help control emissions from domestic and commercial properties and to encourage people to use less energy.

The council states in its current draft housing strategy that; '*As part of our 'Decent and Healthy Homes' priority we will reduce the levels of fuel poverty to improve housing and health standards'.*

The City Council has an ongoing programme of offering energy advice and access to subsidised home insulation measures such as loft and cavity wall insulation. This is provided through a variety of different projects and information campaigns, such as promotions (display at local shows), Home Energy Surveys (individual advice given to householders), and centrally funded Energy Savings Schemes.

Action 10: Energy savings advice and subsidised home insulation improvements will continue to be provided to the public. Uptake will be monitored.

Trees and Green Infrastructure.

As detailed in chapter six, Carlisle City Council recently produced The Green Infrastructure Strategy for Carlisle City and District (2011). The Green Infrastructure Strategy is an evidence based study that will be used to inform the policies in the new Local Plan, in particular rolling forward and updating Policy CP5 Design, which makes provision for landscaping of new development, retention of existing trees, shrubs and hedges and additional planting.

The strategy identifies specific measures to improve air quality such as; '*identifying those areas that currently have an issue with poor air quality created by traffic and work to ensure that street trees and other appropriate vegetation is retrofitted to contribute to resolving the issue'.* As well as; '*ensuring that routes that are likely to create additional air pollution as a result of the growing city and increased traffic are the focus of efforts to add new green spaces, street trees and vegetation.'*

It is envisaged that Environmental Health and Neighbourhoods and Green Spaces team can work together over the next 5 years to investigate ways in which vegetation and trees can be used both to help improve air quality as well as provide ecological, environmental and community benefits. Areas where air pollution is a concern will be examined to see if they are suitable for tree planting projects using shared knowledge, expertise and data from both teams.

It will be necessary to consider suitable tree species and other implementation issues and it may be possible to use monitoring data to demonstrate the indicative effects of the initiative. The direct air quality benefits of strategic vegetation and tree planting is not absolutely clear, however the government are showing support for tree planting within cities and have recently pledged £4 million funding for community and civic tree planting initiatives. The scheme is known as the 'Big Tree Plant' which has the aim of planting 1 million trees by 2015. DEFRA reported in December 2011 that the scheme is on track with 100'000 new trees planted in the first year of the scheme and a further 400'000 pledged to follow.

It is possible that the major potential impact of this scheme may indirect. The results of the project could be very visible and tangible within the community which helps bring the air quality issue into the public attention. It is likely that any media interest would also be beneficial which may have a knock on effect with other measures outlined within the plan.

Action 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.

Joint Working – Policy and Strategy

As detailed in chapter six, air quality management is already linked to a vast array of council plans and strategies. It is, however, important for the Environmental Health department to continue to promote the issue to as many council departments and external agencies as possible. The positive effects of this work can be seen in the previous changes to the planning process, and the inclusion of air quality measures in documents such as LTP(3), The Green Infrastructure Strategy and the Corporate Plan.

The intention is to progress this further over the next five years. It seems logical that by including air quality in as many relevant council plans and policies as possible we will generate more interest and give the air quality concern a higher profile.

The involvement of various council departments and the combined effects of a number of influential council policies, targeting a range of council services, will assist in providing air quality improvements across the district.

Action 12: Joint working will be extended in order to include air quality improvement in all relevant City Council and County Council policies and strategies.

Raising awareness of air quality issues and education

Information, education and promotion are considered to be important ways of influencing travel behaviour and improving air quality. For the air quality action plan to be successful it is vital that the public is provided with information regarding air pollution and its likely effects on health and the environment. It is also important that the public is advised of the air quality improvement actions proposed for Carlisle and also the actions that they can take as individuals.

Building public support to improve air quality and to protect the environment will be an integral part of this Action Plan. Improving and sustaining air quality in the long term will require behavioural change by individuals and businesses. Individuals can help improve air quality by reducing car use and changing drive styles. Businesses can help improve air quality by implementing travel plans and reducing vehicle emissions.

Raising awareness and providing information on air pollution and transport will be achieved in a number of ways:

Providing Public Information
It is important that we provide information on air quality and its impact on health and the environment in a clear and accessible way. We already provide a large range of information on our website. This includes information on locations of the cycle/pedestrian routes in the city and links which give up to date information on buses and train times for local and national travel. In addition features on air quality issues and what people can do to themselves regularly feature in the Carlisle Focus Magazine.

The website now also contains information updated hourly about the real time air pollution levels from our two automatic monitoring stations located within the city and there are links to other sites with information about pollution's levels nationally. This provides a data source for air quality past and present and can assist with environmental education.

Supporting Local and National Initiatives
The City Council will promote national and internal campaigns, such as Car Free Day, Healthy City Week, Walk to Work and Bike Week. The council will also initiate more local public awareness campaigns and educational events to specifically promote greener travel choices and reducing emissions to air.

Review and Assessment
As part of the Air Quality Review and Assessment process the council will continue to produce comprehensive annual reports on air quality. This includes analysis of local air pollution levels, comparison with air quality targets, development within the district and progress made with the Air Quality Action Plan. These reports will continue to be published on the website and be available on request.

Action 13: The City Council will undertake regular publicity events and actively promote health improvement, air quality and sustainable transport issues. Up to date air quality information and monitoring data will be provided to the public.

Chapter 8 Action Plan Table

Government guidance requires local authorities to have regard to the cost effectiveness and feasibility of measures in their Air Quality Action Plan. It does not expect local authorities to undertake any complex, full cost/benefit analysis, instead it accepts that in most cases only indicative assessments can be made. These assessments have been briefly summarised below.

The following table summarises the above action measures it also includes information in relation to:

Focus
A brief summary of how the measure will help to achieve air quality improvements.

Lead Authority
This sets out who is the lead authority with responsibility for ensuring that the actions are carried out.

The Cost of Implementing Schemes
The costs involved in implementing the measure are ranked as high, medium or low.
High = >£1 million
Medium = £100 k to £1 million
Low = <£100 k

Feasibility
The feasibility of each measure has been estimated in relation to ease of implementation and cost. Each measure has been given a number as follows
Most positive = 5
Medium = 3
Least positive = 1

Air Quality Impact
This provides an estimate of the likely air quality improvement of each action. This gives an indication of whether the impact of the proposed action is expected to be high, medium or low. The determination of likely air quality improvement is not straight forward. Carlisle City Council commissioned consultants (AEA) to provide a specific air quality impact assessment of the key action measures such as the Carlisle Northern Development Route. The results of these assessments can be found in chapter 9.

It has been most difficult to assess the air quality improvement arising from 'soft' measures such as encouraging people to use alternative modes of transport but an indicative assessment has been made of these measures.
Most positive = 5
Medium = 3
Least positive = 1

Date to be achieved
This gives the date in which the measure is expected to be completed.

Monitoring and Evaluation
Monitoring and evaluation of the actions contained in the Plan are essential to quantify its effectiveness. Chapter 10 sets out how Carlisle City Council intends to assess and monitor the ongoing implementation of the Plan.

Table 3 Action Plan Summary

Measure No	Measure	Focus	Lead authority	Cost	Feasibility	Air Quality Impact	Date to be achieved
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.	Reduction of traffic volume and HGV's through the city. Reduce congestion and improve journey times	Cumbria CC & Carlisle CC	H	5	5	Road completed Feb 2012. Assessment of traffic and AQ data will continue until Feb 2014.
2	Effective traffic management measures will be implemented to improve the existing road network and incorporate new developments.	To improve traffic flows along main arterial roads and reduce congestion	Cumbria County Council	M	4	4	Plans to be individually implemented up to 2017.
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.	Include air quality concern from the beginning of the planning process and influence large scale development	Carlisle City Council	L	5	4	Responses to planning applications will be ongoing until 2017
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	To increase bus patronage and encourage the widespread use of all passenger transport systems.	Cumbria County Council	M	4	3	Current ongoing improvement. Major schemes to be completed by 2017
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.	To provide opportunity for walking and cycling as a viable transport option across the district.	Cumbria County Council	H	4	3	Current ongoing improvement. Major schemes to be completed by 2017

Measure No	Measure	Focus	Lead authority	Cost	Feasibility	Air Quality Impact	Date to be achieved
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.	To reduce the traffic impact of people commuting to work during peak times of the day.	Cumbria CC & Carlisle CC	L	5	2	Ongoing until 2017
7	The City Council and the County Council will develop and implement a comprehensive Transport Overview and Joint Parking Policy'.	Improve parking arrangements and reduce congestion caused by slow moving traffic seeking spaces.	Cumbria CC & Carlisle CC	L	4	3	2014
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.	Control industrial emissions to air in line with nationally agreed levels and encourage year on year improvement	Carlisle City Council	L	5	3	Ongoing until 2017
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.	To control emissions from burning of trade and domestic waste. Prevent nuisance caused by smoke.	Carlisle City Council	L	5	2	Ongoing until 2017
10	Energy savings advice and subsidised home insulation improvements will continue to be provided to the public. Uptake will be monitored.	Improve energy efficiency. Reduce domestic emissions and fuel poverty.	Carlisle City Council	M	4	2	Ongoing until 2017
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.	To investigate ways in which vegetation and trees can be used to improve air quality and raise public awareness.	Carlisle City Council	M	3	3	2017

Measure No	Measure	Focus	Lead authority	Cost	Feasibility	Air Quality Impact	Date to be achieved
12	Joint working will be extended in order to include air quality improvement in all relevant City Council and County Council policies and strategies.	To generate more internal interest in air quality. Increase profile of local improvement measures.	Cumbria CC & Carlisle CC	L	4	3	Ongoing work until 2017
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.	Increase public awareness and participation. Improve access to information and monitoring data.	Carlisle City Council	L	5	3	Ongoing work until 2017

CHAPTER 9 – Effect of Action Plan Measures on NO_2 Concentrations within AQMA's

The Action Plan focuses on reducing NO_x emissions primarily through measures to reduce traffic flow and vehicle emissions that are consistent with Council wide policies, particularly those in the Local Transport Plan (LTP3). Other actions focus on reducing emissions from buildings and industry as well as measures to raise public awareness of air pollution and greener travel.

The Carlisle Northern Development Route (CNDR) is the single major scheme in the LTP(3) and the Air Quality Action Plan. It is predicted that the CNDR will remove up to 25% of through traffic from the A7 and A595 and, in particular, reduce the flow of HDVs through the city. The new road will be just over 5 miles long and will pass the west of the city from the A595 to Junction 44 of the M6. The CNDR enables non-Carlisle trips to avoid the city and subsequently will reduce congestion on the radial routes to the north (A7) and west (A595) of the city.

Delivery of the scheme is vital to the economy of the area helping to tackle congestion in the city, supporting the development of the Kingmoor Park regional employment site and improving access to West Cumbria for freight traffic. The reduction in through traffic from the city centre will allow possible measures to revitalise the public realm and improve access by walking, cycling and passenger transport to be implemented.

Action Plan Scenarios

A number of scenarios have been considered in order to investigate the potential improvement as a result of the measures outlined in the Action Plan. These were originally developed as parts of two separate Further Assessments which were carried out following the implementation of our AQMA's. The assessments were created in 2007 and 2009 and were used to model the predicted improvements from the CNDR and other measures detailed above.

It was originally intended that the CNDR would be completed by 2010, however since the Further Assessments were produced this was subsequently delayed until 2012. It should be noted that during this period there have been no other major changes in the district that would severely impact upon traffic flows. Monitoring data has also remained relatively consistent throughout the time when the delays were experienced. For these reasons the results of the scenarios are still relevant and considered sufficient to demonstrate the predicted impacts of the key measures of this current action plan. The following data shows the results of the scenarios that were carried out, the modelled results for 2010 should now therefore be applied to 2012 to give indicative improvement values following the recent opening of the bypass.

When sufficient monitoring data has been collected, following the opening of the CNDR, there will be further modelling work undertaken. It is anticipated that this data will help support any decision to amend or revoke the AQMA's as a result of the expected air quality improvements delivered by the measures detailed within this AQAP.

All scenarios for receptors within A7 (AQMA 1), Wigton Rd (AQMA 3) and Bridge St (AQMA 4) consider a 25% reduction in daily traffic flows to represent the reduction to traffic travelling through the city as a result of the proposed road network developments.

For the Currock Street receptor (AQMA 2) no change in the average daily traffic flow was considered. Neither was it considered for the receptors in the AQMAs declared for Dalston Road (AQMA 5) and London Road (AQMA 6), instead a scenario considered a reduction in stationary vehicles (traffic queues).

Given these traffic flows, several levels of congestion were considered, to represent the impact of reduced traffic flows and Travel Planning, increased use of public transport, cycling and walking:

- Current congestion (AQMA No.3 and AQMA No.4). A worst case scenario, in which the measures have no impact on the congestion around junctions and signals despite a 25% reduction in traffic flow as a result of road network developments;

- No congestion. To represent the optimal reduction of congestion. (AQMA 1- 4)

- Reduced congestion. To represent a partial reduction of congestion, peak queue lengths are limited to the current off-peak lengths. Off peak queues are reduced in length to reflect the smaller volume of traffic and better traffic flow at signals. (AQMA's 1, 2, 5 & 6)

- Reduced congestion and proportion of HDVs. To represent the additional reduction of HDVs travelling through the city, the proportion of HDVs is reduced by 50%. (AQMA 1 & 2)

- Reduced traffic volume and proportion of HDVs. To represent the additional reduction of HDVs travelling through the city, the proportion of HDVs is reduced by 50%. (AQMA 3 and 4)

- Reduced proportion of HDVs by 25% in addition to a 25% reduction in queuing traffic. (AQMA 5 & 6).

- Current congestion. A worst case scenario, in which the measures have no impact upon the congestion around junctions and signals despite a 25% reduction in traffic flow as a result of road network developments. (AQMA 1 only)

Scenario results for AQMA's 1 & 2

Tables 4 and 5 show the results of modelling for the NO_2 concentrations within both AQMA's 1 & 2 at the most sensitive receptors discussed in chapter 3. It considers the action plan scenarios for both 2006 and 2010 (2012).

Table 4: Predicted nitrogen dioxide concentrations at selected receptors for the Action Plan scenarios for the A7.

	Year	Scenario				
		Base	all include a 25% reduction to daily traffic flow			
			Present Congestion	Part Congestion	Part Congestion, 50% HDVs	No Congestion
North Kingstown Road, A7	2006	43.45	37.21	35.42	28.04	20.69
South Kingstown Road, A7		38.80	33.13	32.65	25.66	17.80
Scotland Road, A7		46.98	40.22	40.17	31.51	23.86
Stanwix Bank, A7		41.59	35.62	34.15	26.99	20.60
Brampton Road		46.29	39.65	39.52	31.25	25.12
North Kingstown Road, A7	2010	37.76	32.39	30.88	24.84	18.85
South Kingstown Road, A7		33.67	28.87	28.47	22.79	16.43
Scotland Road, A7		40.89	34.99	34.95	27.75	21.44
Stanwix Bank, A7		36.13	31.03	29.80	23.96	18.75
Brampton Road		40.31	34.52	34.41	27.55	22.47

Table 5: Predicted nitrogen dioxide concentrations at selected receptors for the Action Plan scenarios for Currock Street

Receptor	Year	Scenario			
		Base	Part Congestion	Part Congestion, 50% HDVs	No Congestion
Currock Street	2006	37.00	31.13	26.23	24.54
Currock Street	2010	32.38	27.51	23.56	22.15

Tables 4 and 5 show that the construction of the Carlisle Northern Development Route and the South West Inner Relief Road has the potential to substantially reduce the nitrogen dioxide concentrations at relevant receptors in Carlisle. Reductions in nitrogen dioxide concentrations of 6 µg m-3 are possible along the A7 (on average) as a result of the 25% reduction to traffic flows. At the Currock Street receptor, nitrogen dioxide concentrations could be reduced by around 6 µg m-3 with partially reduced congestion. Reducing congestion along the A7 and Currock Street could reduce concentrations by 7 µg m-3 and by 10 µg m-3 if, in addition, the proportion of HDVs travelling along the route was halved. In an optimal scenario where congestion was removed entirely from the A7 and Currock Street locations, nitrogen dioxide concentrations are potentially reduced by 21 and 12.5 µg m-3 respectively.

Scenario results for AQMA's 3 & 4

Table 6 shows the results of modelling for the NO_2 concentrations within AQMA's 3 & 4 at the most sensitive receptors discussed in chapter 3. It considers the action plan scenarios for both 2007 and 2010 (2012).

Table 6 Predicted nitrogen dioxide concentrations at selected receptors for the action plan scenarios for Wigton Rd and Bridge St.

Receptor	Year	Baseline	Scenario 1	Scenario 2	Scenario 3
			25% reduction in daily traffic	S1 + 50% reduction in HDV	S1+ no congestion
Wigton Road (R7)	2007	50.4	44.2	35.0	30.6
Wigton Road (R8)		45.5	39.9	31.6	27.2
Wigton Road (R9)		46.2	40.5	32.1	27.5
Wigton Road (R10)		42.5	37.2	30.4	27.2
Caldcodes (R11)		42.2	37.0	29.5	25.7
Bridge Street (12)		44.5	39.0	32.5	34.7
Bridge Street (13)		40.1	35.2	29.0	27.2
Wigton Road (R7)	2010	44.7	38.9	30.7	26.8
Wigton Road (R8)		40.2	35.0	27.7	23.9
Wigton Road (R9)		40.7	35.5	28.1	24.2
Wigton Road (R10)		37.5	32.6	26.7	24.0
Caldcodes (R11)		37.1	32.4	25.9	22.7
Bridge Street (12)		39.4	34.4	28.7	30.5
Bridge Street (13)		35.3	30.8	25.6	24.0

Table 6 indicates a substantial reduction in nitrogen dioxide concentrations at the locations of the receptors in AQMA No.3 and AQMA No.4 after the beneficial impacts of the Carlisle Northern Development Route was considered. Reductions in nitrogen dioxide concentrations of 5 µg m-3 (on average) are possible along Wigton Road and Bridge Street as a result of a 25% reduction to traffic flows. At the receptors locations in Wigton Road, nitrogen dioxide concentrations could be reduced, on average, by around 13 µg m-3 in a scenario where traffic flows are reduced by 25% and HDVs are reduced by 50%. The effect of this scenario along Bridge Street could reduce concentrations by 12 µg m-3. In an optimal scenario where congestion is removed entirely from the Wigton Road and Brigde Street locations, nitrogen dioxide concentrations are potentially reduced by around 18 µg m-3 and 11 µg m-3 respectively.

Scenario results for AQMA's 5 & 6

Table 7 shows the results of modelling for the NO_2 concentrations within AQMA's 3 & 4 at the most sensitive receptors discussed in chapter 3. It considers the action plan scenarios for both 2007 and 2010 (2012).

Table 7 Predicted nitrogen dioxide concentrations at selected receptors for the action plan scenarios for Dalston Rd and London Rd.

Receptor	Year	Baseline	S1 - 25% reduction in queuing	S2 - 50% reduction in queuing	S1 + 25% reduction in HDV
Dalston Road (R1)	2007	44.6	42.1	39.3	39.1
Dalston Road (R2)		48.2	44.6	40.5	42.1
Dalston Road (R3)		47.8	43.4	38.3	41.1
London Road (R4)		38.5	37.5	36.5	34.5
London Road (R5)		40.9	40.0	39.1	36.8
London Road (R6)		39.7	38.9	38.1	35.8
Dalston Road (R1)	2010	39.6	37.3	34.7	34.6
Dalston Road (R2)		42.8	39.4	35.7	37.2
Dalston Road (R3)		42.3	38.2	33.6	36.2
London Road (R4)		33.8	33.0	32.1	30.4
London Road (R5)		36.0	35.2	34.4	32.4
London Road (R6)		34.9	34.2	33.5	31.5

A 25% reduction in queuing traffic is expected to reduce nitrogen dioxide concentrations at relevant receptors by around 4 µg m-3 in Dalston Road and by 1µg m-3 in London Road.

A 50% reduction in stationary traffic at the location of the receptors has the potential to reduce nitrogen dioxide concentrations by around 8 µg m-3 in Dalston Road and by approximately 2 µg m-3 in London Road.

An assumed 25% reduction in queuing traffic in addition to a 25% reduction in HDVs travelling along Dalston Road and London Road is expected to result in a reduction of 6µg m-3 in Dalston Road and 4 µg m-3 in London Road.

CHAPTER 10 - Monitoring and Evaluation

Air quality, within this local authority has been monitored routinely since the early 1960's following the introduction of the Clean Air Acts. Smoke and sulphur dioxide were the pollutants of concern at that time and the main indicators of air quality. Daily monitoring undertaken by Carlisle City Council recorded initial dramatic reductions in air borne concentrations, followed by continuing downward trends over the next 3 decades. During our Updating and Screening Assessment in 2003 it was decided to cease operating our sulphur dioxide and smoke monitoring station due to concentrations being so low.

Today the pollutant of most concern in Carlisle is nitrogen dioxide. The primary objective of this Action Plan is to reduce nitrogen dioxide levels in Carlisle and improve air quality generally. In order to evaluate the effectiveness of the Action Plan, Carlisle City Council will continue to monitor nitrogen dioxide levels in Carlisle with the use of diffusion tubes and our two continuous analysers. This will show whether the expected reduction is occurring and if nitrogen dioxide concentrations are being brought to within the objective levels.

In previous years there has been a noticeable downward trend in NO_2 levels in most monitoring locations across the district. This was particularly visible over the 3 years between 2007 and 2009. This was followed by an unexpected increase in NO_2 concentrations in 2010 in almost all areas of the district. It is believed that this was linked to adverse meteorological conditions in which the region experienced extensive periods of exceptionally cold weather in 2010. The freezing conditions and limited air movement caused poor driving conditions, increased congestion and slower traffic movement in busy areas. It is predicted that future levels will return to normal and should continue to follow the downward trend that was seen in previous years.

It is expected that this Action Plan will be in place for the next five years until 2017, to cover the implementation period of planned transport improvement measures, in line with the LTP (3) 'implementation plan'. The measures outlined within the plan will be reviewed annually as part of the Air Quality Review and Assessment process. The reports generated will review the extent to which the planned actions have been carried out as well as any changes such as expected completion dates and the achievements of each measure to date. If it appears that the reduction in NO_2 provided by the action measures is not sufficient then this action plan will be reviewed and any possible further measures will be investigated and implemented where possible.

The annual review and assessment reports will also detail the up to date measured concentrations of pollutants across our monitoring network and show trends in monitored pollutant levels over time. This will be the main indicator as to the success of the action plan and will ultimately provide the evidence to support any future decision to make alterations to the AQMA's within the district.