LANCASTER CITY COUNCIL

Promoting City, Coast & Countryside

Lancaster City Council

Air Quality Action Plan for Lancaster

Prepared by Environmental Health Services

Version 1.00

This document was prepared by the Pollution Control Team at Environmental Health Services in conjunction with a multi-agency air quality steering group.

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Abbreviations

AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
HDV	Heavy duty vehicle (also known as heavy goods vehicle)
LDF	Local Development Framework
LDV	Light duty vehicle
LTP	Local Transport Plan
NO2	Nitrogen dioxide
NOx	Oxides of nitrogen
PM10	Fine particulate matter with reference to air quality objectives

1. Executive Summary

In central Lancaster an air quality objective is being exceeded substantially in parts of a formally declared Air Quality Management Area, as reported previously in the council's Further Assessment[1] report. A range of policies, strategies and plans is already in place for transport planning, parking, cycling, walking, public transport and land-use planning. Despite this it evident that one of the air quality objectives is unlikely to be achieved in Lancaster. It is also clear that no actions have been identified that would make substantial progress towards achieving that objective.

This air quality action plan:

- Identifies and assesses potential air quality options for improving local air quality where it exceeds the maximum permissible annual average concentration of nitrogen dioxide as set in a air quality objective.

- Proposes for implementation those suggested options that are relevant to Local Air Quality Management, capable of bringing about improvements or enabling further actions to be brought forward that might do so.

A wide-ranging study is currently being undertaken by the Vision Board for Lancaster & Morecambe, commissioned jointly by Lancaster City Council and Lancashire County Council to identify medium and long-term potential solutions to transport-led problems including poor local air quality. This will play a key role in identifying and evaluating the feasibility of medium and long-term actions for reducing local air pollution due to road traffic in central Lancaster. Since this is the case and the Vision Board is due to report before the end of 2007, this Action Plan only addresses the interim actions that will be taken forward over the next 12 to 18 months and it will in any event require revision once further air quality actions become available.

2. Background

2.1 Duties for Local Air Quality Management

The UK Government has produced a national Air Quality Strategy[2] and air quality standards and objectives for protecting people's health in the outdoor air. The Environment Act 1995 introduced a system of Local Air Quality Management which obliges local authorities to periodically review and assess local air quality in their areas, declare air quality management areas where the prescribed objectives are not likely to be achieved, and work towards meeting them.

The Act is largely enabling and gives local authorities the flexibility to take forward local policies and actions that suit local needs. Local circumstances will also determine needs for declaring Air Quality Management Areas (AQMAs) and the content of Air Quality Action Plans (AQAPs).

Local authorities have a duty to declare as AQMAs those parts of their areas where the air quality objectives are not likely to be met. This applies only to locations where members of the public might reasonably be exposed for the period of the objective, whether an hour or a year.

A local authority declaring an AQMA must carry out a further, detailed assessment of local air quality before drawing up an AQAP. The AQAP must set out what the local authority intends to do in pursuit of the air quality objectives.

2.2 Requirements of air quality action planning

Where any of the air quality objectives are unlikely to be achieved and this is confirmed by Stage 4 'Further Assessment'[1], the local authority responsible for Local Air Quality Management is required to prepare a written Air Quality Action Plan for its Air Quality Management Area. This action plan must set out the actions it intends to take in pursuit of the air quality objectives, including a timetable for implementing the plan. Guidance on action planning is contained in Defra guidance notes[3,4]. Further guidance is provided by the National Society for Clean Air[5,6].

The Action Plan should contain the scenarios that have been modelled in the Stage 4 review and assessment. It should contain a summary of the air quality improvements that might be possible for each of the scenarios identified. The Stage 4 review and assessment provides the technical justification for the measures an authority includes in its Action Plan.

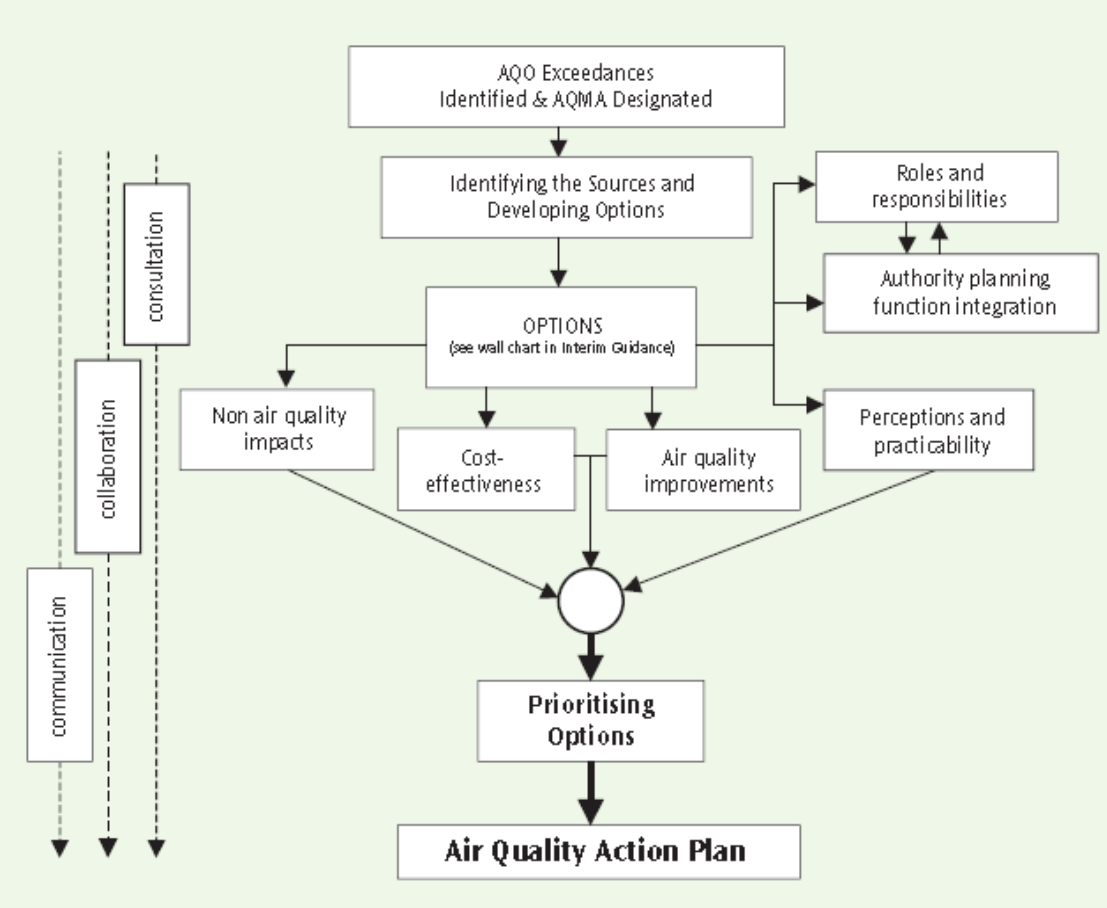
The Action Plan should also contain simple estimates of the costs and feasibility of implementing those scenarios. The Action Plan may also consider the non-health benefits of implementing scenarios in the Action Plan, for example, reductions in road traffic accident deaths as a result of road improvements that also reduce vehicle emissions.

The LA can then identify which scenario(s) offer the most cost-effective or cost-beneficial way of improving air quality.

Public consultation should be undertaken on the draft AQAP. This is important for establishing buy-in to the need for change to tackle unacceptable local air quality.

An outline of the action planning process is shown in Figure 1 below.

Figure 1. Outline of process for developing Air Quality Action Plans



Source: NSCA[6]

2.3 Review and assessment of local air quality in Lancaster

This section summarises the process followed, key actions and conclusions reached by Lancaster City Council during review and assessment.

2.3.1 Screening reviews and assessments of local air quality

The Council's early review and assessment work[7,8] determined that air pollution sources other than road transport were unlikely to cause exceedences of any air quality objective. This has been confirmed by subsequent reports[9,10]. However the exhaust emissions of nitrogen dioxide from road traffic in central Lancaster warranted a more detailed Stage 3 assessment.

2.3.2 Stage 3 assessment for Lancaster

Lancaster City Council's Stage 3 Review and Assessment report[11] produced for the council by NETCEN involved detailed modelling of nitrogen oxides at four locations:

- A6 (Great John Street)
- A6 (Owen Road near Skerton Bridge)
- A683 near Carlisle Bridge
- A589 including Shrimp Roundabout and junction with the B5273

The modelling predicted that it was *"probable that exceedence of the annual average objective for NO_2 would occur at the living accommodation along the A6 Parliament Street adjacent to Phoenix Street and the A6 Caton Road."* This location is at the intersection of the three loops of the gyratory system. The scope of the modelling of the gyratory system was limited, however, and the council wished to consider further the effects of traffic congestion, uphill gradients and road 'canyon' sections where dispersion was likely to be limited.

The Council decided to declare an Air Quality Management Area.

2.3.3 Declaration of an Air Quality Management Area in Lancaster

An Air Quality Management Area for Lancaster came into force on 12th March 2004 following the Council's Stage 3 Local Air Quality Management (LAQM) Review and Assessment report, which found risks of the annual mean air quality objective for nitrogen dioxide being exceeded in the vicinity of Parliament Street. That area encompasses the city centre gyratory system, extending 20m from the roadside and including any property partially encompassed by this area (see Figure 2 overleaf). The AQMA contains approximately 200 to 250 households, some of which are located one footpath width from heavily trafficked road sections.

Following this declaration the council extended its air pollution monitoring and placed a number of passive monitoring sites adjacent to residential properties within the AQMA.

2.3.4 Stage 4 Further Assessment of local air quality in Lancaster

The Stage 4 Further Assessment for Lancaster was undertaken by consultants from the University of the West of England's Air Quality Management Research Centre and completed in 2006.

The findings of the Further Assessment are reported in section 3.1.2

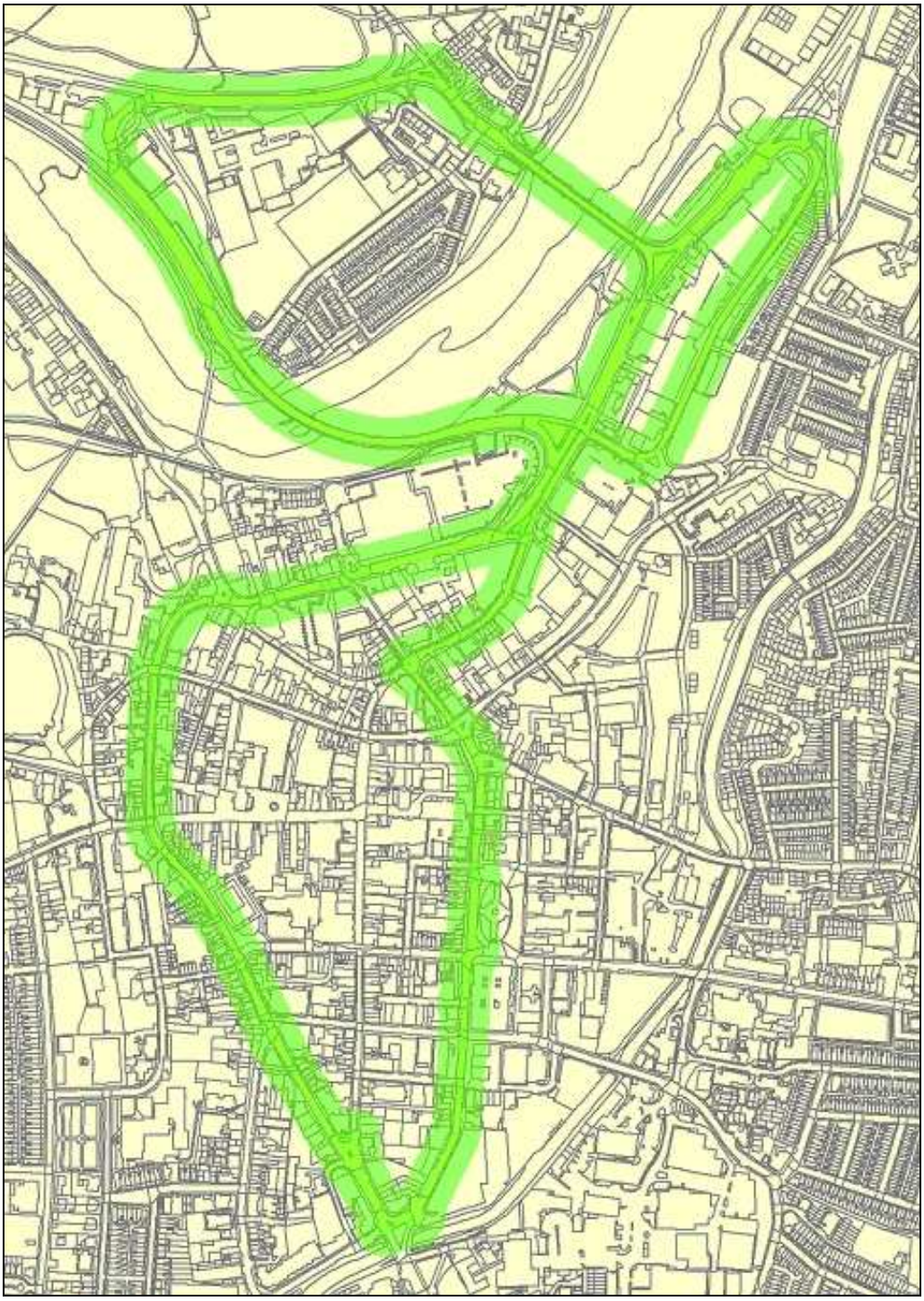
2.3.5 Physical monitoring of air pollution in Lancaster

The council monitors air pollution using a continuous monitoring station at Water Street in Lancaster together with diffusion tubes at around 24 locations in its area (including three tubes co-located with the Water Street automatic analyser). Nine of these are located within the AQMA and were brought into operation following the decision to declare it.

The results for the diffusion tubes within central Lancaster clearly indicate a relatively widespread potential for exceedences of the NO_2 annual mean objective concentrations all around the southern loop of the Lancaster gyratory system. The results also indicate concentrations approaching the objective limit (i.e. between 36 and 40 $\mu g/m^3$) being recorded at Owen Road on the north western loop of the gyratory system and at Caton Road on the north eastern loop.

The council intends to maintain existing monitoring locations within the AQMA and seek funding for a second continuous monitoring station for nitrogen dioxide in order to examine more closely local concentrations. Monitoring will also help to assess the effectiveness of actions to reduce air pollution exposure within the AQMA.

Figure 2. Map of Lancaster air quality management area (shaded)



2.3.6 Air quality management activity elsewhere in the Lancaster district

The council's review and assessment activity[9,12] has also identified likely exceedence of an air quality objective in central Carnforth, approximately eight miles north of Lancaster. This is not related to the air quality problem in central Lancaster and therefore not considered further in this action plan.

3. Statement of air quality problem

3.1 Main sources of air pollution within Lancaster AQMA

3.1.1 Background concentrations of air pollutants in the Lancaster district are relatively low by comparison with other parts of the country. Whilst they are elevated in Lancaster, they remain comparatively low compared with many parts of the south east and with major conurbations.

Review and assessment has confirmed that road traffic sources are causing the likely exceedence of the annual mean air quality objective for nitrogen dioxide in central Lancaster entirely due to local road traffic emissions.

The proportions of road traffic by sector that were employed for dispersion modelling purposes in the Further Assessment report are shown in Figures 3 and 4 below.

Figure 3. Graph showing 12 hour vehicle split in Lancaster City Centre (e.g. southern gyratory loop)

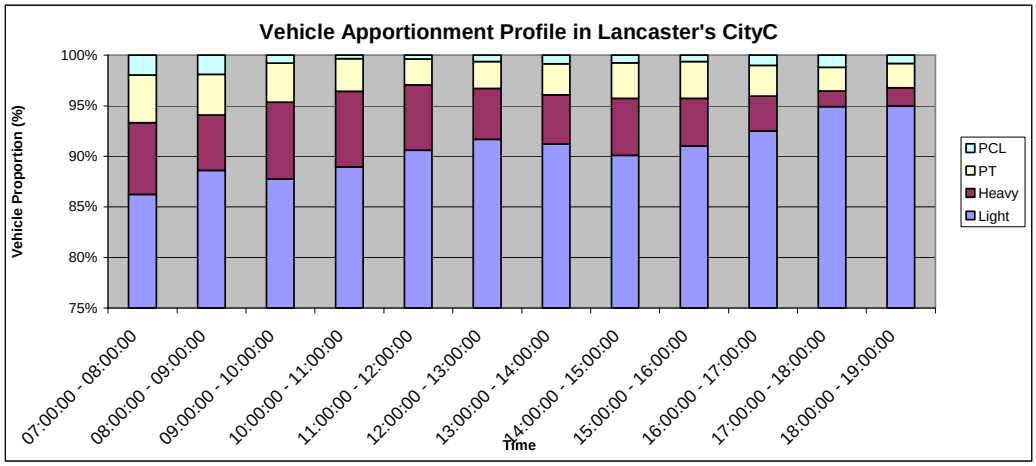
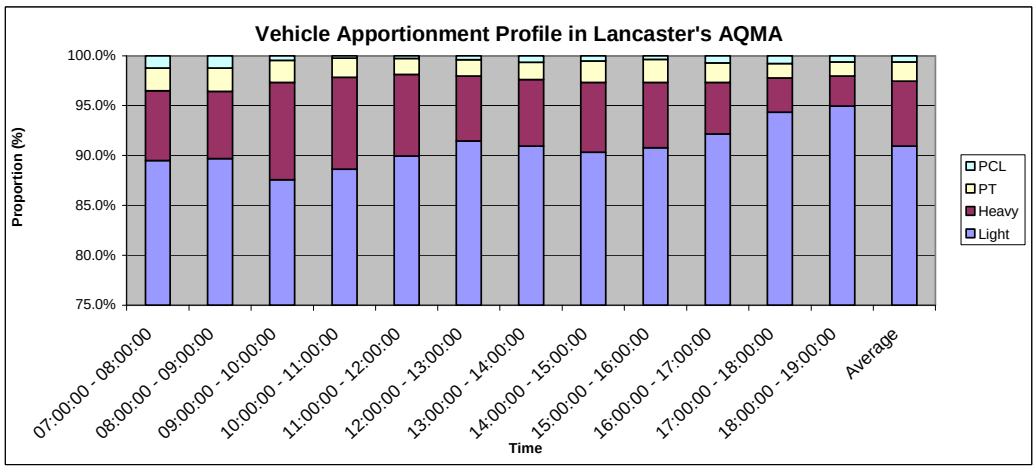


Figure 4. Graph showing estimated 12-hour vehicle split across whole gyratory/AQMA



Key to figures 3 and 4:
'Light' duty vehicles means cars and vans. 'Heavy' duty vehicles means lorries and buses. 'PT' means public transport. 'PCL' means pedal cycle.

3.1.2 The findings of the Stage 4 review and assessment can be summarised as follows:

- There are significant exceedences of the 2005 NO_2 annual mean objective occurring in Lancaster at locations where there is relevant exposure as defined by guidance (principally residential properties)
- These exceedences are occurring entirely within the current AQMA and there is no need to extend the current boundaries.
- There is also no evidence to suggest that the boundaries could/should be reduced. Although there has been some discussion of removing some or all of the North West loop of the Gyratory system from the Air Quality Management Area the modelling still suggests that there is some risk of objective exceedences occurring along the north edge of Owen Road. It would seem sensible to keep the AQMA based on the entire gyratory system as a cohesive road network, particularly with the school sited between Morecambe Road and Greyhound Bridge Road as children are particularly susceptible to air pollution
- At the various monitoring locations within the AQMA where NO_2 concentrations greater than 40µg/m^3 are being measured, estimates suggest that local emissions of nitrogen oxides (primarily from local roads) would need to be reduced by between 60 and 90% in order to meet the air quality objectives
- It is thought that the effects of congestion and gradients have a significant effect on vehicle emissions at various parts of the gyratory system (principally the eastern side of the southern loop). The congestion will exacerbate the effect of the gradient as vehicles will constantly be required to accelerate away from a standing start uphill. Therefore it is not expected that the 60-90% reduction in emissions relates to a 60-90% reduction in vehicle movements as lower flows would lead to more freely flowing traffic
- Despite Heavy Duty Vehicles only contributing to around 5-7% of vehicle flows, their large size and respectively greater emissions mean that this relatively small number of vehicles contributes over half of the nitrogen oxide emissions across the gyratory system. Therefore any measures considered in the action plan that could reduce the number of HDVs travelling around the southern loop of the gyratory system would be likely to have a large contribution towards meeting the air quality objectives

Appendix B indicates the extent of nitrogen dioxide concentrations based on modelling for 2004.

3.1.3 <u>Required reductions in NOx air pollution</u>

The Further Assessment report analysed the reductions in oxide of nitrogen air pollution that would be required in order to achieve the annual mean air quality objective for nitrogen dioxide in the Lancaster AQMA.

Without accounting for any reduction of background concentrations in future years, and based on the 2005 objective year scenario modelled in the Further Assessment, it is predicted that reductions in nitrogen oxide emissions of between 60 and 90% would be needed to achieve the air quality objectives.

The process for calculating required reductions is illustrated in Figure 5 below where sites in the first column refer to Lancaster City Council's air pollution monitoring locations.

Figure 5. Required NOx and NO_2 concentration reductions at each receptor point ($\mu g/m^3$ and %)

Site	Estimated Concentration NO_2			Estimated Concentration NOx			Required Reduction NO_2				Required Reduction NOx			
	Total	Bkgrnd	Roads	Total	Bkgrnd	Roads	Total		From Roads		Total		From Roads	
	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	$\mu g/m^3$	%	$\mu g/m^3$	%	$\mu g/m^3$	%	$\mu g/m^3$	%
1	63	24.7	38.3	**317.4**	40.5	276.9	23.0	37	23.0	60	243.8	**77**	243.8	**88**
5	38	24.7	13.3	**102.3**	40.5	61.8	No Reduction Required							
A	42	24.7	17.3	**126.7**	40.5	86.2	2.0	5	2.0	12	53.1	**42**	53.1	**62**
C	33	24.7	8.0	**75.7**	40.5	35.2	No Reduction Required							
G	37	24.7	12.3	**96.6**	40.5	56.1	No Reduction Required							
H	33	24.7	8.3	**75.7**	40.5	35.2	No Reduction Required							
I	44	24.7	19.3	**140.0**	40.5	99.5	4.0	9	4.0	21	66.4	**47**	66.4	**67**
J	60	24.7	35.3	**281.5**	40.5	241.0	20.0	33	20.0	57	207.9	**74**	207.9	**86**
K	49	24.7	24.3	**177.0**	40.5	136.5	9.0	18	9.0	37	103.4	**58**	103.4	**76**
L	58	24.7	33.3	**259.6**	40.5	219.1	18.0	31	18.0	54	186.0	**72**	186.0	**85**
M	52	24.7	27.3	**202.0**	40.5	161.5	12.0	23	12.0	44	128.4	**64**	128.4	**80**
N	51	24.7	26.3	**193.4**	40.5	152.9	11.0	22	11.0	42	119.8	**62**	119.8	**78**
Q	45	24.7	20.3	**147.0**	40.5	106.5	5.0	11	5.0	25	73.4	**50**	73.4	**69**

Yellow shading indicates site is not a 'relevant' location with regard to the annual mean NO_2 objective

Required Concentration		Total	Bkgnd	Roads
	NO_2	**40.0**	**24.7**	**15.3**
	NOx	**114.1**	**40.5**	**73.6**

3.2 Local factors to be taken into account

3.2.2 Congestion

Road traffic on Lancaster's central gyratory road system is prone to congestion, queuing and delayed journey times. These problems are neither continuous nor predictable with any certainty. However there are no alternative routes for local through traffic which cannot readily benefit from the M6 motorway located to the east of the city.

3.2.2 Topology

The gyratory system in Lancaster is comprised of three main one-way systems forming loops (as illustrated in the AQMA configuration in Figure 1):

- One to the north west incorporating Greyhound Bridge to the south and Skerton Bridge to the north. This loop is fed/supplies the A6 to the north and the A683;
- One to the north east incorporating Caton Road and Parliament Street and fed by/supplying the A683 leading north east to junction 34 of the M6;
- A southern loop going through the city centre feeding/supplied by the A6 (also leading to the A588) to the south.

The connections between these three loops have implications for road congestion especially when incidents and obstacles to road traffic occur.

3.2.3 Topography

The eastern (south-bound) A6 within the southern loop forming the main city centre gyratory slopes upwards. Traffic under stop-start driving conditions on these road sections will produce greater emissions than it would on level or downward sloping road sections.

3.2.4 Road 'canyons'

Sections of the city centre gyratory in Lancaster are relatively narrowly confined on both sides by buildings three or more storeys tall. In certain locations termed road 'canyons' these physical constraints are believed to limit the dispersion of locally generated air pollution from vehicle exhaust emissions. This may be one explanation for localised higher concentrations of nitrogen dioxide measured by the council.

4. Existing policies and strategies

4.1 Lancaster City Council

The council is already engaged in a range of policy and strategy areas relevant to the Lancaster AQAP, both individually and working together with partner agencies, stakeholders and the community.

4.1.1 Community Strategy

The Community Strategy was produced by the Lancaster District Strategic Partnership. Membership of this Local Strategic Partnership (LSP) includes representatives from community groups, the voluntary and business sectors and organisations in the public sector, such as the City Council, the County Council, Parish Councils, the Police, Fire Service, Health Service, local colleges and the University.

The Community Strategy contains a range of relevant objectives listed in Appendix A. These have typically been re-stated in the suggestions for air quality actions received during consultation and stakeholder engagement when preparing this action plan.

Implications for AQAP:
The AQAP will help to deliver against Community Strategy objectives and targets although it is noted that the Community Strategy addresses transport, access and economic prosperity issues as well as environmental and sustainability ones. No specific conflicts have been identified.

4.1.2 Local Plan

The existing Local Plan has a policy statement concerning local air quality:

"The City Council will seek to maintain or improve air quality wherever possible by resisting development which would result in unnecessary journeys."

This is not a formal policy but a statement designed to present an indication of corporate direction.

A new Local Development Framework is being prepared and the Core Strategy document was formally submitted to the Secretary of State in May 2007. This contains a specific policy CE1 with the stated purpose:

"***To support the District's Regeneration, improve residents Quality of Life and minimise the Environmental Impacts of Traffic."***

A copy of this proposed policy is contained in Appendix C.

In addition, through Development Control the council has identified air quality as a material consideration in a number of proposed developments, requiring air quality assessments to be undertaken and imposing planning conditions where necessary to protect the health and comfort of future occupants. Planning conditions relating to car parking space restriction, cycling facilities and pedestrian site access have also been imposed. These are in line with some of the suggested air quality actions proposed during consultation and stakeholder engagement.

Implications for AQAP:
The AQAP will help to deliver against Local Plan aims although it is noted that the Local Plan addresses transport, access and economic prosperity issues as well as environmental and sustainability ones. No specific conflicts have been identified. The AQAP will deliver directly against policy CE1 proposed for the Local Development Framework due to replace the existing Local Plan.

4.1.3 Parking Strategy

Lancaster City Council's cabinet approved a draft car Parking Strategy in April 2006 subject to review by an informal cabinet working group and external consultation. The strategy seeks better utilisation of existing space and a shift from long-term to short-term parking. It sets out a hierarchy for the strategic management of parking priorities :

1. Residents
2. Businesses, shoppers and visitors
3. Daily commuters

An action plan containing short, medium and long-term priorities is due to be finalised and approved in the near future with these key aims:

1. Maintain existing levels of short stay car parking to support shoppers, businesses visitors and residents
2. Where practical seek to ensure the replacement of any short stay car parking that is lost
3. Consider changes in short stay car parking space linked to redevelopment only after full impact analysis and due consideration of overall parking and traffic management issues
4. Review the use of existing car parking places to ensure the best use of space available

Implications for AQAP:
The Parking Strategy seeks to maintain existing capacity. Future revisions of the AQAP will need to consider this position carefully if demand management proposals are brought forward to incentivise modal shift towards alternative forms and modes of transport. At the present time no actions are proposed that would conflict with the Parking Strategy.

4.1.4 Cycling Strategy and Cycling Demonstration Town project

Lancaster City Council first published its Cycling Strategy in 1997. This was last reviewed in November 2002 and contains the following vision statement:

"A District within which cycling is a popular mainstream mode of travel for local journeys with safe and accessible routes through its urban centres."

The strategy aims to achieve this vision through the following aims:

1. Provide the corporate policy framework proposed by Lancaster City Council to promote cycling as a viable mode of transport.

2. Set out the strategic framework for seeking external funding for cycle improvements both from public funding agencies and through planning agreements in association with new development.

3. Co-ordinate all programmes of action both within and outside the Council which help promote cycling.

4. Set targets against which the effectiveness of the policies and associated action may be judged.

5. Outline potential and proposed cycle routes within Lancaster district which address deficiencies in the existing network.

More recently Lancaster became one of six 'cycling demonstration' towns attracting funding for three years through a successful application made by the Lancaster & Morecambe Economic Development Zone (EDZ) and Lancashire County Council to the Department of Transport / Cycling England. The Cycling Demonstration Town project[A] aims to show how increased investment can encourage more cyclists to get on their bikes. The funding provided will be spent on a range of measures including filling in the missing links in the district's cyclepath network, better signage, training in bike confidence and cycle maintenance, and better promotion of cycling.

Some cycle route improvements have already been completed to:

- Morecambe Promenade
- Lancaster and Morecambe Greenway Links
- Caton Road / River Lune Millennium Park
- Signage
- Lancaster Canal Towpath Improvements
- Ryelands Park

Further work is planned to Lancaster City Centre:

- Contraflow on Phoenix Street, Lancaster. Work expected to start autumn 2007.
- Lancaster City Council and Lancashire County Council have appointed consultants Mayer Brown to explore Lancaster's gyratory system and how it can be improved for, and/or penetrated by, cyclists.

Other work has reached consultation and design stages:

- Shared use footways on Caton Road and Morecambe Road
- Linking of promenade to Lancaster Canal via Rushley Drive, Hest Bank
- University route via Haverbreaks

Implications for AQAP:
The AQAP will help to deliver against these objectives. No potential conflicts have been identified.

4.1.5 Sustainability Partnership

Lancaster City Council's Sustainability Partnership works in support and delivery of the Local Strategic Partnership's aims and objectives. Its overall aim is to promote sustainable development across the district. In outline its objectives are to:

[A] For more information follow the 'Cycling & Walking' link from the home page of Lancaster City Council's website www.lancaster.gov.uk.

- Ensure the principles of sustainable development are understood and applied
- Encourage sustainability assessments in new and revised plans and policies
- Promote best practice sustainable development
- Support implementation of the Community Strategy objectives concerning sustainability

The Sustainability Partnership is supported by a Sustainable Transport Forum. The purpose of this forum promotes an integrated, sustainable, low-cost transport infrastructure for the district. Recent initiatives have involved:

- Helping to form a local Walking Strategy
- Steering the County Council's production of a cycling and walking map of the district
- Considering potential improvements to public transport

Implications for AQAP:
The AQAP will help to deliver against these aims and objectives. No potential conflicts have been identified.

4.1.6 Business Travel Plan

Lancaster City Council has prepared a Business Travel Plan in consultation with employees and members. The aim of the City Council's Business Travel Plan is to bring together a number of actions that will change the travel arrangements of its employees. The change being sought is to reduce car usage in favour of more sustainable methods of transport, such as walking, cycling and the use of public transport.

A supporting Business Travel Action Plan is being prepared and this may contain actions for:

- Reducing single occupancy vehicle travel
- Increasing cycling and walking rates
- Fleet management and driver awareness
- Use of public transport
- Changing the way employees and members work (e.g. video and remote teleconferencing, home working and hot desking)
- Marketing and promotion of alternative modes of transport for council business and commuting

Implications for AQAP:
An option has been suggested for the AQAP through which the council's own Business Travel Plan can be seen to set an example for other significant employers within the district. No conflicts have been identified.

4.1.7 Smoke control areas

The council has previously declared eight Smoke Control Areas. These do not impact directly on the AQAP which deals only with nitrogen dioxide.

Implications for AQAP:
The smoke control areas and this AQAP do not share any specific objectives. No potential conflicts have been identified.

4.1.8 Industrial pollution prevention and control

The council regulates pollution control standards and emissions from a range of industrial processes. However none have been identified individually as significant contributors to elevated nitrogen dioxide concentrations in the Lancaster AQMA.

Implications for AQAP:
Industrial pollution control and this AQAP do not share any specific objectives. No potential conflicts have been identified.

4.2 Lancashire County Council

Lancashire County Council has responsibility for highways management, road and public transport policy within the Lancaster district. It maintains and/or supports travel advice, information, marketing and promotion of public transport.

4.2.1 Local Transport Plan (LTP)

In 2006 Lancashire County Council finalised and published its Local Transport Plan for 2006 to 2011. Relevant sections are reproduced in Appendix D.

The Local Transport Plan identifies a number of possible actions:

- Heysham M6 Link road
- Cycling Demonstration Project
- Personalised Travel Planning
- Morecambe West End Neighbourhood Scheme (no effect in Lancaster)
- Park and Ride
- Intelligent Transport Systems (no significant effect presented)

Overall these schemes are predicted to lead to less than 1µg/m^3 reduction in concentrations of NO_2. This is currently less than the smallest reduction required at any of the monitoring locations included within the study.

The Further Assessment report prepared for Lancaster City Council will inform and help to develop actions for Lancaster's AQMA that can be fully integrated with the actions planned by the county council. It is anticipated that this detailed assessment will strengthen the effectiveness of schemes outlined in the LTP and lead to the development of further actions.

Implications for AQAP:
The Local Transport Plan is the primary strategy vehicle for delivering improvements in the planning of road traffic, and therefore the causes of poor local air quality within the Lancaster AQMA. Through the work of the steering group the options considered in this AQAP reflect LTP considerations of air quality. Opportunities for further integrating the AQAP and LTP may arise in the future however it is recognised that some aspects of the AQAP extend more widely than road transport and care will be needed.

4.2.2 Structure Plan

No identified policies or strategies that directly concern the AQAP have been identified in the county council's Structure Plan.

Implications for AQAP:
No specific shared objectives have been identified. No conflicts have been identified.

4.2.3 Minerals & Wastes Plan

No identified policies or strategies that directly concern the AQAP have been identified in the county council's Minerals & Waste Plan.

Implications for AQAP:
No specific shared objectives have been identified. No conflicts have been identified.

4.2.4 Lancashire Environment Strategy

In December 2003 the Lancashire Local Agenda 21 Strategy was dissolved and absorbed within the community planning process. Many of the social and economic elements of sustainable development have now been framed within other strategies and programmes and then absorbed within community strategies.

The Lancashire Environment Strategy[13] was developed as a similar approach for objectives relating to environmental sustainability, providing an over-arching framework to protect and enhance Lancashire's environment.

This contains the following objectives and actions which may be relevant to the AQAP:

Reducing dependence on private car use

- *1.5.1 Provide a more integrated transport network with even provision across different locations*
- *1.5.2 Provide accurate and up-to-date travel information including real-time information at rail stations and bus stops*
- *1.5.3 Ensure cycle and pedestrian provision is integrated into highway improvement schemes and is well monitored and maintained*
- *1.5.4 Provide appropriate well maintained facilities for non-car users, e.g. bus shelters, cycle parking*
- *1.5.5 Encourage the development and implementation of green travel plans, particularly school travel plans*
- *1.5.6 Reduce the need to travel, e.g. promotion of teleworking, video conferencing, provision of council services electronically*
- *1.5.7 Promote 'good health' via sustainable transport*
- *1.5.8 Promote the 'Road User Hierarchy'*
- *1.5.9 Promote local tourist destinations for local groups to reduce dependence on travel and stimulate the local tourist economy*

Reducing the levels of air pollution from transport

- *2.2.1 Promote responsible car use and maintenance to minimise emissions from motor vehicles*
- *2.2.2 Develop Air Quality Management Plans where appropriate*
- *2.2.3 Encourage uptake of alternative fuels in commercial vehicle fleets*
- *2.2.4 Encourage rail freight and other alternative freight delivery methods*
- *2.2.5 Reduce food miles through local food projects*

Implications for AQAP:
The AQAP will help to deliver against objectives and targets in the Lancashire Environment Strategy as far as the Lancaster AQMA is concerned although it is noted that the Community Strategy addresses transport, access and economic prosperity issues as well as environmental and sustainability ones. No specific conflicts have been identified.

4.2.5 Travel Plan

Lancashire County Council has a Travel Plan in place for employees and members.

Implications for AQAP:
The county council's own Travel Plan sets an example for other significant employers within the district insofar as the county has local employment bases. No conflicts have been identified.

4.3 Highways Agency

The Highways Agency has been consulted and, routine highway management activities aside, it has no identified policies or strategies that would have any significant implications for local air quality in the Lancaster district. The major roads in the Lancaster district that fall under the jurisdiction of the Highways Agency do not have significant direct implications for the Lancaster AQAP.

Implications for AQAP:
No specific shared objectives have been identified with explicit reference to the Lancaster AQMA. No conflicts have been identified.

4.4 Environment Agency

The Environment Agency has been consulted and, routine pollution control activities aside, it has no identified policies or strategies that would have any significant implications for local air quality in the Lancaster district. The industrial sites subject to Environment Agency air pollution regulation that lie close to central Lancaster do not have significant emissions of nitrogen dioxide so as to have significant implications for the Lancaster AQAP.

Implications for AQAP:
No specific shared objectives have been identified with explicit reference to the Lancaster AQMA. No conflicts have been identified.

4.5 Neighbouring local authorities

Lancaster City Council is bounded by four neighbouring district tier local authorities: Craven District Council, Ribble Valley District Council, South Lakeland District Council and Wyre Borough Council.

None have any identified policies or strategies that would have any significant implications for local air quality in the Lancaster district. None have major new developments proposed that would have significant implications for local emissions of nitrogen dioxide air pollution.

Implications for AQAP:
No specific shared objectives have been identified with explicit reference to the Lancaster AQMA. No conflicts have been identified.

4.6 North Lancashire Primary Care Trust

The primary care trust has been consulted and it has no identified policies or strategies that would have any significant implications for local air quality in the Lancaster district. It is, however, a substantial employer within the district and may be considered in a Travel Planning context.

Implications for AQAP:
No specific shared objectives have been identified with explicit reference to the Lancaster AQMA. No conflicts have been identified. No conflicts have been identified.

The primary care trust's travel planning provides an opportunity to set an example for other significant employers within the district insofar as the trust has local employment bases.

5. Air quality measures considered

5.1 Sources of identified air quality measures

5.1.1 Guidance on preparing AQAPs[3] does not specify which measures should be included or excluded. It only requires that they should be 'available' and meet standard tests for inclusion. These state that options should be clear, reasonable, workable and achievable.

5.1.2 Suggested measures were sought through public consultation, direct contact with residents within the air quality management area, from officer suggestions and contact with partner agencies. The results of public consultation are summarised in Appendix E.

5.1.3 A further opportunity was presented by the Vision Board's transport stakeholder working group which has drawn on the views of wider agencies, organisations and interest groups. As a result a 'long list' containing all suggested measures was drawn up to assist the multi-agency officer steering group responsible for drafting an AQAP. In line with the Vision Board's intention, stakeholders did not limit their suggestions to incremental changes or existing funding. Instead, many suggestions involve major and aspirational changes to local transportation systems.

5.2 Issues affecting selection of air quality measures for the AQAP

The steering group addressed three current issues before deciding which suggested measures should be taken forward to detailed consideration in developing the draft AQAP:

5.2.1 Vision Board for Lancaster & Morecambe

This is a transport strategy funded between Lancaster City Council and Lancashire County Council. It is intended to identify and develop long-term solutions to congestion and constraints on economic development and quality of life for communities in and around the urban conurbation of Lancaster, Morecambe and Heysham. The Vision Board is due to report late in 2007 but outside the timescale proposed for preparation of a draft AQAP. In the meantime no long-term solutions have been tabled which could be either implemented immediately or taken forward with confidence that all air quality objectives will be achieved. Instead it is proposed that this AQAP serves as an interim plan to be reviewed and revised with a full assessment of longer-term measures at the earliest appropriate opportunity once the Vision Board's identified solutions, feasibility analysis and recommendations become available late in 2007.

5.2.2 Proposed Heysham M6 link road

This proposed development may have implications for air quality action planning but is presently subject to a planning inquiry, has not yet received assured funding, and would in any event be a minimum of five years from construction. Given this lack of certainty and a more appropriate decision-making system, it appears inappropriate to address this proposal in the draft AQAP at this time.

5.2.3 Major new developments

Major new developments where proposed but not yet subject to planning permission may have implications for local air quality. However they will be subject to the separate, rigorous, development control decision-making regime where air quality is already material consideration. Given the lack of certainty over proposed new developments and the jurisdiction of a separate dedicated decision-making system, it appears inappropriate to address such proposals in the draft AQAP at this time. Where major new developments have already received local air quality consideration and planning permission, but have yet to be completed, their likely impacts will be reflected in development of the AQAP.

5.3 Consideration of suggested air quality measures

5.3.1 For reasons outlined above, the council working with partner agencies has decided to take forward at this time all those suggested options which are relevant to local air quality management and capable of being implemented at this time. The remaining options are either not achievable at the present time, not funded, or not relevant to local air quality management.

The individual assessment of optional actions is dealt with in section 6.

5.4 Short-listed options for reducing air pollution in the Lancaster AQMA

The council working with partner agencies has decided to take forward the following 19 options for improving air quality within the Lancaster AQMA.

Road transport access and highway management

Action 1
Review Lancaster city centre highway network (gyratories, optimisation of signal control, etc.) to identify potential for reducing road traffic emissions contributing to air quality objective exceedences.
Source: Public consultation and Vision Board transport strategy workshop

Action 2
Implement city centre parking strategy to assist the incentivisation of modal shift away from the private car (connected with existing action).
Source: Vision Board transport strategy workshop

Action 3
Conduct a strategic signing review (e.g. tourist / freight traffic) to minimise avoidable unintended vehicle journeys within the AQMA.
Source: Vision Board transport strategy workshop

Action 4
Review freight and servicing vehicle access to city centre retail premises in order to identify potential for reducing vehicle exhaust emissions contributing to AQO exceedences.
Source: Vision Board transport strategy workshop

Action 5
Explore the potential for highway network management to incorporate 'red routes' minimising travel times and delays for bus public transport and incentivising modal shift from private car towards public transport.
Source: Vision Board transport strategy workshop

Public transport

Action 6
Establish a statutory 'Quality Network Partnership' for bus-related public transport serving the Lancaster and Morecambe urban areas to provide a framework for further measures incentivising bus travel.
Source: Lancashire County Council

Action 7
Introduce a smart ticketing system for public travel by Stagecoach buses with benefits of incentivisation and reduced boarding and waiting times.
Source: Lancashire County Council

Action 8
Explore the feasibility of, and options for, Park and Ride schemes to serve Lancaster city centre (subject to decision on Heysham M6 link road) to identify potential for modal shift ways from private car to bus for journeys terminating in central Lancaster.
Source: Lancashire County Council

Action 9
Explore with train operators the potential for improved local rail services in the Lancaster and Morecambe area to support and incentivise modal shift from the private car.
Source: Lancashire County Council

Alternative modes of private transport

Action 10
Identify and explore opportunities for improved access to and use of Lancaster canal towpaths and River Lune cycle/paths to incentivise modal shift away from the private car for shorter journeys – for travel journeys involving both Lancaster and Morecambe (partly connected with the Cycling Demonstration Town project).
Source: Vision Board transport strategy workshop

Action 11
Complete a District Signage Scheme to facilitate and promote cycling and walking in Lancaster and Morecambe (connected with the Cycling Demonstration Town project).
Source: Vision Board transport strategy workshop

Action 12
Provide high quality, secure cycle parking in appropriate locations to incentivise journeys into Lancaster by bicycle (connected with the Cycling Demonstration Town project).
Source: Vision Board transport strategy workshop

Travel planning

Action 13
Review and promote Personalised Travel Planning and car sharing to promote and incentivise modal shift away from the private car.
Source: Vision Board transport strategy workshop

Action 14
Increase the number of travel plans employed by existing businesses and new developments (incorporating targets stipulated in planning conditions for new developments) to minimise numbers of avoidable private car journeys contributing to traffic flows and congestion in Lancaster.
Source: Vision Board transport strategy workshop

Action 15
Maximise the effectiveness of Lancaster City Council's own employee and member Travel Plan to minimise numbers of avoidable private car journeys contributing to traffic flows and congestion in Lancaster.
Source: Public consultation

Action 16
Explore the feasibility of establishing local car clubs to reduce individual demand for private car ownership.
Source: Vision Board transport strategy workshop

Highway and land use planning

Action 17
Develop specific planning policy requiring the establishment and maintenance of viable car pooling schemes in new developments of sufficient size to reduce individual demand for private car ownership.
Source: Lancaster City Council

Action 18
Explore the feasibility and benefit offered by roadside emission testing to enforce legal restrictions on permissible road traffic exhaust emissions, in order to promote individual attention to private car engine maintenance and disincentivise the continued running of vehicles that fail to comply.
Source: Lancaster City Council

Action 19
Review local planning policy on air quality and road transport within the Lancaster district to identify and explore any opportunities for further strengthening planning controls over road transport trips generated by new developments.
Source: Lancaster City Council

5.5 Additional actions for measuring the effectiveness of the AQAP

The following measures are proposed to help measure reductions in road traffic volumes and emissions in order to gauge the effectiveness and progress of the AQAP and individual measures.

Action 20
Maximise air pollution monitoring within the AQMA to inform decisions and monitor progress towards achieving the air quality objective currently exceeded in central Lancaster, and specifically establish a readily moveable second continuous monitoring station.
Source: Lancaster City Council

Action 21
Optimise and extend where possible continuous road traffic measurement within the Lancaster AQMA with a view to supporting further assessment and enabling the effectiveness of AQAP measures to be assessed.
Source: Lancashire County Council

6. Assessment of air quality measures

6.1 **Assessment of Actions 1 to 19** (at paragraph 5.4)

The council working with partner agencies is required to assess the impacts and costs of proposed actions for reducing air pollution in working towards meeting the air quality objectives. This process has been conducted as outlined at 6.3.1 to 6.3.4 below and summarised in the action checklist contained in Appendix F.

6.1.1 Anticipated air quality improvements

The combined schemes contained in the Local transport Plan (see paragraph 4.2.1) are predicted to lead to less than 1µg/m^3 reduction in concentrations of NO_2. This is currently less than the smallest reduction required at any of the monitoring locations included within the study and whereas a reduction of more than 20µg/m^3 may be required in places to achieve the air quality objectives.

On this basis it has not been practicable to provide accurate estimates of nitrogen dioxide reductions achievable from even those proposed actions which would deliver a tangible impact. For the remaining actions which involve 'enabling' studies, it will be the resulting practical proposed actions which are suitable for closely estimating pollution reductions.

Instead an approach has been taken where improvements are rated according to how favourable they are towards facilitating future air quality improvements. For example Action 1 involves a review of highway management of the gyratory system with reference to insights obtained through the Further Assessment. This review cannot in itself improve air pollution levels but it can help to identify where improvements might best be made.

The potential indirect air quality positive impact of each action, both within and outside the Lancaster AQMA, have been rated using the following key:

✓✓✓✓	Large
✓✓✓	Moderate
✓✓	Small
✓	Very small
-	None / negligible

6.1.2 Costs of each action

Costs have been estimated for each action using the following key:

> £10 million	£££££
£1 – 10 million	£££££
£100k – 1 million	££££
£10 – 100k	£££
£1 – 10k	££
> £1k	£
None / negligible	-

6.1.3 Cost effectiveness of actions

The general cost effectiveness of each Action 1 to 19 has been assessed considering the positive impact within Lancaster AQMA, using the matrix in Figure 6 overleaf. In each case effectiveness has been rated as outlined at 6.1 and cost as outlined at 6.2.

The results of cost effectiveness assessment of the measures are contained in Figure 3 where each numbered measure is identified in the appropriate scoring box.

Figure 6. Cost effectiveness of implementing the identified air quality measures (in the context of securing reductions in directly relevant air pollution within the Lancaster AQMA)

Effectiveness / Cost	None / neg.	Very small	Small	Moderate	Large
None / neg.		17	19		
> £1k		15		5	
£1 – 10k		2, 16	4, 9, 18		
£10 – 100k		3	6,7,8,10 11,12,13,14	1	
£100k – 1 million					
£1 – 10 million					
> £10 million					

6.1.4 Wider impacts

The wider, negative impacts of each Action 1 to 19 have been assessed and noted. Due to the predominance of enabling measures, however, few actions have real impacts and this is reflected in their assessment. Wider negative impacts have been summarised in words and rated using the following key:

Large	××××
Moderate	×××
Small	××
Very small	×
None / negligible	-

6.2 Ranking of options

Following air quality impact assessment, cost rating and wider impact identification, the proposed Actions 1 to 19 were ranked as follows:

1. In order of cost effectiveness actions are ranked according to the colour shading of the box in Figure 6 in which it is placed:

Green	–	higher
Yellow	–	medium
Red	–	lower

2. For actions of equal colour shading, ones with higher rated effectiveness in reducing air pollution within the AQMA score highest.

3. For actions that continue to score equally, ones with higher rated effectiveness outside the AQMA score highest.

4. For actions that still cannot be differentiated in ranking, an inspection of negative impact is used (least negative impact scores highest).

5. Finally, for actions continuing to score equally, rankings are assigned according to support for existing policies and strategies, particularly where enabling measures are likely to lead to positive new future actions.

7. Air quality actions to be taken forward in this Action Plan

7.1 The council working with partner agencies has considered all the actions that have been identified and that appear appropriate to take forward in this action plan, bearing in mind the current work of the Vision Board jointly funded by Lancaster City Council and Lancashire County Council to identify and assess longer-term solutions to transportation and local air quality problems. It will be important to review this action plan once the Vision Board has reported its findings.

7.2 The council working with partner agencies is satisfied that none of the proposed actions has disproportionately negative wider impacts so as to rule it out. Similarly, no action has been ruled out due to disproportionately high cost compared to benefit. The ranking of options serves for information only in this AQAP because the council and partners assigned responsibility for their implementation have already agreed to complete them within agreed timescales.

7.3 The final list of actions to be taken forward in the draft Air Quality Action Plan is that at paragraphs 5.4 and 5.5. The responsible organisation and the timescale for implementing each action are identified against it in Appendix F.

7.4 The council will carry out public and stakeholder consultation on this draft AQAP and seek to encourage public participation. The draft AQAP will be reviewed in the light of consultation responses received.

8. Conclusions

Problems of road traffic congestion and unreliable journey times into and through Lancaster are well known. Perhaps less well known until recently was the extent of poor local air quality. This has now been quantified in the council's Further Assessment report. A shared understanding has been developed with partner agencies.

Whilst a range of strategies is already in place the council working with partner agencies, stakeholders and the community does not have adequate answers to these problems. However it is committed through this AQAP and other strategies identified at 4.1 to work towards acceptable solutions. This will not be easy and few practical actions have been identified that can be taken forward in the AQAP at this time.

Substantial common ground does appear to be identifiable amongst stakeholders. This indicates that there may be good support for the work of the Vision Board for Lancaster & Morecambe which is charged with identifying long-term solutions that are feasible and potentially affordable.

With this in mind, and though unusual, the council together with partner agencies is proposing an interim AQAP pending the outcome of the Vision Board's work later in 2007. In the meantime the enabling actions which are proposed here will enable a number of practical measures to be developed and tested for consideration in the near future.

There may be areas of policy and strategy where objectives conflict. The council proposes separately from this AQAP to establish a Local Air Quality Forum where shared understanding, consensus building and lasting well-supported solutions can be developed.

Appendices

Appendix A
Relevant objectives contained in the Community Strategy

5(a) Improve the provision, integration and use of road, rail, cycling and walking networks by:

- Implementing M6 link road and river crossing.
- Developing and producing an integrated transport plan for the district.
- Working with public transport agencies to improve integration, reliability, affordability and promotion of public transport services and public transport information throughout the district.
- Working with the Strategic Rail Authority, Network Rail and train operating companies to improve train services, including a mainline stop at Carnforth.
- Identifying and providing improvements to buildings and other developments that contribute to the integration of the transport networks.
- Bring about a sustained reduction in traffic levels in Lancaster City Centre.
- Conducting a feasibility study into the possibility of additional rail stations and freight link at Heysham, Hest Bank, the University and other areas to encourage the movement of goods and people.
- Improving the quality of rural access roads and flexibility of public transport for the rural areas.
- Identifying, securing funding and developing sites within the district for coach drop off points and dedicated coach parking for Lancaster, Morecambe and Carnforth.
- Conducting a feasibility study into a Park and Ride Scheme including park and ride and park and walk schemes on the south of Lancaster City and implementing if feasible.
- Improving the transport links between the railway station and the centre of Lancaster, between the bus and train stations and the Royal Lancaster Infirmary (RLI), and between rural train stations and nearby settlements and services.
- Introduce an Intelligent Transport Systems e.g. for car parking availability, estimated travel times.

5(b) Improve safety of highways and traveling in the District by:

- Reducing speed through better enforcement and introducing more 20 mph zones. including in rural areas.
- Improving road safety education by strengthening links with the Lancashire Partnership for Road Safety and other partnerships.
- Improving public transport and road safety for people with a physical disability or sensory impairment.
- Introducing community safety initiatives such as better lighting, maintenance and development of pavements and extensions of cycle path network.

5(c) Encourage people travelling to work and school to use alternatives to the private car by:

- Encouraging schools to adopt School Travel Plans leading to further Safer Routes to Schools initiatives.
- Encouraging local employers, organizations including private, voluntary and public, individually and collectively to develop and implement Business Travel Plans.
- Developing an overall parking strategy to manage demand.

5(d) Reduce pollution arising from travel by:

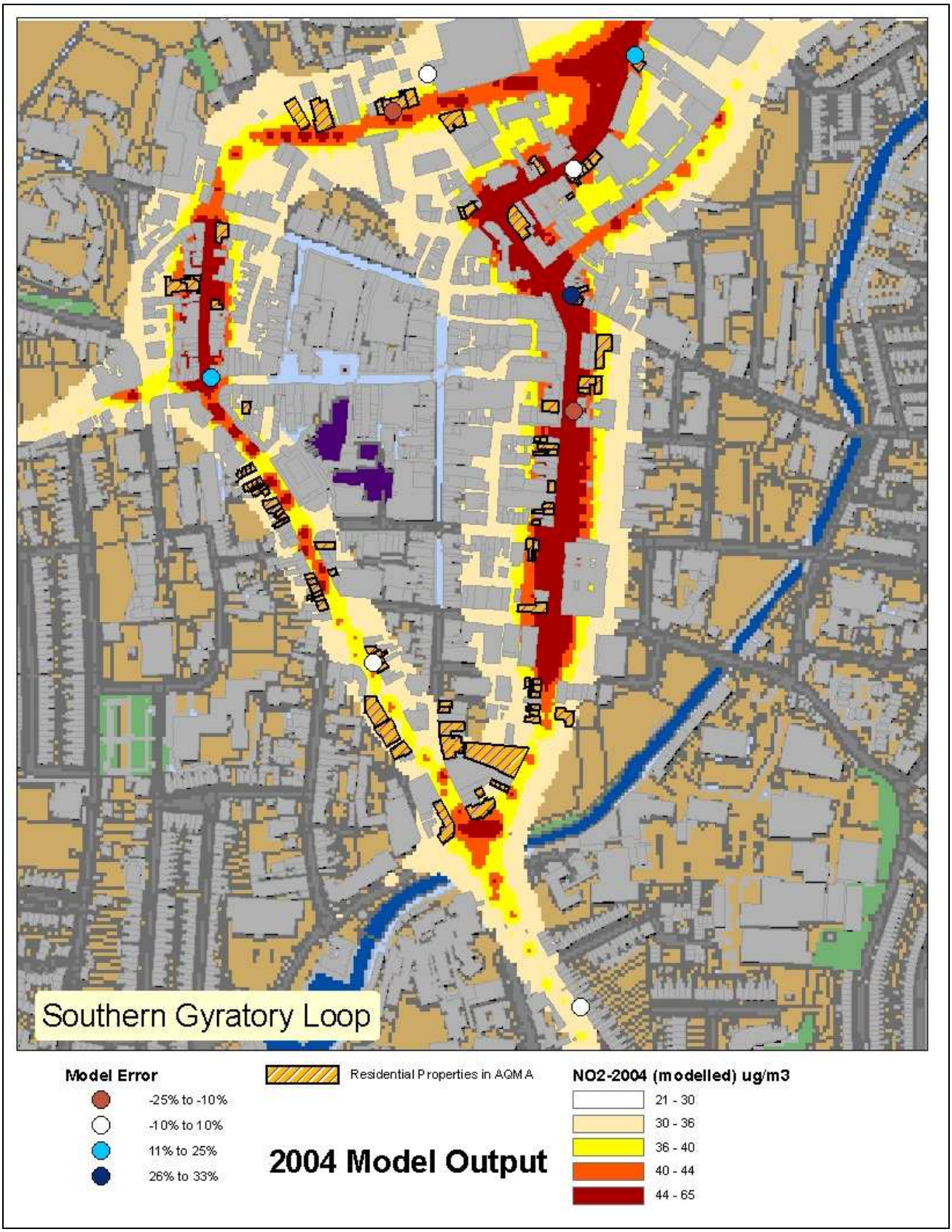
- Developing local initiatives to reduce air pollution arising from transport.

7(d) Reduce pollution to water air and land by:

- Minimising the impacts of Climate Change e.g. by reducing Greenhouse Gas emissions -promoting sustainable transport, energy efficiency and recycling.
- Implementing the Environmental Protection Strategy.

Appendix B

Modelled nitrogen dioxide (NO_2) concentrations over the southern section of Lancaster's gyratory system (the city centre ring road) for 2004



Appendix C

Extract from Local Development Framework Core Strategy (submitted)

Policy CE 1

TRANSPORTATION MEASURES

Purpose: ***To support the District's Regeneration, improve residents Quality of Life and minimise the Environmental Impacts of Traffic.***

The Council will minimise the need to travel by car by:

- **Focusing development on town centres and locations which offer a choice of modes of transport and resisting major development in car dependent locations;**
- **Improving walking and cycle networks, creating links and removing barriers and ensuring that development is integrated with pedestrian and cycle networks;**
- **Protecting land for strategic transport improvements such as the Heysham-M6 Link;**
- **Monitoring vehicle technological change and providing for low-emission vehicles;**
- **Reducing local traffic impacts through the Lancaster Air Quality Management Plan;**

Ensuring all major development proposals are accompanied by enforceable measures to minimise the the transport impacts of development, including Business Travel Plans and contributions to appropriate off-site measures.

The Council will work with partners to promote the following transportation measures:

- **Better access to White Lund, South Heysham and its Port via the Heysham/M6 link;**
- **Better public transport between Heysham, Morecambe, Lancaster City Centre and University, more 'Quality Bus' services and, after completion of the Heysham/M6 link, more road space for buses, and other innovative solutions;**
- **Innovative rural transport initiatives such as Carnforth Connect;**
- **Integrating the provision and management of car parking and park and ride in Lancaster and Morecambe and managing parking (including disabled parking) in association with development;**
- **Innovative traffic management solutions such as Intelligent Transport Systems;**
- **Addressing the problems of lorry traffic in Carnforth by rationalising land uses and using road capacity freed up by the Heysham/M6 link;**
- **Investment in local freight and passenger rail services and additional halts.**

TARGETS (2003-2021)	INDICATORS
1.1 a-e) Public Transport Accessibility; *1.2 a-b) Cycle accessibility;* *1.4 a-c) Urban Concentration;* *3.4 a) Integrated Transport Study;* *3.4 b) Heysham-M6 Link Road;* *3.4 c) Cycling and Walking Networks;* *3.4 d) Travel to work by bicycle;* *3.4 e) Travel to work by foot;* *3.4 f) Traffic flows in central Lancaster;* *4.1 a-c) Access to services;*	*Progress on Heysham-M6 Link proposals;* *Quality Bus Routes;* *Quality Bus Patronage;* *Local Rail Patronage;* *Business Travel Plans approved;* *Cycle route length;*

(continued overleaf)

MILESTONES	IMPLEMENTED BY	MEANS
LMV Transport Study Completed Autumn 2007 *Local Transport Plan Approved January 2007* *Cycling Strategy Reviewed 2009* *City Centre Cycle Strategy completed Autumn 2007* *Heysham-M6 Link – Permission Granted Spring 2008;* *Heysham-M6 Link – Work Commences Spring 2010;* *Heysham-M6 Link – Completed – Summer 2012;*	*LancashireCounty Council;* *Private/Public partnership;* *LancasterCity Council;* *Lancaster and Morecambe Vision;* *Rail and Bus Operators;* *Cycling and Walking Groups;* *One Voice;*	*Local Transport Plan* *Cycle Strategy* *Walking Strategy* *Planning obligations* *Parking Strategy*

Appendix D

Extract from Local Transport Plan (2006) concerning local air quality in Lancaster

The following information extracted directly from the Lancashire County Local Transport Plan is as referenced in the council's Further Assessment report[1].

The following table is the summary of the air quality and traffic data within AQMAs. Where available, individual trajectories are shown. To indicate the overall level of success in improving air quality within Lancashire, combined air quality within Lancashire's AQMAs has been calculated, giving a Lancashire trajectory. A graphical representation of the Lancashire average exposure per resident to oxides of nitrogen is included in the AQMA section in the District chapters.

Table 9.7.4 Air Quality and Traffic Flows on Primary Links within AQMAs

Air Quality and Traffic Flows on Primary Links within AQMAs									
Location and Population within AQMA	**Traffic Flow and Air Quality**	**2003/4 Observed**	**2004/5 Base year**	**Trajectory**					
				2005/6	**2006/7**	**2007/8**	**2008/9**	**2009/10**	**2010/11**
Lancaster (Action Planning not complete)									
City Centre Gyratory	NOx mg/m^3	43	41	41	40.8	40.6	40.4	40.2	40.1
	AADF NB		20200	20200	20031	19862	19693	19524	18024
	SB		16190	16110	15941	15772	15603	15434	16934
Population 455	7-10am		3620	3560	3445	3330	3215	3100	3427

Notes

AADF = Annual Average Daily Flow 2 way, except Lancaster which operates as a gyratory
7-10am = Inbound flow only
DO = Do nothing (applies the Lancashire average current rate of air quality change)
RR = Required reduction to satisfy National Air Quality Strategy objectives
(1) Measures include only those indicated in the Lancaster chapter. Further measures that will be included in the developed Action Plan.
(2) AQMAs excluded from average exposure calculation as they would artificially reduce overall values.
(3) Values estimated.
(4) Average Exposure per AQMA resident uses the following equation and is applied to each assessed year.

$$\frac{\sum_{i=1}^{n} (NO^{x}_{i} \times Pop_i)}{\sum_{i=1}^{n} Pop_i}$$

where n = number of AQMA
and Pop = population of each AQMA.

9.7.5 LTP8: Lancaster Mean Resident Exposure Reduction within AQMA

The following table indicates the calculated air quality impacts from packages of work on the City Centre AQMA. The impact of other schemes will be included when the Action Plan is accepted. A number of the identified schemes in the District Chapters have secondary benefits to air quality. In Lancaster, the Heysham M6 link benefits particular corridors including both river crossings but has only a slight impact on town centre movements and air quality.

Table 9.7.5a Lancaster: Annual Mean Resident Exposure Reduction within AQMA

Lancaster: Annual Mean Resident Exposure Reduction within AQMA	
Package/Scheme	**Reduction NO_2 µg/m^3**
Heysham M6 Link	0.1
Lancaster City Centre Air Quality Zone	To be determined
Cycling Demonstration Project	0.1
Personalised Travel Planning	0.3
Morecambe West End Neighbourhood Scheme	Not Applicable
Park and Ride	0.4
ITS	Not Applicable
Total	**0.9**

The above impacts have been included in the ‘do-something’ trajectory which assumes that traffic growth is restrained and that the measures implemented reduce the AADF. The ‘do-nothing’ trajectory assumes the AADF growth will occur at the same rate as per the previous 5 years. Currently this is 0.2% increase per year.

Improvements to vehicle and fuel technology should make an important contribution to the improvement of air quality within AQMAs. However, their contribution is not being relied upon and their benefits are not included. If the technology benefits were taken into account, they would have sufficient impact to meet air quality objectives in a number of Lancashire’s AQMAs.

The following summary table contains Lancaster's observed annual mean exposure concentration and trajectories for both 'do nothing' and 'do something' situations. The 'do nothing' includes a factored Lancashire trajectory as a comparison. The table also includes the percentage change from base year. The year on year changes will be included in the Annual Progress Reports to showing the level of success in achieving the required change that satisfies the air quality objectives.

Table 9.7.5b

LTP8 Air Quality in Lancaster									
Annual Mean Resident Exposure Reduction within AQMA µg/m^3									
	2003/4 Observed	2004/5 Base year	Trajectory						Notes
			2005/6	2006/7	2007/8	2008/9	2009/ 10	2010/11	
Lancaster observed	43	41	N/A						Observed data 2005 not yet available
Lancaster do nothing		41	41.0	41.1	41.1	41.1	41.2	41.2	Observed base value with calculated year on year traffic growth using DMRB
Lancashire do nothing		41	43	44	46	48	50	52	Lancashire average trend factored to Lancaster's base year
Lancaster do something		41	41	40.8	40.6	40.4	40.2	40.1	Includes the impacts of the identified Lancaster District packages/schemes. Assumes uniform reduction over time.

Changes in Annual Mean Resident Exposure within AQMA % change from base year										
	2004/5	2005/6	Trajectory					% Increase per year		
			2006/7	2007/8	2008/9	2009/10	2010/11	Min	Max	Ave
Lancashire do nothing	0	3.7	7.3	12.2	17.1	22	26.8	3.6	4.8	4.5
Lancaster do nothing	0	0	0.2	0.2	0.2	0.5	0.5	0.0	0.3	0.1
Lancaster do something	0	0	-0.5	-1.0	-1.5	-2.0	-2.4	-0.4	-0.5	-0.4

Changes in Annual Mean Resident Exposure within AQMA % change from base year

Appendix E

Results of public consultation on suggested air quality actions for consideration when developing the AQAP

Sixteen members of the public responded to the recent public consultation. Most respondents made more than one suggestion as to how the air quality around the Air Quality Management Area in Lancaster could be improved.

Below is a summary of the suggestions in descending order of the number of respondents making each suggestion:

Suggestion		Number of times suggested
1.	No to the Centros Miller development	8
2.	More and better cycling schemes	6
3.	Allocate more space to public transport	5
4.	Provide a cheaper and better bus service	5
5.	Create a park and ride scheme	3
6.	Incorporate alternative solutions into planning stage	3
7.	Encourage more people to walk to school	2
8.	Reduce the number of car parking spaces available	2
9.	Provide more rail links and stations (especially to university campus)	2
10.	Introduce a congestion charge	2
11.	Introduce a blanket 20mph speed limit	1
12.	Don't allow the Heysham to M6 by-pass to be built	1
13.	Councillors and Council employees use more public transport or bicycles as an example	1
14.	Provide better incentives for non-car owners e.g. lower council tax	1
15.	Encourage co-operation between local business and public transport e.g. shopping trolley park at bus station.	1
16.	Put in more traffic calming measures	1
17.	Build a light rail or tram system	1
18.	Provide better access to public footpaths	1
19.	Look at other schemes around Europe based on restricting traffic access e.g. La Rochelle	1
20.	Don't forget suburbs and rat runs when putting together AQAP	1
21.	Use Councillor Whitelegg as a consultant	1

Appendix F

Checklist for proposed air quality actions

No.	Description	Cost of measure	Person / Org. responsible	Benefit on declared pollutant within AQMA	Wider benefit outside AQMA	Target transport modes	Completion date	Non-air quality negative impacts identified	Other issues / problems / comments	Community Strategy objective?	Realistic to implement measure ?	Rank
1	Review Lancaster city centre highway network (gyratories, optimisation of signal control, etc.) to identify potential for reducing road traffic emissions contributing to AQO exceedences.	£££	Lancashire County Council (Highways)	✓✓✓ (mostly localised to road junctions)	✓✓✓	Road transport	December 2008	-	No: review process only at this stage	No	Yes	2
2	Implement city centre parking strategy to assist the incentivisation of modal shift away from the private car by daily commuters (connected with existing action).	££	Lancaster City Council	✓	✓✓	Road transport (private car)	December 2008	××	Small negative impacts – inconvenience to daily commuting car drivers	No	Yes*	18
3	Conduct a strategic signing review (e.g. tourist / freight traffic) to minimise avoidable unintended vehicle journeys within the AQMA.	£££	Lancashire County Council (Highways)	✓	✓	Road transport	December 2008	-	No: review process only at this stage	No	Yes	19

No.	Description	Cost of measure	Person / Org. responsible	Benefit on declared pollutant within AQMA	Wider benefit outside AQMA	Target transport modes	Completion date	Non-air quality negative impacts identified	Other issues / problems / comments	Community Strategy objective?	Realistic to implement measure ?	Rank
4	Review delivery and service vehicle access to city centre retail premises in order to identify potential for reducing vehicle exhaust emissions contributing to AQO exceedences.	£££	Lancashire County Council (Highways)	✓✓	✓	Road transport (goods and service vehicles)	December 2008	-	No: review process only at this stage	No	Yes	5
5	Explore the potential for highway network management to incorporate 'red routes' minimising travel times and delays for bus public transport and incentivising modal shift from private car towards public transport.	£££	Lancashire County Council (Highways)	✓✓✓	✓✓✓	Road transport	December 2008	-	No: exploratory process only at this stage	No	Yes	1
6	Establish a statutory 'Quality Network Partnership' for bus-related public transport serving the Lancaster and Morecambe urban areas to provide a framework for further measures incentivising bus travel.	£	Lancashire County Council (Public Transport Policy)	✓✓	✓✓✓	Public transport (bus)	June 2008	-	No negative impacts identified	No	Yes	7

No.	Description	Cost of measure	Person / Org. responsible	Benefit on declared pollutant within AQMA	Wider benefit outside AQMA	Target transport modes	Completion date	Non-air quality negative impacts identified	Other issues / problems / comments	Community Strategy objective?	Realistic to implement measure ?	Rank
7	Introduce a smart ticketing system for public travel by Stagecoach buses with benefits of incentivisation and reduced boarding and waiting times.	£££	Lancashire County Council (Public Transport Policy)	✓✓	✓✓✓	Public transport (bus)	October 2008	×	Very small negative impact to bus passengers – inconvenience of requirement for pre-purchasing of tickets	No	Yes	12
8	Explore the feasibility of, and options for, Park and Ride schemes to serve Lancaster city centre (subject to decision on Heysham M6 link road) to identify potential for modal shift ways from private car to bus for journeys terminating in central Lancaster.	£££	Lancashire County Council (Public Transport Policy) and Lancaster City Council (Planning)	✓✓	✓✓	Public transport (bus)	December 2008	-	No: exploratory process only at this stage	No	Yes	8
9	Explore with train operators the potential for improved local rail services in the Lancaster and Morecambe area to support and incentivise modal shift from the private car.	£	Lancashire County Council (Public Transport Policy)	✓✓	✓✓✓	Public transport (rail)	December 2008	-	No: exploratory process only at this stage	No	Yes	4

No.	Description	Cost of measure	Person / Org. responsible	Benefit on declared pollutant within AQMA	Wider benefit outside AQMA	Target transport modes	Completion date	Non-air quality negative impacts identified	Other issues / problems / comments	Community Strategy objective?	Realistic to implement measure ?	Rank
10	Identify and explore opportunities for improved access to and use of Lancaster canal towpaths and River Lune cycle/paths to incentivise modal shift away from the private car for shorter journeys – for travel journeys involving both Lancaster and Morecambe (partly connected with the Cycling Demonstration Town project).	£££	Lancaster City Council (Economic Dev'ment - Cycling Demonstration Project)	✓✓	✓✓✓	Alternative transport - cycling and pedestrian	December 2008	-	No: exploratory process only at this stage	No	Yes	11
11	Complete a District Signage Scheme to facilitate and promote cycling and walking in Lancaster and Morecambe (connected with the Cycling Demonstration Town project).	£££	Lancaster City Council (Economic Dev'ment - Cycling Demonstration Project)	✓✓	✓✓✓	Alternative transport - cycling and pedestrian	December 2008	×	Negligible or very small and localised negative impact – possible increase in occasional disamenity to residents' adjacent to public paths due to increased usage	No	Yes	14

No.	Description	Cost of measure	Person / Org. responsible	Benefit on declared pollutant within AQMA	Wider benefit outside AQMA	Target transport modes	Completion date	Non-air quality negative impacts identified	Other issues / problems / comments	Community Strategy objective?	Realistic to implement measure ?	Rank
12	Provide high quality, secure cycle parking in appropriate locations to incentivise journeys into Lancaster by bicycle (connected with the Cycling Demonstration Town project).	£££	Lancaster City Council (Economic Dev'ment - Cycling Demonstration Project)	✓✓	✓✓✓	Alternative transport (cycling)	December 2008	×	Negligible or very small negative impact – take-up of public land for cycle parking areas	No	Yes*	13
13	Review and promote Personalised Travel Planning and car sharing to promote and incentivise modal shift away from the private car.	£££	Lancashire County Council (Highways) & Lancaster City Council (Corporate Strategy & Economic Dev'ment)	✓✓	✓✓✓	All modes; Road transport (private car)	December 2008	-	No: review and promotion only at this stage	No	Yes	9
14	Increase the number of travel plans employed by existing businesses and new developments (incorporating targets stipulated in planning conditions for new developments) to minimise numbers of avoidable private car journeys contributing to traffic flows and congestion in Lancaster.	£££	Lancashire County Council (Highways) and Lancaster City Council (Dev'ment Control)	✓✓	✓✓✓	All modes; Road transport (private car)	Ongoing	-	No negative impacts identified	No	Yes	10

No.	Description	Cost of measure	Person / Org. responsible	Benefit on declared pollutant within AQMA	Wider benefit outside AQMA	Target transport modes	Completion date	Non-air quality negative impacts identified	Other issues / problems / comments	Community Strategy objective?	Realistic to implement measure ?	Rank
15	Maximise the effectiveness of Lancaster City Council's own employee and member Travel Plan to minimise numbers of avoidable private car journeys contributing to traffic flows and congestion in Lancaster.	£	Lancaster City Council (Corporate Strategy & Economic Dev'ment)	✓	✓	All modes; Road transport (private car)	December 2008	-	No negative impacts identified	No	Yes	16
16	Explore the feasibility of establishing local car clubs to reduce individual demand for private car ownership.	££	Lancaster City Council (Corporate Strategy & Economic Dev'ment)	✓	✓	Road transport (private car)	December 2008	-	No: exploratory process only at this stage	No	Yes	17
17	Develop and implement a specific planning policy requiring the establishment and maintenance of viable car pooling schemes in new developments of sufficient size to reduce individual demand for private car ownership.	-	Lancaster City Council (Forward Planning & Development Control)	✓	✓	Road transport (private car)	June 2008; (Impleme-ntation later through LDF)	-	No new impacts: unlikely to disincentivise new development. Associated with pre-existing planning policy restricting car parking space in new developments	No	Yes	15

No.	Description	Cost of measure	Person / Org. responsible	Benefit on declared pollutant within AQMA	Wider benefit outside AQMA	Target transport modes	Completion date	Non-air quality negative impacts identified	Other issues / problems / comments	Community Strategy objective?	Realistic to implement measure ?	Rank
18	Explore the feasibility and benefit offered by roadside emission testing of private cars to enforce legal restrictions on permissible road traffic exhaust emissions, in order to promote individual attention to private car engine maintenance and disincentivise the continued running of vehicles that fail to comply.	££	Lancaster City Council (Env'mental Health)	✓✓	-	Road transport (private car)	March 2008	-	No: exploratory process only at this stage	No	Yes	6
19	Review local planning policy generally on air quality and road transport within the Lancaster district to identify and explore any opportunities for further strengthening planning controls favouring modal shift away from reliance on the private car for occupants of new developments. Implement new policies as developed.	-	Lancaster City Council (Forward Planning & Development Control)	✓✓	✓✓	All modes; Road transport (private car)	June 2008; Implementation governed by Local Develop-ment Framework timetable	-	No: review process only at this stage	No	Yes	3

No.	Description	Cost of measure	Person / Org. responsible	Benefit on declared pollutant within AQMA	Wider benefit outside AQMA	Target transport modes	Completion date	Non-air quality negative impacts identified	Other issues / problems / comments	Community Strategy objective?	Realistic to implement measure ?	Rank
20	Maximise air pollution monitoring within the AQMA to inform decisions and monitor progress towards achieving the air quality objective currently exceeded in central Lancaster, and specifically establish a readily moveable second continuous monitoring station	£££	Lancaster City Council (Environmental Health)	N/A	N/A	N/A	Ongoing; Implement second monitoring station by January 2008 (subject to external funding)	-	Note: This measure does not reduce air pollution but enables closer monitoring of progress towards achieving the air quality objective	No	Yes*	N/A
21	Optimise and extend where possible continuous road traffic measurement within the Lancaster AQMA with a view to supporting further assessment and enabling the effectiveness of AQAP measures to be assessed.	£££	Lancashire County Council (Highways)	N/A	N/A	N/A	Ongoing: Implement available improve-ments by December 2008	-	Note: This measure does not reduce air pollution but enables closer monitoring of progress towards achieving the air quality objective	No	Yes*	N/A

* Subject to confirmation of (or external) funding – decisions pending

References

[1] Lancaster City Council (2006) Further Assessment of local air quality in Lancaster

[2] Defra (2007) *The Air Quality Strategy for England, Scotland, Wales & Northern Ireland*.

[3] Defra guidance note LAQM.PG(03)

[4] Defra guidance note LAQM.PGA(05)

[5] NSCA *Air Quality Action Plans - Interim Guidance*

[6] NSCA *Planning for Action*

[7] Lancaster City Council (1999) *Stage 1 Review & Assessment of local air quality*

[8] Lancaster City Council (2000) *Stage 2 Review & Assessment of local air quality*

[9] Lancaster City Council (2004) *Updating & Screening Assessment of local air quality*

[10] Lancaster City Council (2006) *Updating & Screening Assessment of local air quality*

[11] Lancaster City Council (2002) *Stage 3 Review & Assessment of local air quality*

[12] Lancaster City Council (2006) *Detailed Assessment of local air quality in Carnforth*

[13] Lancashire County Council *Lancashire Environment Strategy 2005 – 2010*.