



CITY OF  
*Lincoln*  
COUNCIL



# City of Lincoln Council

## Air Quality Action Plan (2006)

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**City of Lincoln  
Air Quality Action Plan**

## Local Authority Information

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## Introduction

The purpose of the Air Quality Action plan (AQAP) is to provide a framework for improving the air quality within Lincoln City centre, and more specifically within the Air Quality Management Area (AQMA), which was declared in December 2001.

The principal aims of this document are to:

- Raise awareness of Lincoln's air quality issues and the proposed solutions to improve air quality;
- Assist in the prioritisation of measures to improve air quality;
- Promote constructive dialogue with all stakeholders on air quality,

At this stage the Action Plan does not go into specific details of how and when the numerous actions will be implemented. An Implementation Plan addressing the following issues will be published in due course as an addendum to this Action Plan:

- Further quantification of the air quality impacts of the proposed actions;
- Prioritisation of the individual actions taking account of cost-effectiveness assessment;
- Assignment of responsibility for each of the actions;
- Details of funding proposals for the individual actions; and
- Clarification of time-scales.

The Action Plan overarches previous technical assessments of air quality and, by its very nature, will evolve as actions to improve air quality are implemented.

Comments have previously been invited and received on all aspects of this Action Plan as part of the consultation process. Comments received through the consultation process have been taken into account form part of this document. Feedback regarding this document is, however, still welcome at anytime in order to enable the Action Plan to develop.

## **The Air Quality Management Process**

### ***Legislative Background***

Part IV of the Environment Act 1995 introduced a framework for Local Air Quality Management (LAQM) across England and Wales. This placed a requirement on local authorities to periodically review air quality in their area and assess the predicted future air quality against prescribed air quality objectives for seven key pollutants detailed in the Air Quality (England) Regulations first laid down in 1997 and updated in 2002. (Appendix 1)

### ***The National Air Quality Strategy***

The Air Quality Strategy for England, Scotland, Wales and Northern Ireland (AQS) was published in January 2000 and superseded the original National Air Quality Strategy (NAQS) published in March 1997. It provides a framework for reducing air pollution at national and local levels from a wide range of emission sources.

Central to the Strategy are health-based standards for the eight local air pollutants of current greatest concern. These standards are based on recommendations made by the Government's Expert Panel on Air Quality Standards (EPAQS). From these standards, air quality objectives have been derived, which take account of the costs and benefits, as well as of the feasibility and practicality, of moving towards the standards. The relevant dates for achieving each of the objectives range from 2003 to 2010.

The eight pollutants are:

*Benzene*

*1,3-butadiene*

*Carbon Monoxide (CO)*

*Lead*

*Nitrogen Dioxide (NO<sub>2</sub>)*

*Particulates (PM<sub>10</sub>)*

*Sulphur Dioxide (SO<sub>2</sub>)*

*Ozone*

(There is no local air quality objective for ozone as it is predominately a trans-boundary pollutant. Its formation and effects are normally observed many miles from the original source of the parent pollutants and, as such, local measures will not directly have any effect on the levels of ozone with an area. It is therefore being dealt with at a national level.)

## ***The Review and Assessment Process***

Government guidance (see Appendix 2) issued under the Environment Act originally recommended a phased approach to air quality Review and Assessment. This process involved three stages with each subsequent stage being increasingly focused and detailed in order to more accurately assess local air quality.

Each stage considered the likelihood of exceedences of the air quality objectives at relevant locations (i.e. those at which people are likely to be exposed) over the relevant exposure period. For example, an annual average may be used to assess impact at residential locations, where as one hour averages might be used at an urban roadside location, such as a shopping area, where people might reasonably be expected to spend an hour.

*Stage 1* employs a desk-based approach in which all sources of air pollution are identified within the district and assessed for their potential to cause exceedences of the air quality objectives. Where there is an indication that any pollutant may fail to meet the objectives, a Stage 2 assessment should be carried out for that pollutant.

*Stage 2* involves using more detailed methods to assess the probability of meeting the air quality objectives, such as simple modelling methods (e.g. the Design Manual for Roads and Bridges DMRB) and assessment of actual current monitored levels of air quality.

If predictions or monitored levels of pollutants indicate that the relevant air quality objective is unlikely to be achieved, a detailed and accurate third stage air quality Review and Assessment of that pollutant will be required.

*Stage 3* may therefore include more advanced monitoring, computer modelling and emissions inventories and should indicate the geographical extent of any exceedences.

If, after completion of the Stage 3 assessment, the process still indicates that air quality objectives are likely to be exceeded in certain areas, the local authority has a duty to declare an Air Quality Management Area (AQMA), covering at least that area that is predicted not to meet the objectives.

A *Stage 4* assessment is then required for those pollutants that exceed the objectives within the AQMA to further assess the extent of exceedence, the source of the pollutants and the level of improvement needed.

The Council is subsequently required to draw up an Air Quality Action Plan (AQAP) detailing measures that will realistically attempt to reduce the pollutant concentrations in the AQMA down to, or below, the relevant air quality objective.

The review and assessment process is carried out on a rolling basis. It has now evolved from the original three stage review and assessment process to a two stage process, although the principals behind the process are still very similar. The first stage is now called an Updating and Screening Assessment (USA), which builds on the previous review and assessment process, and the second stage, if one is required, is now known as the Detailed Assessment. This process takes place on a three yearly cycle.

In addition, in those years where either a USA or Detailed Assessment is not required, the Council has to submit an Air Quality Progress Report, which is intended to check if there have been any changes affecting all seven pollutants. Also, having produced an Air Quality Action Plan, the Council is obliged to produce an annual Action Plan Progress Report detailing any development on the implementation of proposed measures.

## **Review & Assessment of Air Quality in the City of Lincoln**

The original review and assessment process in Lincoln was carried out using consultants CasellaStanger (formerly Stanger Science and Environment). The process involved the then seven Lincolnshire authorities (Boston BC, City of Lincoln Council, East Lindsey DC, North Kesteven DC, South Holland DC, South Kesteven DC and West Lindsey DC) and Lincolnshire County Council. This approach was chosen in order to share experience, maximise resources and in acknowledgement that air pollution is not constricted by administrative boundaries.

The Stage 1 review and assessment report was published in December 1998 and indicated that in Lincoln, nitrogen dioxide and particulates required more detailed consideration.

In September 2000, the Stage 2 Review and Assessment, using the DMRB model, confirmed that detailed assessment would be necessary for these two pollutants.

The Stage 3 assessment used complex computer modelling and extensive air quality monitoring data. This report was published in February 2001. It indicated that, in Lincoln, areas of the City centre were likely to fail to meet the annual average objective for nitrogen dioxide within the timescale set in the air quality objectives.

As a result, in December 2001, an Air Quality Management Area (AQMA) was declared by the Council, which covered the area that was predicted in the Stage 3 report to exceed the annual average air quality objective of  $40\mu\text{g}/\text{m}^3$ .

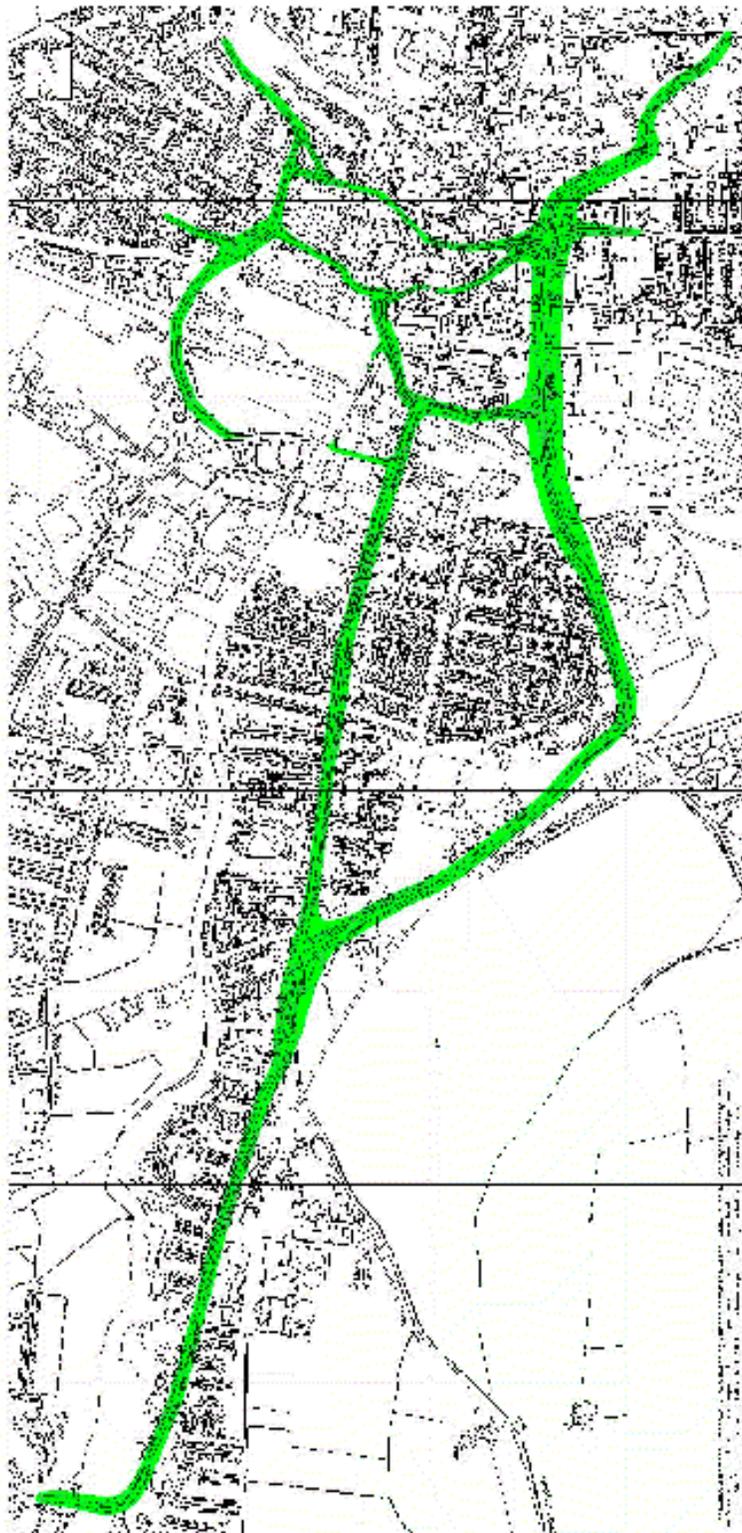
### ***The Air Quality Management Area (AQMA)***

The AQMA (shown in figure 1) covers a large area of the City centre road network, including:

- *Yarborough Road (from Hampton Street to West Parade)*
- *The Avenue*
- *West Parade (from The Avenue to Corporation Street)*
- *Corporation Street*
- *Clasketgate*
- *Newland*
- *Wigford way*
- *Mint Street*
- *Silver Street*
- *High Street (from Wigford Way to St Catherines)*
- *St Mark Street*
- *St Catherines*
- *Newark Road (from St Catherines to 256 Newark Road)*
- *South Park*
- *South Park Avenue*
- *Canwick Road*
- *Pelham Bridge*
- *Melville Street*

- *Broadgate*
- *Newton Street*
- *Pelham Street*
- *St Marys Street*
- *Norman Street*
- *Lindum Road*
- *Monks Road (from Broadgate to 51 Monks Road)*
- *Wragby Road (from Lindum Road to Langworthgate)*
- *Carholme Road (from The Avenue to Harvey Street)*
- *Brayford Way*

**FIGURE 1**  
**Lincoln City Air Quality Management Area No. 1**



## ***Stage 4 Report***

In December 2002 a Stage 4 report was produced, to further investigate the levels of nitrogen dioxide (NO<sub>2</sub>) in the AQMA.

The Stage 4 report concluded that the annual average concentrations of NO<sub>2</sub> predicted in the City centre were slightly lower than those predicted at Stage 3, which may be attributed in part to the use of the up-dated emission factors.

However, given the accepted uncertainties associated with any modelling and that all areas of the AQMA still exceeded 36 µg/m<sup>3</sup> (i.e. within 10% of the air quality objective), it was concluded that the original area should continue to be treated as an AQMA.

Exceedences of the annual mean objective for NO<sub>2</sub> in 2005 were predicted at the façades of 386 buildings. A further 533 façades concentrations were predicted to exceed 36 µg/m<sup>3</sup>.

Another objective of the Stage 4 report was to look at source apportionment and the reduction in the oxides of nitrogen (NO<sub>x</sub>) required to achieve the air quality objective.

Source apportionment seeks to define the amount of air pollution from different types of sources and helps point towards what type of measures that should be considered for improving air quality. NO<sub>x</sub> reduction determines the amount of reduction required in nitrous oxides and, therefore, indicates the amount of reduction in NO<sub>2</sub> that will be required to meet the air quality objectives and will again indicate what type of measures need to be taken and to what extent.

### *Source Apportionment*

The report found that heavy duty class vehicles (HDV) are the biggest contributors to NO<sub>x</sub> in the AQMA, contributing an average of 56%, with light duty class vehicles (LDV) contributing an average of 44%.

*Table 1: Percent contribution from vehicle classes to total NO<sub>x</sub> concentrations from roads at receptors in the Lincoln AQMA*

Vehicle Class	Percent Contribution of NO <sub>x</sub>	
	LDV	HDV
Mean	<b>44</b>	<b>56</b>
Min	41	54
Max	46	59

Heavy duty class vehicles are estimated to make up between 3% and 7% of the total traffic flow.

### NO<sub>x</sub> Reduction

A requirement of Stage 4 is to determine the amount of NO<sub>x</sub> reduction required at the maximum point of impact within an AQMA. The maximum required reductions in NO<sub>x</sub> (µg/m<sup>3</sup>) were calculated for the ten highest concentrations in the AQMA.

*Table 2: NO<sub>x</sub> reductions required at the façades of 10 buildings in locations of maximum impact*

	NO <sub>2</sub> (µg/m <sup>3</sup> )	NO <sub>x</sub> (µg/m <sup>3</sup> )	Reduction NO <sub>x</sub> required (µg/m <sup>3</sup> )
Annual mean AQS objective	40.0	107.2	= NO <sub>x</sub> conc. at receptor – 107.2
Receptor			
High Street/St Marks Street	47.2	146.7	39.5
High Street	44.9	133.3	26.1
High Street/Boultham Avenue	45.1	134.3	27.1
Pelham Bridge	52.7	180.8	73.6
Broadgate	46.1	140.0	32.8
Broadgate	50.7	167.8	60.6
Canwick Road	53.3	184.5	77.3
High Street (south)	45.6	137.5	30.3
Newark Road/Ewart Street	48.5	154.1	46.9
South Park	46.6	143.0	35.8

The maximum calculated NO<sub>x</sub> reduction required in the Lincoln AQMA is therefore 77.3 µg/m<sup>3</sup> on Canwick Road. (It should be emphasised that this is the amount that NO<sub>x</sub> needs to be reduced by and not NO<sub>2</sub>, to which the air quality objective applies.)

## **Air Quality Action Plans**

### ***What is an Air Quality Action Plan (AQAP)?***

Local authorities are required to produce an Air Quality Action Plan (AQAP) where they have designated an AQMA. This also includes a timetable for implementing the plan.

The AQAP should contain a list of actions to improve air quality, based on scenarios identified in previous review and assessment reports.

The action plan should also contain a simple cost and benefit analysis for each action identified and the feasibility of implementing the individual actions. Non-health benefits may also be identified, e.g. reduction of traffic accidents, and may be included as a secondary benefit of an action.

Having established a series of scenarios to improve air quality, the City of Lincoln Council can identify which actions offer the most cost effective or cost beneficial way of improving air quality.

Once the cost-effectiveness of each action has been assessed, the Action Plan should then seek to prioritise the various measures, assign responsibility for each action and identify proposals for funding the implementation.

### ***Aims and Objectives of the AQAP***

The overall aim of the AQAP is to provide a framework to minimise the effects of air pollution on human health.

The action plan provides the mechanism to enable a concerted approach from the local authority and the County Council, as well as the local community, businesses, town centre management partnerships, education establishments, transport companies etc., to address air quality issues within the City.

The objectives can be seen to be more far reaching, in that secondary benefits may result from the primary need to achieve air quality objectives.

### ***The City of Lincoln Council Action Plan***

Appendix 3 includes a number of either ongoing or proposed measures to improve the air quality within Lincoln. It is by no means exhaustive and may change as the action plan evolves.

The list of measures includes all those actions detailed in the consultation draft AQAP, including those that may be unfeasible on the grounds of limited air quality improvements for excessive cost and those that will clearly be beneficial to air quality but may prove to be unpopular with the public or agencies responsible for implementing any such measures.

As noted in the Introduction to this document, the Action Plan does specifically define how and when the numerous actions will be implemented. An Implementation Plan addressing the following issues will be published in due course as an addendum to this Action Plan:

- Further quantification of the air quality impacts of the proposed actions;
- Prioritisation of the individual actions taking account of cost-effectiveness assessment;
- Assignment of responsibility for each of the actions;
- Details of funding proposals for the individual actions; and
- Clarification of time-scales.

Responses from the consultation process have been taken into account when drawing up the list of proposed measures and appraising their feasibility. A précis of the consultation responses is provided later in this document.

The list of actions is based upon the following factors:

- potential of the measure to improve air quality
- cost of the measure
- other risks or disadvantages
- other benefits
- opinion of the consultees on the acceptability of the measure.

It is inevitable that, as there is a move towards implementing some of the measures and further detailed knowledge of costs and estimates of air quality improvements is gained, that the AQAP will evolve and timescales and priorities within the plan may change.

### ***Timescales***

It is recognised that the AQAP should have been produced within 12-18 months of designating the AQMA and, unfortunately, the City of Lincoln Council failed to publish its plan within this specified timescale. However, several initiatives that feature in this report have been running throughout the Air Quality Management process. Specifically, the formation of the 'Lincolnshire Strategic Air Quality Partnership' between the County Council and the three Lincolnshire district councils which have declared AQMA's (Boston BC, City of Lincoln Council and South Kesteven DC) to address air quality and Local Transport plan issues, as well as a variety of educational and promotional activities have been progressed.

Specific time-scales for each of the proposed actions will be included within the Implementation Plan, which will form an Addendum to this document. However, it is important to note that a number of potential actions for improving the air quality within the City centre are only likely to be either technically or economically feasible once an eastern relief road has been opened.

### ***Who is responsible for implementing the AQAP?***

Responsibility for improving air quality potentially lies with almost every individual either residing in or visiting the City. In terms of pollution from vehicles, which is the predominant source within Lincoln, each action or decision we make affecting the way we travel in Lincoln, whatever that may be, will have an impact on air quality. On a wider scale, everyday actions that we take can affect the air quality over a wider area. Measures to improve energy efficiency may not impact the air quality noticeably in Lincoln but may have an effect where in the areas around the power stations as well as globally.

Many of the actions highlighted in the plan fall outside the direct control of the City of Lincoln Council. For example, any actions required within the road network are the responsibility of the Highways Authority, which in Lincoln's case is Lincolnshire County Council. Responsibilities for progressing individual measures will be assigned in the Implementation Plan that will form an Addendum to this Action Plan.

In addition, national and European government also have a role to play in tackling longer term issues such as the adoption of legislation relating to allowable emissions from new vehicles.

However, as the lead authority on local air quality matters, it is the City of Lincoln Council's responsibility to engage with those who do have the ability and powers to take action, and encourage and promote those actions. This role operates at a number of levels including, for example, public education and awareness raising on less polluting modes of transport, as well as working with and influencing those who can make those modes of transport more desirable and accessible.

Local Authorities have been provided with limited adoptive enforcement powers to help in tackling air quality issues, such as powers to work with the police to stop and test vehicles for excessive emissions and serve advice notes or fixed penalty notices.

### ***Supplementary Plans and Development Policies***

The AQAP should, wherever possible, relate to and build upon existing plans and policies where air quality is a material concern. The following documents are particularly significant in producing this Action Plan:

- Local Transport Plan
- Lincoln Local Strategic Partnership Community Plan
- City of Lincoln Council Local Plan, and Local Development Framework (in development)

The City of Lincoln Council will continue to integrate air quality issues into the strategic documents of both the City Council and other appropriate agencies.

### **Consultation Process**

Consultation at all levels and from as wide an audience as possible is essential in developing the AQAP and ensuring all stakeholders have a degree of ownership of the document. This in turn improves the likelihood of the plan succeeding in reducing pollution levels.

Comments have therefore been encouraged on all aspects of the plan.

### ***Action Plan Consultees***

In order for the AQAP to become an enabling report, consultation with major and interested stakeholders should prevail. The list of those consulted on the draft document is as follows:

- *Secretary of State*
- *Members of the Public*
- *Internal Departments within the City of Lincoln Council*
- *Lincolnshire Environmental Protection Liaison Group*
- *Lincoln Local Strategic Partnership*
- *Primary Care Trust (West Lincolnshire)*
- *Lincolnshire County Council*
- *Neighbouring District Councils*
- *Business and Commerce groups*
- *Relevant Community Groups*
- *Educational Establishments within the City*

### ***Public and Stakeholder Consultation***

A number of responses to the consultation were received from a variety of agencies, community groups and members of the public.

The salient points from the consultation responses include:

- Targeting HDVs as the principal polluters by:
  - ensuring high standards of maintenance on the fleets
  - undertaking emissions testing
  - diverting through traffic HDVs away from the AQMA
  - restricting HDV access to the City centre during peak pollution times
  - encouraging night-time HDV deliveries to avoid congestion
  
- Encourage steady traffic flow by:
  - reducing the speed limit in selected areas (e.g. to 20mph)
  - minimise artificial obstructions on the highway (such as road narrowing and ineffectual bus lanes)
  - use less obstructive types of road crossings (for vehicles and pedestrians)

- Close the railway crossings the High Street and Brayford East and:
  - provide bridges or alternative means of crossing for pedestrians
  - set up circular routes both south and north of the railway to divert road traffic
- Avoid the use of “congestion charging” as the motor car is the only viable mode of transport for the majority
- Seek to reduce traffic to the Great Northern Terrace area (via Portland Street and Cross Street) by:
  - relocating the civic amenity site or creating an alternative access to it
  - provide new road from Tentercroft Street to Washingborough Road to relieve pressure on Portland Street, Cross Street and Kesteven Street (by providing alternative access to Great Northern Terrace).
  - seek reforms in the Heavy Goods Vehicle Operators licensing system to take account of wider impact of HDV movements.
- Concern expressed over the proposed temporary car park at Tentercroft Street (under Pelham Bridge) and the extra associated vehicle movements that will be created within that area.
- The greatest single determinant of health is income. It is therefore essential that AQAP measures do not harm the economic regeneration of Lincoln.
- Encourage health initiatives that are closely related to air quality improvements, for example:
  - raise awareness of the benefits of cycling/walking over car use
  - promote measures to improve pedestrian and cyclist safety
  - promote measures to discourage the ‘school run’
- Improve air quality monitoring network to assist decision making.
- Promote the development of the eastern relief road.
- Develop and implement workable park and ride schemes from one or more locations around the City, e.g.
  - from the ‘Western Gateway’
  - use of vacant car parking space or temporary two tier systems at supermarkets
- Improve public transport by:
  - creating ‘high speed’ bus routes linking supermarkets
  - considering a small light tram system

- Encourage awareness and participation by holding a competition for ideas to improve air quality, open to individuals, schools, community groups and businesses, with the ideas being fed into the action plan development process.

Many of the comments and suggestions obtained through the consultation process are addressed either specifically or generally in the draft AQAP options detailed in Appendix 3. Those that are not covered by existing proposed actions have been incorporated into Appendix 3 for further consideration.

***Defra Feed Back on Consultation Draft of City of Lincoln Council's Action Plan***

Having reviewed the draft Action Plan, Defra have stated that the plan would benefit through consideration of the following points:

- Further quantification of the air quality impacts of measures;
- Prioritisation of the action plan measures to be taken forward following consultation according to their cost-effectiveness;
- Assignment of responsibilities for the action plan measures;
- Details of whether or not funding has been secured for the proposed measures and where additional funding will be required; and
- Closer consideration to time-scales.

As discussed in earlier sections, it is the City of Lincoln Council's intention to fully address these issues within an Implementation Plan, which will be issued as an Addendum to this Action Plan.

## APPENDIX 1

### Air Quality Strategy 2000 objectives and objectives in the 2003 Addendum prescribed in regulations for the purposes of local air quality management

Table 2: Air Quality Strategy 2000 objectives and objectives in the 2003 Addendum prescribed in regulations for the purposes of local air quality management			
Pollutant	Objective*	Concentration measured as	Date to be achieved by
Benzene	16.25 µg/m <sup>3</sup> (5 ppb)	running annual mean	31 December 2003
Benzene (apart from Scotland and Northern Ireland)	5 µg/m <sup>3</sup> (1.54 ppb)	annual average	31 December 2010
1,3-butadiene	2.25 µg/m <sup>3</sup> (1 ppb)	running annual mean	31 December 2003
Carbon monoxide (apart from Scotland)	10 mg/m <sup>3</sup> (8.6 ppm)	maximum daily running 8-hour mean	31 December 2003
Lead	0.5 µg/m <sup>3</sup>	annual mean	31 December 2004
	0.25 µg/m <sup>3</sup>	annual mean	31 December 2008
Nitrogen dioxide	200 µg/m <sup>3</sup> (105 ppb) not to be exceeded more than 18 times a year	1-hour mean	31 December 2005
	40 µg/m <sup>3</sup> (21 ppb)	annual mean	31 December 2005
Sulphur dioxide	350 µg/m <sup>3</sup> (132 ppb) not to be exceeded more than 24 times a year	1-hour mean	31 December 2004
	125 µg/m <sup>3</sup> (47 ppb) not to be exceeded more than 3 times a year	24-hour mean	31 December 2004
	266 µg/m <sup>3</sup> (100 ppb) not to be exceeded more than 35 times a year	15-minutes mean	31 December 2005
Particles (PM <sub>10</sub> )	50 µg/m <sup>3</sup> not to be exceeded more than 35 times a year	24-hour mean	31 December 2004
	40 µg/m <sup>3</sup> (21 ppb)	annual mean	31 December 2004

## APPENDIX 2

### References, Guidance Documents and sources of information

[www.airquality.co.uk](http://www.airquality.co.uk)

Air Quality Action Plans: Interim Guidance for Local Authorities. National Society for Clean Air and Environmental Protection (NSCA)

Air Quality: Planning for Action. National Society for Clean Air and Environmental Protection (NSCA)

Air Quality Management Areas: Turning Reviews into Action. National Society for Clean Air and Environmental Protection (NSCA)

Consultation for Local Air Quality Management: The How to Guide. National Society for Clean Air and Environmental Protection (NSCA)

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Local Transport Plan Lincolnshire County Council

A Community Plan for Lincoln - Lincoln Local Strategic Partnership

City of Lincoln Council Local Plan and emerging Local Development Framework

**APPENDIX 3**

**Potential AQAP Options**

## Potential AQAP Options - Transport

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
1	Information and Awareness Raising	Initiatives to promote alternative transport types, reduction in car use, more efficient car use, alternative fuels, awareness of pollution levels and health effects of pollution	L	M	S-L	Reduction in car use, less emissions and congestion. Fuel savings for drivers. Safer and quieter environment. Promotes healthy lifestyles and sustainability. Provides choice. Ties in with other Council aims.	None	
2	Integration of air quality issues into policy.	Both public and private sector have the scope to integrate air quality, transport and sustainability issues into their policies and procedures.	L	M	S-L	Reduction in car use. Wider environmental and socio-economic awareness and benefits. Potential financial savings (e.g. fleet management) are significant.	None	

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
3	Land Use Planning	Using the planning system to ensure that developments do not contribute to a deterioration in air quality.	L	M	S-L	Reduction in traffic use, encouragement of more sustainable transport modes. Alignment with other Council policies. General environmental improvements.	Perceived restriction in development. Potential conflict with some policies. Potential access and inequality issues.	Specific supplementary planning guidance should be developed for the AQMA.
4	Walking and walking facilities.	Adoption and promotion of walking policies, both for commuting, within work travel and leisure.	L	M	S-L	Zero emission option. Promotes healthier lifestyles. Sustainable. Healthier workforce.	Safety issues - both traffic and lone individuals.	
5	Cycling and cycling facilities.	Adoption and promotion of cycling policies, networks and improvement of cycling facilities, parking and safety.	M	H	S-L	Zero emission option. Promotes healthier lifestyles. Sustainable. Healthier workforce	Safety issues - both traffic and lone individuals.	

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
6	Education in Schools - Travel	Promoting walking and cycling to/from school.	L	M	S-L	Zero emissions option. Significantly reduced congestion and emissions around schools. Short journeys produce disproportionately higher vehicle emissions. Health and lifestyle benefits. Encourages early behavioural changes.	Perception of safety. Likely to have limited effect within AQMA itself.	
7	Education in Schools - Environment	Promoting wider environmental issues	L	L	S-L	Likely to promote more sustainable actions and travel in future generations.	Any improvements difficult to quantify.	
8	Travel Plans	Development and implementation of plans to reduce car travel to places of work and learning.	M	M	S/M/L	Reduction in traffic, congestion and emissions. Promotes alternatives to car, encourages modal shifts. Potential travel cost savings	Negative perception of "enforced" reduction in use of car likely.	County Council are actively promoting, and working with users to develop, travel plans

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
9	Improved road signing/route guidance	Improving signage to re-route traffic away from sensitive areas	M	M	M/L	Less traffic and congestion in some areas, reduced emissions. Therefore potential safety and noise improvements	Potential increased traffic in other areas, potential increase in noise to other areas. Not encouraging modal shift.	Currently little option in re-routing traffic other than through traffic around western bypass. Will be more successful following completion of eastern bypass.
10	Improved public transport information	Improving information may encourage greater public transport use	M	M	M/L	Reduced traffic and congestion. Encourages modal shift	Capacity of public transport network.	
11	Improved public transport facilities.	Improvements of both transport (e.g. buses) and fixed facilities (e.g. lighting, seating at stations)	High	Low	Medium/Long	Reduced traffic and congestion. Encourages modal shift Improved customer safety and satisfaction	Would need to be widespread to have desired effect	
12	Improved Parking information	Real time signage or similar to indicate parking availability in City Centre	M	L	M	Reduced mileage and congestion. Improved visitor satisfaction and impression of City	May be perceived to encourage City Centre traffic.	

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
13	Bus Lanes	Widening scope of bus lanes and bus priority routes particularly in AQMA to reduce bus flow and reduce journey times	M	M	M	Reduced traffic and congestion. Time savings for passengers. May encourage modal shift.	Insufficient road capacity in areas to accommodate bus lanes. Loss of road space for other users. Therefore potentially more congestion, longer journey times and increased emissions from other lanes.	Unlikely to be viable until eastern relief road built allowing non City Centre traffic to relocate.
14	High Occupancy Vehicle (HOV) Lanes	Improves journey times and flows for shared vehicles. Encourages car sharing.	M	M	M/L	Reduced traffic, congestion and emissions. Time savings for passengers.	Insufficient road capacity in areas to accommodate HOV lanes. Loss of road space for other users. Therefore potentially more congestion, longer journey times and increased emissions from other lanes. Difficult to enforce.	Unlikely to be viable until eastern relief road built allowing non City Centre traffic to relocate.

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
15	Park and Ride Scheme	Strategically located park and ride sites to transfer City Centre car journeys to bus journeys.	High	High	Long	Reduced congestion and emissions. Improved travel options. Would benefit large numbers of both visitors and commuters.	May generate longer trips to site(s). May encourage driving/ park and ride rather than wholly public transport travel. Council decision to discontinue previous Park and Ride scheme. Likely to require tying in with other options to gain greatest benefit (e.g. bus lanes).	Park and ride often most successful when sites distributed around 360 degrees, therefore likely to be most successful when eastern growth corridor opens up access.

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
16	Construction of Eastern Relief Road	Construction of road network from A158 to A15 to provide alternate route options for non city centre traffic north/south traffic.	H+	H+	M-L	Reduced traffic, congestion and noise in City Centre. Improved journey times. Re-routes traffic away from sensitive areas - greatest impact in AQMA. Considerable economic development potential for eastern area.	Relocation of traffic and therefore pollution to other locations. Possible slight increase in some journey times. Associated environmental / ecological issues. Improvements may be short lived as perceived traffic flow improvements encourage increased growth in traffic.	Current air quality assessment (County Council) predicts this measure alone will cause the air quality objective to be met in the AQMA.
17	Parking Policies	Alterations to current parking policies (City & County Councils and private sector) to align with air quality improvements	L	L	S-L	Reduced congestion, potential business benefits to retail sector	Conflict with other policies and objectives. Parking measures may be unpopular. Potential impacts on business/commerce.	

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
18	Roadside emissions testing Regular/enforcement	Emissions testing to identify and reduce emissions from high polluting vehicles.	M	H	S-M	Reduced emissions, potential for reduced noise and improved safety.	Potential negative impact of mandatory scheme	
19	Roadside emissions testing Infrequent/promotional	Emissions testing to identify and reduce emissions from high polluting vehicles.	L	M	S-M	Reduced emissions, potential for reduced noise and improved safety.		
20	Scrappage incentives	Offering incentives to encourage replacement of older higher polluting vehicles with less polluting vehicles.	M	L	S-M	Reduced emissions. Reduced dumping of old vehicles	Does not encourage modal shift. System may be abused.	
21	Restrict Idling Engines	Enforce law against idling vehicle engines	L	L	S-L	Reduced emissions and noise. Local improvements.	Considerable enforcement time/manpower. May have limited effect in AQMA.	

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
22	Promote advice and incentives for improving bus/HGV emissions.	Encourage bus/HGV fleets to retrofit exhaust type abatement technology. Encourage replacement of older fleet models with newer less polluting types.	M	H	S-L	Reduced emissions and noise. Improved environmental image. Potential fuel savings. Additional benefits in reducing particulates.	Costs to operators.	Consideration could be given to extending this scheme to other areas such as taxis, fleet vehicles to further improve benefits
23	Promote alternative vehicle fuels	Promote and encourage use of low emission vehicle fuels. (e.g. LPG, electric)	M	L	S-L	Reduced emissions. Costs savings.	No improvement in congestion. May cause slight increase in other pollutants. Limited availability. Conversion costs. No specific individual incentive unless combined with other measures (e.g. LEZ's). Future cost savings uncertain.	
24	Traffic management at specific air pollution "hotspots".	Methods used to encourage smooth traffic flow and driving styles in particular areas.	M	L	M-L	Reduced emissions and congestion. Potential fuel savings to motorists.	Unlikely to be feasible in City Centre. May divert traffic to other areas.	

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
25	Low Emission Zone (LEZ)	Restricted entry to AQMA or other similar area based on pre-selected criteria (e.g. when pollution levels exceed criteria or on grounds of pollution emissions of vehicle)	L	H	M-L	Reduced emissions, congestion, noise. Would encourage alternative/ public transport; cleaner fleets and raise awareness of air quality issues.	Highly contentious. Currently no real alternative road routes for north/south traffic. Potentially inequitable and socially exclusive unless grants available. Additional costs. Potential displacement of traffic to other City areas causing considerable congestion and air quality problems. Administrative and technical problems if LEZ implemented on a pollution levels exceedence criteria.	Most likely to be successful if alternative road networks available to absorb displaced traffic.

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
26	Road User Charging	Charge levied to enter AQMA or other similar area. Variable charging (e.g. discounts to least polluting vehicles).	M	H	L	Reduced emissions, congestion, noise. Would encourage alternative/ public transport; cleaner fleets and raise awareness of air quality issues. Potentially revenue generating to reinvest in air quality management.	Highly contentious. Currently no real alternative road routes for north/south traffic. Potentially inequitable and socially exclusive unless grants available. Considerable additional administrative costs. Potential displacement of traffic to other City areas causing considerable congestion and air quality problems.	Most likely to be successful if alternative road networks available to absorb displaced traffic.
27	Workplace Parking Charges.	Charges (both public and private sector) on free/subsidised parking to reflect true environmental costs.	L	L	S-L	Reduced emissions, congestion, noise. Most effective in AQMA/ city centre. Potential revenue for reinvestment in air quality management.	Highly contentious. Inequitable. Costs to businesses, commerce.	

Measure Number	Measure	Description	Cost (Low, Medium, High)	Impact on air quality (Low, Medium, High)	Timescale (Short, Medium, Long)	Advantages	Disadvantages	Comments
28	Rail operator negotiations regarding the air quality issues of level crossing closures in the City Centre.	Negotiate to ensure that air quality issues are considered in the development of any plans for the expansion of the local or regional rail network.	M	M	M-L	Reduced emissions and congestion.	Possible conflicting priorities.	
29	Provide alternative access to Great Northern Terrace Industrial Estate.	Alternative access to Great Northern Terrace with direct link to proposed Eastern Relief Road would provide relief to hotspots such as Portland Street and Cross Street.	H	H	M-L	Reduced traffic, congestion and noise in Portland Street/Cross Street area. Improved journey times. Re-routes traffic away from sensitive areas - greatest impact in AQMA.	Relocation of traffic and therefore pollution to other locations. Possible slight increase in some journey times. Improvements may be short lived as perceived traffic flow improvements may encourage growth in traffic.	

