



Winchester
City Council

AIR QUALITY ACTION PLAN



FINAL VERSION

APRIL 2006

SUMMARY

In November 2003 Winchester City Council declared an Air Quality Management Area (AQMA) within Winchester city centre for the pollutants nitrogen dioxide (NO₂) and fine particles (PM₁₀). However, new guidance on comparing our PM₁₀ data with the gravimetric based objectives means PM₁₀ compliance is currently being achieved, although monitoring continues to assess compliance with 2010 objectives. There is a need therefore to reduce emissions of NO_x (the precursor to the formation of NO₂) within the city centre. This document – the Council's Air Quality Action Plan – sets out the proposed measures to be implemented with the aim of achieving this goal and fulfils the requirements of Section 84(2) of the Environment Act, 1995.

The results of previous technical studies undertaken by the Council have shown that it is road traffic that is the main emission source of nitrogen dioxide. To this end, the main area of concern that forms the focus of attention of this Air Quality Action Plan is to change the way in which people access the city centre with particular emphasis on modal shift away from private vehicle use to more sustainable forms of transport.

The assessment has been performed in accordance with the Department of Environment, Food and Rural Affairs (DEFRA) technical guidance document LAQM PG(03) and, more recently, LAQM.PGA(05), which provides for the integration of an action plan into the Local Transport Plan (2006 – 2011). To this end, the role of Hampshire County Council as the management authority for the road network within the City Centre is clearly defined.

This Action Plan details a combination of actions that are currently being proposed and actions that require a detailed project appraisal before potential implementation. These can be broadly summarised as:

- Actions implemented as part of the MIRACLES project,
- Further development of Workplace and School Travel Plans,
- Promotion of walking and cycling,
- Improvements to public transport,
- Emission testing of road vehicles,
- Improved traffic management – including traffic rerouting,
- Improvements to taxi fleets,
- Review of car parking strategy,
- Improved information and advice on reducing pollution within AQMA.

It is the ultimate aim of an Action Plan to achieve the annual mean objective for nitrogen dioxide currently in force. However, where this proves impractical to do so, the authority must show that it is at least moving toward achievement of the objective.

The measures proposed above have been subjected to a detailed dispersion modelling assessment, the results of which show that, come 2010, Winchester City Council may still be required to maintain an Air Quality Management Area for the city centre. The extent of the AQMA is considerably smaller when compared to the 2005 area of exceedence. Nonetheless, the results show that additional measures may be required to bring about the necessary reductions in traffic emissions in the city centre to comply with the 2010 EU Limit Values. Additional measures that could be considered are:

- 1) The implementation of a Low Emission Zone (LEZ)
- 2) Further demand management measures.
- 3) Infrastructure development.

The County Council who manage the roads within the city centre has an important role to play in assisting the Council in further reducing the levels of pollution arising from road traffic. A strong partnership, built on a common willingness to improve the environment of Winchester city centre is crucial to the future success of the Council's Air Quality Action Plan. Therefore, the City Council fully intends to work in partnership with the County to realise the aspirations for improvement contained within this plan.

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1.0 INTRODUCTION – THE NEED FOR AN AIR QUALITY ACTION PLAN

1.1 The Local Air Quality Management Regime

Since the implementation of Part IV of the Environment Act 1995 all local authorities have been under a duty to review air quality within their district. The current objectives that have to be met are prescribed under the Air Quality (England) Regulations 2000 (as amended) (1). It is a requirement that each local authority conducts a formal staged review of air quality within its district in accordance with a comprehensive set of guidance documents. These reports are then sent to the Department of Environment, Food and Rural Affairs (DEFRA) for approval.

The Regulations include a set of air quality objectives with different compliance dates between 2003 and 2010. Where it is predicted that air quality is unlikely to meet these objectives then an Air Quality Management Area (AQMA) needs to be declared to implement additional measures to try and achieve such compliance. Current air quality objectives, which are required to be assessed as part of this Local Air Quality Management (LAQM) regime, are shown in Table 1 below.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25µg/m ³	Running annual mean	31.12.2003
	5.00µg/m ³	Annual mean	31.12.2010
1,3-butadiene	2.25µg/m ³	Running annual mean	31.12.2003
Carbon monoxide	10.0mg/m ³	Maximum daily running 8 hour mean	31.12.2003
Lead	0.5µg/m ³	Annual mean	31.12.2004
	0.25µg/m ³	Annual mean	31.12.2008
Nitrogen dioxide (Provisional)	200µg/m ³ not to be exceeded more than 18 times a year	1 Hour mean	31.12.2005
	40µg/m ³	Annual mean	31.12.2005
Particles (PM10) (Gravimetric)	50µg/m ³ not to be exceeded more than 35 times a year	24 hour mean	31.12.2004
	40µg/m ³	Annual mean	31.12.2004
	50µg/m ³ not to be exceeded more than 7 times a year ¹	24 hour mean	31.12.2010
	20µg/m ³ ¹	Annual mean	31.12.2010

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Sulphur dioxide	350µg/m ³ not to be exceeded more than 24 times a year	1-hour mean	31.12.2004
	125µg/m ³ not to be exceeded more than 3 times a year	24-hour mean	31.12.2004
	266µg/m ³ not to be exceeded more than 35 times a year	15-minute mean	31.12.2005

1. New objectives not currently within regulations but guidance recommends inclusion in an assessment

Table 1 – Current Air Quality objectives for England set within Regulations for the purpose of Local Air Quality Management

The key elements of the Environment Act 1995 concerning the current AQS are listed in Table 2.

Part IV Air Quality	Commentary
Section 80	Places a statutory duty on the Secretary of State (SoS) to produce a national air quality strategy.
Section 81	Obliges the Environment Agency to take account of the strategy.
Section 82	Requires local authorities to review air quality and to assess whether the air quality standards and objectives within their areas are likely to be exceeded.
Section 83	Requires a local authority, for any area where air quality standards are not being met, to issue an order designating it an air quality management area (AQMA).
Section 84	Imposes duties on a local authority with respect to AQMAs. The local authority must carry out further assessments and draw up an action plan specifying the measures to be implemented within the AQMA, and the time-scale for doing so, to move towards attainment of the air quality standards and objectives.
Section 85	Gives reserve powers to cause assessments to be made in any area and to give instructions to a local authority to take specified actions. Authorities have a duty to comply with these instructions.
Section 86	Provides for the role of County Councils to make recommendations to a district on the carrying out of an air quality assessment and the preparation of an action plan.
Section 87	Provides the SoS with wide ranging powers to make regulations concerning air quality. These include standards and objectives, the conferring of powers and duties, the prohibition and restriction of certain activities or vehicles, the obtaining of information, the levying of fines and penalties, the hearing of appeals and other criteria. The regulations must be approved by affirmative resolution of both Houses of Parliament.
Section 88	Provides powers to make guidance which local authorities must have regard to.

Table 2: Major elements of the Environment Act 1995

To date the following reports have been issued regarding air quality within Winchester's District:

- **Winchester City Council Stage 1 Review (Dec 1998)** – Concluded that only three pollutants needed further assessment, these being Carbon monoxide (CO), Nitrogen dioxide (NO₂) and Particles (PM₁₀'s).
- **Winchester City Council Stage 2/3 Review (Aug 2000)** – Concluded that CO, NO₂, and PM₁₀ levels would comply with relevant objectives. However, DEFRA required further assessment for Nitrogen dioxide levels at houses close to main roads within the town centre. This report included a dispersion modelling study (AAQuIRE model) of South Hampshire performed by consultants CES.
- **Winchester City Council Air Quality Review and Assessment (Additional Assessment of Nitrogen dioxide levels within Winchester Town Centre) (Oct 2001)** - This report was in response to DEFRA's comments. It concluded that there were a small number of properties close to busy city centre roads that could have levels higher than the background site and that dispersion modelling should be performed to investigate these locations further. DEFRA rejected this conclusion advising that we should declare an AQMA and then perform this dispersion modelling.
- **Casella Stanger & Winchester City Council – Air Quality Review and Assessment – Detailed Dispersion Modelling (July 2003)** – This report was a detailed dispersion model of Winchester town centre using the BREEZE dispersion model. It predicted that failures of the annual nitrogen dioxide objective would occur after the set deadline. The model performed poorly for particles, it suggested that failures could occur but poor data ratification meant exact quantification was not possible. With regard to particles it was recommended that alternative models with better consideration of topographical effects were explored
- **Winchester City Council Air Quality Review, Updating and Screening Assessment (USA)**. New guidance on the assessment of air quality was issued by DEFRA early 2003. The most important document being Technical Guidance LAQM TG(03) (2), which provides comprehensive guidance on performing such an assessment. In accordance with this guidance a re-review of the initial assessments was made. This report concluded that some monitoring was required for sulphur dioxide at the Alresford Station of the Watercress Steam Railway Line but all other conclusions remained valid.
- **Casella Stanger – Winchester City Council – Air Quality Review and Assessment – ADMS roads update August 2004**. This used the same data as Casella's July 03 report but utilised a different model (ADMS Roads) that included better consideration of topographical effects. However modelled results still failed to correlate with monitoring data. It was concluded that the level of exceedances for particles was less than that for nitrogen dioxide and that any action plan aimed at achieving the nitrogen dioxide standard should ensure compliance with the 24 hour particle standard. It was further concluded that additional sites for particle monitoring should be considered to check compliance is achieved.

All these reports are available on CD in Word or Acrobat formats by contacting Phil Tidridge at Winchester City Council Health and Housing Department (Tel 01962 848519 or E mail ptidridge@winchester.gov.uk)

1.2 Health impacts of air pollution

The air quality objectives are health based being derived mainly from epidemiological studies. The current air quality objectives are derived from a series of European Union Directives, which in turn were informed by considerable work previously performed in the deriving initial UK based standards.

Exposure to pollutants can have two types of effects. These are the acute effects – almost instantaneous adverse health effects in response to exposure. An example of an acute effect would be an asthma attack during peak periods of pollutant occurrence. The other health impact is the chronic or long term effect on health, for example the possibility of a permanently lowered lung function following long term exposure to certain pollutants. In general, acute effects result from high exposures over short time periods and chronic effects are due to lower exposures over long periods. It is for this reason that the air quality objectives are set over different averaging periods. For Acute effects short means (from 15 minutes to 24 hours) are considered whilst for chronic effects annual means are used. Some pollutants, including nitrogen dioxide and particles, are considered to have both acute and chronic health effects so have more than one air quality objective with different means.

The pollutant of most concern in the City Centre is that of nitrogen dioxide (NO₂). This pollutant is discussed in more detail below.

Nitrogen Dioxide – Road vehicles are responsible for 49% of UK emissions of oxides of nitrogen (2000) (3). Simply put, the burning of fossil fuels in air produces such oxides. Both nitric oxide (NO and nitrogen dioxide (NO₂) are produced, with nitric oxide being the major primary pollutant. This is the first stage in a complex series of chemical reactions, involving a range of other pollutants such as ozone. Together the two oxides are referred to as oxides of nitrogen or NO_x. The concentration of the different elements of NO_x will depend on the oxidising capacity of the local atmosphere.

Nitrogen dioxide has been identified as having a number of possible health effects associated with the respiratory system. Relatively high short term concentrations can cause inflammation of the airways and could for example precipitate or exacerbate episodes of asthma. Longer term exposures can increase reactivity to allergens, such as pollen, in sensitised individuals and reduce long term lung function. It has been suggested that exposure of children to elevated levels of nitrogen dioxide may increase the risk of respiratory infections and possibly lead to poorer lung function in later life (4). The UK Air Quality Expert Group has recently published a detailed study of “Nitrogen Dioxide in the United Kingdom” which provides a comprehensive review of this pollutant (3). This report observes that although total emissions of road transport NO_x have reduced by 34 percent between 1990 and 2000, changes in the balance between NO and NO₂ means this has not resulted in a comparable reduction in the nitrogen dioxide levels. An increase in diesel car penetration rate in the UK fleet is highlighted to be of particular concern and could increase road transport nitrogen dioxide emissions by 3 percent by 2010.

1.3 Winchester City Council’s Air Quality Management Area (AQMA)

Where an area has been identified as unlikely to meet air quality targets the authority must declare that area as an Air Quality Management Area (AQMA). Such an area has

been declared for Winchester town centre for non compliance with the annual average nitrogen dioxide standard..

This AQMA for the City Centre is shown in figure 1.

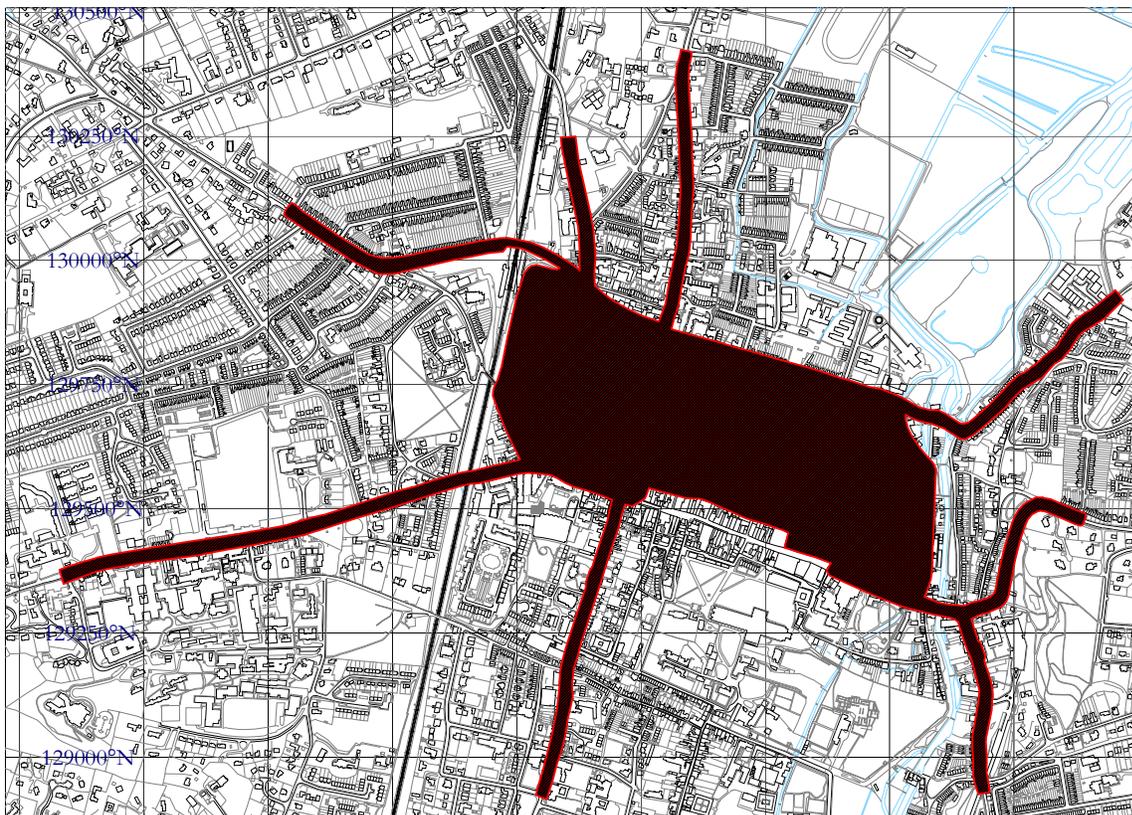


Figure 1 – Winchester Town Centre Air Quality Management Area (in Red)

This map is based upon the predicted modelled concentrations for annual average nitrogen dioxide levels at the end of 2005. Whilst the annual mean objective for 2005 is set at $40\mu\text{g}/\text{m}^3$ the Council has taken a conservative approach to the declaration (due to uncertainties in the modelling predictions of 20 percent) and has used the predicted $36\mu\text{g}/\text{m}^3$ contour as the basis for the AQMA.

1.4 Action Planning – What Needs to be Achieved?

Although the AQMA has been declared on the occurrence of nitrogen dioxide levels above the $36\mu\text{g}/\text{m}^3$ contour, the results of predictive modelling and the ongoing monitoring undertaken by the Council within the City Centre show that concentrations above this threshold vary considerably. At a number of locations, a marginal increase above this level is shown to occur, whilst at other locations a substantial increase in levels of nitrogen dioxide is shown.

In order to determine what needs to be achieved by the City Council's Air Quality Action Plan it is important that the maximum concentration of nitrogen dioxide is determined.

Results of the monitoring and modelling work show that the areas within the city centre that pose the most significant threat to compliance with the annual mean objective are:

- St George's Street

- Jewry Street

Using this as our main target it has been calculated that it will be necessary to implement a series of local measures that reduces the predicted 2005 nitrogen dioxide emission concentrations by a further 17 percent.

Once an AQMA has been declared it is necessary to produce and consult upon an Air Quality Action Plan (AQAP) that identifies the extent of the problem, evaluates all potential solutions on a cost benefit basis and identifies actions that will be taken. This document is the final version of our Air Quality Action Plan. A draft version of this plan has already been subject to a lengthy consultation processes throughout 2005.

DEFRA policy guidance PG(03) **(5)** on local air quality management provides detailed guidance on producing an AQAP. Since the declaration of the AQMA in November 2003, a joint officer/members working party has reviewed all the options detailed within this guidance. It has subsequently had to reassess this process in light of the new DEFRA guidance note PGA(05) **(6)**. Chapter 3 of this document provides details of the options that are either being implemented or will require more detailed assessment and evaluation before final implementation.

