National Society for Clean Air
and Environmental Protection

Air Quality Action Plans:

Interim Guidance for Local Authorities

This document is the first part of NSCA's guidance on how local authorities could develop Local Air Quality Action Plans, following the declaration of Air Quality Management Areas under the Environment Act 1995. It will also be of use to local authorities seeking to develop local air quality strategies. This part sets out the process for developing action plans and the elements which authorities need to consider. The second part will build on this and will be published in Spring 2001.

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Participation of DETR officials on the working group should not be taken to mean that this guidance constitutes a definitive statement of Government Policy

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Section 1: Introduction

This guidance provides some practical ideas and methodologies for considering the various elements of an action plan. It is intended to provide interim advice prior to more comprehensive guidance, including case studies and examples, to be produced by the NSCA AQAP Working Group in Spring 2001. The lists of options outlined in this document, and their subsequent impacts, are not exhaustive, but may provide assistance as to some of the potential options available to local authorities. A Wall Chart encompassing a range of options and their potential impacts is attached to the back cover of this document. This, together with the checklists towards the end of the document, may prove to be particularly useful to non air quality professionals who are perhaps not as familiar with the local air quality management framework.

The Legal Context

As the first phase of air quality review and assessment draws to a conclusion in the UK, the declaration of Air Quality Management Areas (AQMAs) is now getting underway. By the end of December 2000 in England, Scotland and Wales, local authorities are expected to have identified areas where the air quality objectives will not be met by the appropriate date, and to have declared AQMAs accordingly. Consequently, the focus for air quality management is turning to the preparation and implementation of Air Quality Action Plans (AQAPs) to assist in the delivery of the UK's air quality objectives.

Air Quality Action Plans ultimately provide the mechanism by which local authorities, in collaboration with national agencies and others, will state their intentions for working towards the air quality objectives through the use of the powers they have available. Whilst there is no prescriptive time scale for the preparation and delivery of the plan, DETR guidance document LAQM.G1(00): Framework for Review and Assessment suggests a period of 12-18 months from the declaration of an AQMA.

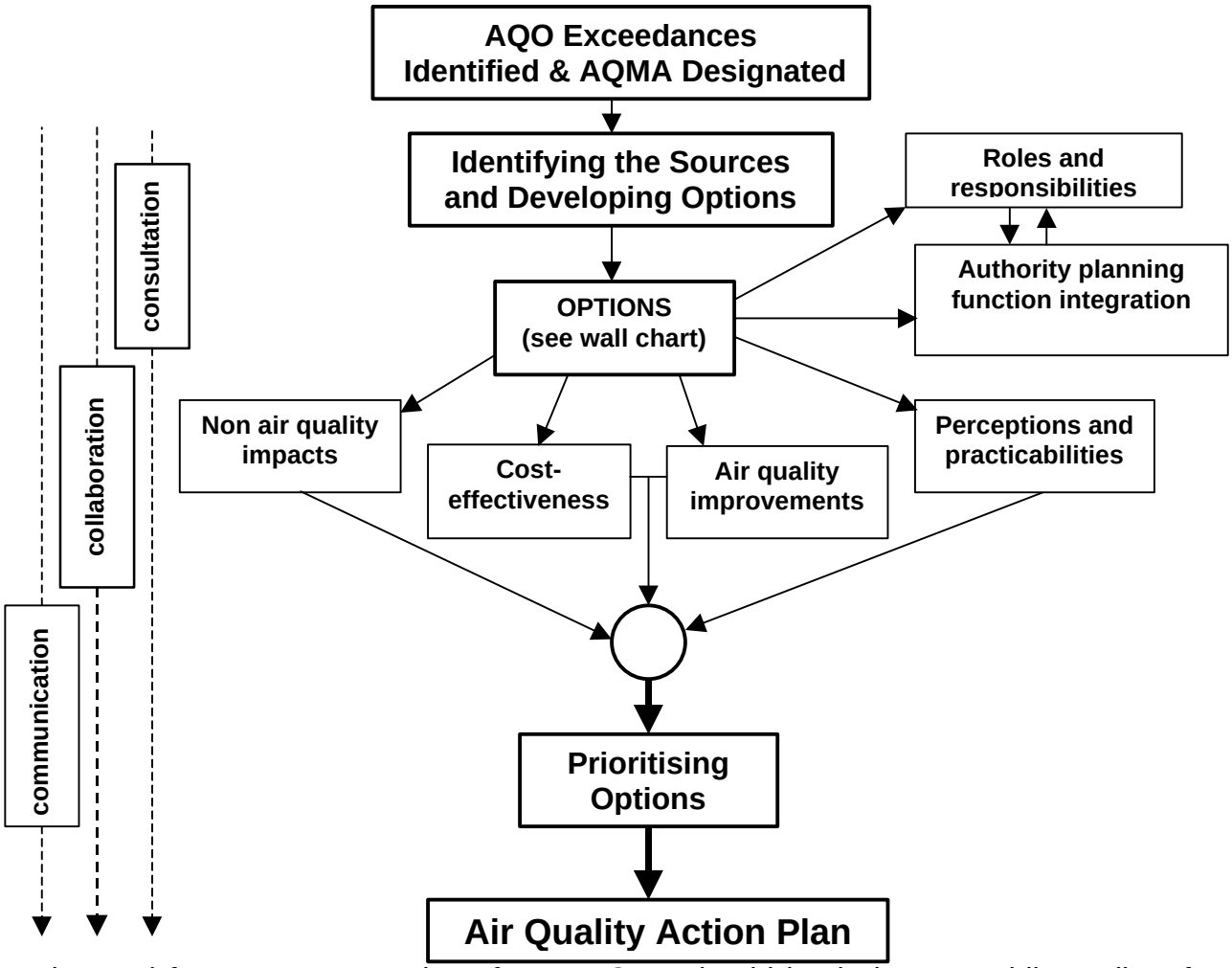
Local authorities with designated AQMAs are required to undertake a further review of air quality (recognised as Stage 4) within the AQMA, which is intended to refine the outcomes of the earlier stages of review and assessment. For some authorities this further review provides a final checking or clarification of the results from Stage 3, and for other authorities will provide an opportunity for further refinement of both monitoring and modelling data.

As part of this further review, a local authority is required to consider the cost-effectiveness and feasibility of different abatement options, and in this respect the authority may wish to initiate preparations for an action plan whilst conducting the further review, or Stage 4. An authority is also required to consider the extent to which air quality improvements are required as part of the further review process.

Developing Action Plans

In developing the AQAP, an authority should include an assessment of options available, an understanding of the wider non-air quality impacts of such options, and the likely improvements offered by them. The length of the action plan will vary considerably between authorities, depending upon the degree to which air quality improvements are required and the complexity of options and actions considered necessary. Good practice in other areas would also suggest that a clearly defined implementation strategy is needed, which in turn should contain a timetable setting out when each of the measures will be implemented and a projection of when expected air quality improvements will occur. Plans should aim to be consistent with those of nearby authorities, where similar sources are identified and similar mitigating measures therefore required.

Figure 1: The Process for Developing Air Quality Action Plans



First and foremost, preparations for an AQAP should begin by assembling a list of tasks to consider, and a committed team, which may include representatives from within and external to the local authority, who will undertake work on various aspects of the plan. An Air Quality Manager, or equivalent, within a local authority will play an important role in facilitating the preparations for an AQAP, and should continue to provide the scientific support underpinning the action plan. However, it is recognised that the environmental health profession alone will not have all the necessary powers

and functions to improve local air quality. As such, it is important for environmental health departments to spend time fostering good working relationships with other authority departments and external bodies as early in the action planning process as possible.

Guidance Layout

This guidance is divided into seven key sections, the first of which looks at the various **local authority and external agency roles** within action planning. The subsequent sections consider how to **identify sources and possible measures and actions** to improve air quality, the **cost-effectiveness of options identified** and **assessing air quality improvements**. Just as important are consideration of any potential **environmental, social and economic impacts of various options**, and how any action to improve air quality may be **perceived by the wider community**.

Finally, the report considers an approach to the process of actually **prioritising the options** identified so as to present a final plan for implementation. This is perhaps the most difficult aspect of the action planning process, reflecting the complexity of determining appropriate actions and the influence of local circumstances. Figure 1 on page 2, in addition to setting out a proposed process for developing AQAPs, also summarises the key themes of the document.

Local Air Quality Strategies

For the majority of local authorities, their initial review and assessment will indicate that a formal Air Quality Management Area will not be necessary. However, for many of these, the margins by which they avoid exceedance of the air quality objectives will be small, while for others a commitment to improving air quality will have been adopted as part of a corporate policy or Agenda 21 Plan. Rather than developing an AQAP, therefore, such authorities may wish to adopt a Local Air Quality Strategy.

The format and structure of Local Air Quality Strategies is far more flexible than AQAPs, and they may include pollutants not covered by the LAQM regime, for example, greenhouse gases, dioxins, nuisance dusts and odours, etc. The scope of the Strategy may, in fact, be set through a process of consultation with stakeholders and local communities. Equally, the aims of the Strategy need not be as specific or rigidly defined as those for an AQAP, although a clearly stated set of objectives will be needed. Having said this, guidance on developing AQAPs will have a role in the development of Local Air Quality Strategies and NSCA intends to pilot this document with a number of authorities who are considering this route, in order to test its applicability.

Finally, as with all the earlier stages of the local air quality management process, developing practicable action plans and strategies to deliver improvements in air quality will require firm commitment, collaboration, consultation and above all effective communication.

Applicability in the UK

This guidance is intended for use by all local authorities in the UK with a responsibility for air quality management under the Environment Act 1995. However, while the principles and methodologies in the guidance can be universally applied, the bodies responsible for carrying out certain statutory functions differ for England, Wales, Scotland and Northern Ireland. By and large, this document has been written with reference to those bodies operating in England and Wales, such as the Environment Agency, the Department of the Environment, Transport and the Regions (DETR), the National Assembly for Wales, Regional Development Agencies, the Welsh Development Agency, etc.

For Scotland, the following differences should be noted:

- Generally, reference to DETR should be taken as reference to the Scottish Executive.
- References to DETR general guidance notes for local air quality management should have an "S" inserted, e.g. LAQM.G2(00) becomes LAQM.G2(S)(00). Technical guidance notes are not affected.
- The Scottish Environment Protection Agency (SEPA) carries out the equivalent functions for Scotland as the Environment Agency for England and Wales, with the addition of "Part B" processes under the Environmental Protection Act 1990 and all installations under IPPC.
- The equivalent bodies to Regional Development Agencies and the Welsh Development Agency are Scottish Enterprise and Highlands and Islands Enterprise, although these do not have sustainable development as a statutory duty.
- The functions of Government Offices and the Highways Agency are also undertaken by the Scottish Executive.

For Northern Ireland, while both the Air Quality Strategy for England, Scotland, Wales and Northern Ireland and the European Daughter Directives on air quality cover the Province, neither the Environment Act 1995 nor Part I of the Environmental Protection Act 1990 apply. Therefore, for local authorities there is no obligation to carry out Review and Assessment, to declare AQMAs or to prepare Air Quality Action Plans. However, some local authorities are undertaking these activities on a voluntary basis and it is hoped that this guidance will prove useful to them. Broadly speaking, the functions of the Environment Agency, DETR, RDAs, Government Offices, etc. will be undertaken by the Northern Ireland Assembly and its various departments, e.g. Department of the Environment.

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Section 2: Roles and Responsibilities

An effective Air Quality Action Plan relies heavily upon the integration of a variety of local government functions, as well as integration with regional plans and collaboration with external agencies. This section provides information on the planning processes to be considered in developing an action plan, and the issues for professionals and colleagues to consider.

To assist local authority and other professionals with their involvement in developing and implementing an action plan, key action points are provided as a series of checklists in Appendix A. These checklists are designed to illustrate how different parts and functions of local authorities, and external agencies, can contribute to the effective development of action plans. They are designed to give an indication to EHOs of the wide range of different interests at stake, and of what they can and should expect from each of the different departments and agencies.

Local Authority Planning Functions

This section, in parallel with Appendix A, considers various local authority planning functions, which require consideration in the implementation and development of a local authority Air Quality Action Plan (AQAP). Consideration is given to both statutory functions and non-statutory functions of various local government departments, which may be required to assist with the implementation of a particular mitigating measure or option, or indeed a series of measures.

Table 1 provides a summary of the local government planning functions, which may require consideration when developing the action plan.

Regional and Agency Planning Functions

There are also a number of external agencies which have an important contribution to make to the development of AQAPs. Both statutory functions and non-statutory functions of the various agencies may be required to assist with the implementation of a particular mitigating measure, or series of measures.

Table 2 provides a summary of the regional and agency planning functions, which may require consideration when developing the action plan.

Table 1: Local Government Planning Functions

Planning Function	Sub Divisions	Plan, Strategy or Procedure			Authority-wide initiatives and requirements
Land Use Planning	Development Control	Development Control Procedures			Best Value Eco-Management and Audit Schemes (EMAS)/Environmental Audits Local Authority Performance Plans, Community Planning, Travel Plans
	Strategic Planning	Structure Plans *			
		Unitary Development Plans			
		Local Plans			
	Town Centre Management	Management Strategies			
	Building Control	Building Control Procedures			
	Minerals Planning *	Minerals Planning Strategy			
	Waste Management *	Waste Management Strategy			
Environ-mental Health	Pollution Control	IPPC processes procedures	Air Quality Strategy	Climate Change Programme	
	Environmental Quality				
	Energy Management	Energy Conservation and Management Strategies			
Transport Planning	Transport Planning *	Local Transport Plans and transport strategies			
		Commuter Plans			
	Highways Engineers	Network Plans			
		Highway work e.g. traffic calming			
	Fleet Management	Fleet Management Strategy			
Economic Development & Regeneration		Economic Development Plans and Strategies			
		Regeneration Strategies			
		Tourism Plans and Strategies			
Sustainable Development		Local Agenda 21 Strategy and Programme			
Education Services *		Education Strategies and Programmes			
Chief Executive & Policy Unit		Policy overview and co-ordination function			
Treasury Department		Resource allocation and cost control			

** denotes two-tier (i.e. County Council) or Unitary Authority function*

Table 2: Regional and Agency Planning Functions

Agency or Other Group	Contacts	Plan, Strategy or Procedure
Regional Development Agency (RDA), Welsh Development Agency	Planning functions Environment functions	Regional Development Plans Regional Planning Guidance Regional Transport Plans
Government Offices (GO), National Assembly for Wales	Planning departments Environment departments	Local Transport Plans
Environment Agency (EA) (for England and Wales)	Process Inspectors LEAPs officers ZIPS officers Regional Air Pollution Specialists	IPPC/IPC authorisations Local Environment Action Plans (LEAPs) Zones of Industrial Pollution Sources (ZIPS)

Agency or Other Group	Contacts	Plan, Strategy or Procedure
Highways Agency (HA), Transport for London (TfL), National Assembly for Wales	Regional Officers Network & Customer Service (NCS) Area Teams	
Health Authorities	Consultants in Communicable Disease Control (CCDCs)	Health Action Zones Health Improvement Programmes Healthy Living Centres

Useful References and Web Links

Regional Development Agencies (www.local-regions.detr.gov.uk/rda/info/index.htm)
Welsh Development Agency (www.wda.co.uk)
National Assembly for Wales (www.wales.gov.uk)
Government Offices for the Regions (www.government-offices.gov.uk)
Structure Plans (www.planning.detr.gov.uk/ppg12/index.htm)
Highways Agency (www.highways.gov.uk) (email airquality@highways.gsi.gov.uk)
Transport for London (www.tdfl.gov.uk)
Sustainable Distribution Strategy (www.detr.gov.uk/itwp/susdist/index.htm)
Travel Plans (www.local-transport.detr.gov.uk/travelplans/index.htm)
School Travel Plans (www.local-transport.detr.gov.uk/schooltravel/index.htm)
Road Safety (www.roads.detr.gov.uk/roadsafety/strategy/index.htm)
Environment Agency (www.environment-agency.gov.uk)
Climate Change Programme (www.environment.detr.gov.uk/climatechange/draft/index.htm)
Department of Health (www.doh.gov.uk/hef/airpol/airpolh.htm)
Health Action Zones (www.haznet.org.uk)
Healthy Living Centres (www.doh.gov.uk/hlc.htm)
Regeneration Policies and Programmes (www.regeneration.detr.gov.uk/policies.htm)
Best Value (www.local-regions.detr.gov.uk/bestvalue/bvindex.htm)

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Section 3: Identifying the Sources

Through their emissions inventory and subsequent modelling work as part of the Review and Assessment process, the local authority will be generally aware of the principal sources impacting on the AQMA and giving rise to exceedances of the air quality objectives. It is imperative that a local authority has a more precise understanding of the extent to which different sources contribute to exceedances prior to considering appropriate actions. This will help to ensure that actions focus upon reducing emissions from those sectors responsible for the greater proportion of emissions.

This Section will consider some of the methods for assessing the relative contribution, in percentage terms, of each of these sources. It is not possible, or indeed necessary, to calculate exact percentages, but the methods outlined will assist in providing useful indications.

Introduction

In declaring an AQMA, the local authority will have already undertaken a substantial amount of work on assessing air quality in the area. The assessment of the relative contribution of different sources should make as much use of existing information as possible. The method for assessing relative contribution is broken down into four parts:

- Identify pollutants, averaging period and principal sources;
- Review available information;
- Assess the contribution of different sources; and
- Present the results.

Identify Pollutants, Averaging Periods, and Principal Sources

From the information obtained in a Stage 3 review and assessment, the pollutants of concern, together with their averaging periods and principal sources, should have been identified.

The geographical extent of the assessment should be considered. Whilst the Action Plan is intended to improve air quality within the AQMA, air quality is not restricted by local boundaries and it will be necessary to consider action over a wider area. All relevant sources impacting upon the AQMA therefore need to be considered.

Review Available Information

The principal source of information available to the Authority will be the Stage 1, 2 and 3 review and assessments undertaken as part of the process of declaring an AQMA. It is anticipated that as far as possible source attribution will be undertaken

on the basis of this existing information. This includes making use of and extending techniques already applied.

Guidance note LAQM.G1(00): Framework for Review and Assessment of Air Quality sets out the basic information needed for a Stage 3 Review and Assessment, with further, detailed requirements given in LAQM.TG4 (00): Pollutant Specific Guidance. Ideally information should be available on the following:

- Release characteristics for the pollutants concerned from sources within or near the AQMA. These are likely to be traffic, and Part A or Part B processes, although groups of smaller sources, such as houses using solid fuel heating or industrial estates with a variety of small processes and sources, may also have to be considered. Where appropriate this should include information on the diurnal and seasonal release patterns.
- Details of modelling undertaken for each of the source sectors during the review and assessment process, including the source of meteorological information, the time period for the meteorological data, validation of model results against local monitoring data and the basis for modelling. Similar assumptions and uncertainties will apply when drawing up the Action Plan. The Action Plan has to be justified and this will depend on the consultation and validation undertaken in the earlier reviews and assessments.
- Estimates of 'background' concentrations of pollutants derived from source types not explicitly considered by the modelling. These might be based on data from rural monitoring stations or values derived from guidance notes or research reports, such as the "NETCEN maps" published on the Internet (www.aeat.co.uk/netcen/airqual). These factors should have been considered in reviews and assessments.
- Output from the modelling in the form of contour plots or concentration information at key receptor sites within the AQMA and nearby areas. The reviews and assessments may have produced pollution maps of the whole local authority area. The receptors may be those associated with the highest concentrations or those where sensitive individuals may be living or present such as at schools or hospitals.

During the review and assessment process a variety of approaches may have been used to assess the impact of different pollutants or sources and this may lead to inconsistencies. It is important therefore that information used in the source apportionment is, as far as practicable, based on the same assumptions using what are considered the most accurate techniques. Local authorities will need to make their own decision as to the extent to which the information can be harmonised depending on the effort required. However, it may be possible, for example, to rerun some model calculations with meteorological data for a different period or site to improve consistency. On the other hand, a major revision of the emission inventory for a particular sector will probably not be practicable or indeed necessary.

Where concentrations have been derived from the use of simplifying assumptions, such as the percentile to mean ratios suggested in DETR document LAQM.TG4(00): Pollutant Specific Guidance, or the Guidance Note 24 (Guidance for Estimating the Air Quality Impact of Stationary Sources, Environment Agency 1998), it may be necessary to undertake more detailed modelling to reliably assess the impact of

alternative emission scenarios. The following sections rely to some extent on the assumption that robust estimates of the individual contributions from different sources have been made. It is also expected that the extra assessment by the local authority should be kept to a minimum subject to delivering reliable information on the contribution from different source categories.

Assessing the Contribution of Different Sources

The outcome required is an assessment of the relative contribution of different source types (typically traffic, industrial and background sources) to air pollution within the AQMA. This can then be used to help assess the effectiveness of different control options and which of one or more source types should be addressed.

The ideal approach, if sufficient information on release characteristics and a suitable model is available, is to model the impact of all sources. A series of model runs could then be undertaken, progressively introducing emissions from different sectors and thereby enabling the relative contribution of different sectors to be identified.

When full information of this type is not available, surrogate information about the contribution of different sectors, which may have been derived in a variety of ways, will need to be combined in some form. Sectors might be industry (Part A and Part B) traffic, trunk roads or other sources. Information about sectors may have been derived by different methods. The approach adopted will depend principally on the averaging period of the pollutant concerned. For example, it would be possible to simply add the concentrations from different sectors on an annual average basis, but this is unlikely to be appropriate for estimates of percentage exceedances of concentrations associated with short averaging periods, such as 1 hour or 15 minute periods. Short-term impacts from different source types are unlikely to coincide spatially or temporally.

For convenience pollutants have been divided into three groups depending on their averaging period and separate approaches to assess the relative contribution of different source types identified. The groups considered are shown in Table 3 on page 12.

Annual average objective contributions

Provided that the information has been derived on a consistent basis, the annual average contributions from different sources can be added to provide an overall total. The relative contribution from each source type can then be calculated as a fraction or percentage of the total. In the case of nitrogen dioxide the annual average of NO_x can be added and a NO_x to NO_2 conversion factor applied.

A simple spreadsheet model might be developed in order to recalculate the relative contributions and totals when assessing different options for control (see Section 4 on Assessing Air Quality Improvements).

Table 3: Averaging Period of Air Quality Strategy Pollutants

Averaging Period	Pollutants considered
Annual	Benzene 1,3-butadiene Lead Nitrogen dioxide (Annual objective) Particles (Annual objective)
24 hr – 8 hr	Particles (24 hr objective) Sulphur dioxide (24 hr objective) Carbon monoxide (8 hr objective)
1 hr – 15 minute	Nitrogen dioxide (1 hour objective) Sulphur dioxide (15 minute and I hr objectives)

24 hr and 8 hr average objective contributions

It is not possible to obtain reliable estimates of combinations of sources by simply adding the 24 hour or 8 hour average contributions from different sources, since the short-term peak contributions arising from different sources are likely to occur at different locations and at different times. In undertaking Stage 1 to 3 review and assessments, information on the contribution of different sources will have been derived and then combined to give an overall total concentration.

In the case of sulphur dioxide, the major source is likely to be industrial. Concentrations from industry will be superimposed on a general background representative of vehicle and domestic emissions together with remote industrial sources. The contribution from the industry will need to be derived from modelling of the impact of all sources on the AQMA. Following the guidance note LAQM.TG4(00), (Review and Assessment: Pollutant Specific Guidance), it is suggested that the background value for the 24 hour mean is taken to be the annual average concentration in the area. Where the industrial component needs to be more closely defined, for example where there are a number of outlying Part A processes together with more local Part B processes, then a model may need to be run sequentially adding in the emissions from the different sources.

In the case of particles, guidance document LAQM.TG4(00), Review and Assessment: Pollutant Specific Guidance provides information on the assessment of the contributions from the major source types and background concentrations. Where the concentrations in the review and assessment have been derived on the basis of the approach used in LAQM.TG4(00) the relative contributions of the different sources can be derived by the disaggregating the total concentration. Disaggregation involves considering the derived concentrations from sources separately and combined.

For carbon monoxide, the major sources are road traffic and industry. Where separate assessments of the impact of roads and industry have been made and then combined for comparison with the objective in line with LAQM.TG4(00), the relative contribution can be obtained by the disaggregation of the total concentration.

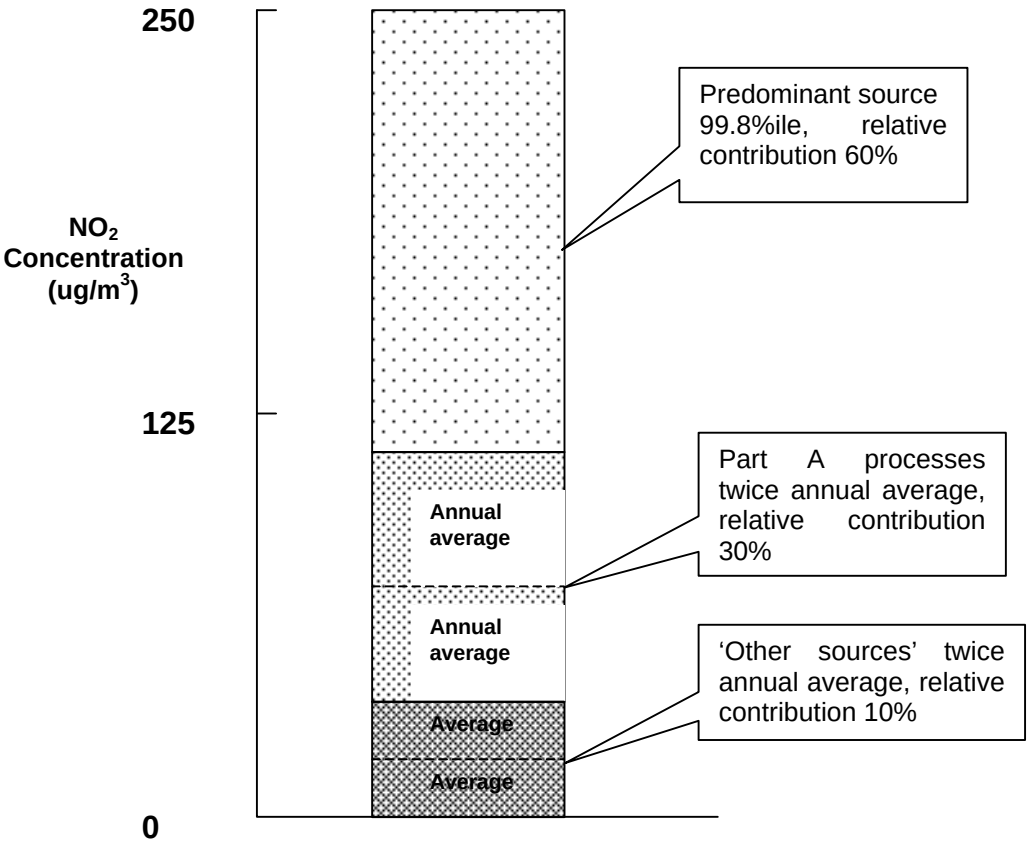
1 hour and 15 minute objective contributions

For the assessment of the 1 hour objective for nitrogen dioxide and both the 1 hour and 15 minute objectives for sulphur dioxide, it can probably be assumed that the peak contributions from low level sources such as road traffic will not coincide with the peak contribution from industrial sources.

For nitrogen dioxide, the peak 99.8th percentile (equating to no more than 18 exceedances a year) for each of the major source sectors (predominantly industry and traffic) should be determined. Based on LAQM.TG4(00), where there is one dominant source sector (for example a Part A process or traffic) then the total concentration can be calculated as the highest 99.8th percentile plus twice the annual average of the remaining sources (including the background concentration).

The relative contribution of the different source types can be estimated by disaggregating the total. Figure 2 gives an example of the relative contributions of different sources to the total NO_2 concentration in an area dominated by road traffic sources but with an additional contribution from two Part A processes. In the example, the 1 hour objective of 200 μgm^{-3} is exceeded by around 50 μgm^{-3}. Where there is a combination of source sectors, none of which is dominant, then one needs to undertake a more detailed assessment as suggested previously.

Figure 2: Example of Relative Contributions to an Exceedance of the 1 Hour NO_2 Objective (99.8th percentile, no more than 18 exceedances per year)



Where there is a single major dominant source for a sulphur dioxide exceedance, the total concentration as the 99.9th percentile of 15 minute means (equating to no more than 35 exceedances a year), or the 99.7th percentile of 1 hour means (equating to no more than 24 exceedances a year) can be calculated as the source contribution plus twice the annual mean background (LAQM.TG4(00)). It may be necessary to distinguish between the relative contribution of different industrial sources, for example Part A or Part B processes, which are impacting on an area, as suggested previously. This can be done, either by running a suitable model a number of times and adding different sources in sequence, or by modelling each source individually.

This latter approach means using sequential meteorological data and storing the concentration output for each hour of the year at a number of receptor points. The output from each source at each receptor can then be combined and a 99.9th percentile of the 15 minute mean concentration calculated from the combined data. This approach is expensive both in terms of effort and computer resources but may be justified if it is likely that a detailed site by site assessment of control options will need to be undertaken.

Presentation of Results

The relative contribution of the different sectors to the objective can be presented in either tabular or graphical form. Where spatially distributed data is being presented a major consideration is likely to be whether the relative contribution is shown at locations where the peak values occur or whether average values for the area as a whole are shown. To some extent this will depend on the area being considered and the magnitude of any changes in concentration. (This is also relevant to section 4: Assessing Air Quality Improvements). If the differences in concentration and the importance of different sources in the area shows little variation, then the average contribution of different sources might be reported. However, where the relative contribution varies significantly then it may be necessary either to divide the area into more homogeneous sub-regions or to report results at a number of key receptors.

What is important here is to present the data in a way which conveys both the necessary technical information and which is also clear and accessible to those who have not been involved in its preparation and who may not have a great deal of technical expertise. It may, therefore, be necessary to devise a number of presentational approaches and a strong emphasis should be placed on graphical representation.

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Section 4: Assessing Air Quality Improvements

Section 3 described how a local authority might investigate the contribution of various emission sources impacting upon an AQMA. The local authority will then need to produce an Action Plan for reducing the contribution of the primary sources, which would typically be road traffic or significant Part A or B processes, but may include some area sources. This will involve the local authority following the suggestions in Section 3 as to how to identify their main contributors, and then following the general approach suggested in this section, to develop and assess improvement options.

Estimating the Improvement Required

Before identifying the options it has available for improving air quality, the local authority will need to determine the overall level of improvement required. This can be calculated simply, in μgm^{-3}, as the difference between the total predicted concentration (from the Stage 3 Review and Assessment) and the relevant air quality objective. This can be expressed in terms of concentration units or as a percentage.

Example 1: an urban area has been identified, where the highest annual average NO_2 value is $44\mu gm^{-3}$, against an objective value of $40\mu gm^{-3}$. The required improvement (in μgm^{-3}) to meet the objective is therefore:

Required Improvement = Predicted Concentration – Objective
= $44\mu gm^{-3}$ - $40\mu gm^{-3}$
= 4 μgm^{-3}

and as a percentage:

$$\textbf{Percentage Improvement} = \frac{\textbf{Required Improvement}}{\textbf{Predicted Concentration}} \times 100 = 9\%$$

It is important that the point of maximum concentration, where exposure is likely, has been identified, and the required improvement is calculated using this information. Having said this, consideration also should be given to the need to allow for some headroom for future development or uncertainty in the overall assessment process. It may be appropriate therefore to seek a greater percentage improvement than would otherwise be required just to meet the objective. However, any additional requirement of this type will need to be properly justified as it will almost inevitably have implications for the costs of compliance.

This general approach to assessing the required overall level of reduction works well for conservative pollutants which do not undergo any significant change as a result of

atmospheric chemistry. However, the assessment of the impact of the releases of nitrogen oxides represents a particular problem as the emission is usually mainly NO which is converted to NO_2 in the atmosphere. A number of empirical relationships have been derived to convert NOx to NO_2, for example, Derwent et al, 1996 (other examples of NOx:NO_2 conversion are discussed in LAQM.TG4(00)). The appropriate factor will vary with source type and where the ambient concentration is made up of contributions from different sectors it is difficult to combine these in a manner which enables the percentage improvement, expressed as NOx, to be calculated robustly. Taking into account these technical difficulties it may be better to present the required reductions of nitrogen oxide compounds in terms of NO_2. For consistency, local authorities should use the same NO_2:NOx relationship in preparing action plans as was used in their Review and Assessment.

An example of how relative reductions from different sources can be calculated is shown Appendix B, Example 2. **It should be noted that this is only one of the methods available and that results obtained will not give precise values and should only be used for indicative purposes**.

Selection of Options to Improve Air Quality

The next stage in the selection and development of options is to identify the sources where controls might be effective in reducing concentrations and which make a significant contribution to the exceedance of a particular objective. This would, for example, exclude most background sources. Control options can then be identified for the “relevant” sources. The Wall Chart provided with this Guidance identifies a large number of control options and while the list is by no means exhaustive, it will provide a good starting point.

Where road transport is identified as a significant major contributor to poor air quality in the AQMA, a wide range of control options can and will need to be considered. In addition to this document, guidance on the potential reduction options is given in DETR document LAQM.G3(00): Air Quality and Transport, and LAQM.G4(00): Air Quality and Land Use Planning, and in the WS Atkins Report *An Evaluation of Transport Measures to Meet NAQS Objectives* (1999). The main requirement will be to obtain estimates of emission reductions as a consequence of a given control option. An example of a method for calculating the required changes in one measure of traffic flow – vehicle kilometres travelled – is shown in Example 3, Appendix B. The measure of traffic used will vary, depending on a number of considerations, not least the standard used in the Local Transport Plan for that particular local authority.

Local authorities may also be interested in the Traffic Management and Air Quality Research Programme (TRAMAQ). This is a six-year programme commissioned by the Charging and Local Transport (CLT) division of DETR to research the effects of traffic management schemes on air quality and/or vehicle emissions. The TRAMAQ programme began in 1998 and currently is due to be completed by 2004/5; the intention of the programme is to provide local authorities with technical advice and guidance so that they can better assess the effects of traffic management on air quality in urban areas. The current programme addresses some of the identified gaps in research, but not all. Further information on TRAMAQ can be obtained from Eric Wyatt, CLT Division, DETR, Tel: 020 7944 2594, E-mail eric_wyatt@detr.gsi.gov.uk.

Where further controls within an Action Plan are required from industrial processes, the appropriate regulatory authority (either the Environment Agency or Local Authority) may need to seek further information from the operators concerned as to the additional control measures which might be applied. The appropriate level of reduction will then be determined in a manner consistent with the appropriate legislative requirements. It will therefore not be possible in most circumstances to identify in advance the level of reduction which can be achieved from industrial processes. To deal with this issue it is suggested that in discussion with the regulator a range of possible scenarios are identified representing, for example, high, medium or low percentage reductions.

In a large number of cases, it will not be possible for individual options to deliver the entire reduction required. Indeed it may be more effective to combine a number of options to deliver the required improvement. It is therefore a key task to identify the optimum mix of options taking into account the considerations discussed in this guidance.

Further Modelling of Options

Initially, local authorities will wish to assess the potential for a wide range of options to reduce air pollution. However, it will probably not be practicable to use complex modelling software to assess all of these and, therefore, a relatively simple screening approach could be used to assemble option packages. These can then be subjected to the other considerations discussed in this guidance, such as cost-effectiveness, non air quality impacts and practicability. Once a "shortlist" of possible emission reduction scenarios have been identified, further detailed dispersion modelling will need to be undertaken to properly assess the improvement in the area of exceedance or AQMA. Where a number of control options have been identified they can be combined into different scenarios and their ability to deliver the required level of improvement considered.

The percentage reduction in emissions of a particular pollutant will not necessarily result in an equivalent reduction in the ambient concentration due to background sources, or changes in the temporal or spatial patterns of emission. The local authority should run a dispersion model for all sources for a number of reduction scenarios in order to obtain a more accurate estimate of the overall improvement. The dispersion modelling will in essence be similar to the predictive modelling carried out for Stage 3, but with source modification. It may also be possible to limit the number of receptors to those of particular interest in order to reduce computer run-times or create simple spreadsheets for repetitive analysis of options. Further guidance may be found in LAQM.TG3(00) and LAQM.TG4(00).

References

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Section 5: Cost-Effectiveness

One of the key features of an Air Quality Action Plan is that the measures it proposes must be cost-effective. This suggests that some form of analysis of the costs and benefits is required, although a formal "Cost-Benefit Analysis" is not necessarily needed or in fact desirable. It should also be noted that the benefits needn't be restricted to the air quality benefits, although these are of the greatest importance in AQAPs, and the costs go beyond simple implementation costs. This section sets out how local authorities can approach cost-effectiveness while Appendix C provides some of the more detailed elements of formal cost-benefit approaches.

The DETR guidance document LAQM.G2(00) (Developing Local Action Plans and Strategies) states that in developing an action plan '*Local authorities must ensure that the relative contributions of industry, transport and other sectors to improving air quality are cost-effective and proportionate…'*

To assess the cost-effectiveness of a measure, two elements are involved. The first assesses the likely reductions in emissions or air quality benefits of a measure, along with the consequential non-air quality effects. The second assesses the costs of implementing the measure, while also considering knock-on costs or possible revenue streams.

Guidance on how to assess the air quality improvements from measures is presented in Section 4 and the non-air quality impacts are looked at in Section 6. This section describes how to assess the costs of measures and to combine these data to assess cost-effectiveness.

Cost-Effectiveness

In any area, there are a potentially large number of different measures that could be implemented to improve air quality. An important component of developing an action plan or air quality strategy is the comparison of these options against each other to allow selection of the most appropriate measure or combination of measures to achieve the necessary air quality improvements.

One of the key criteria recommended in Government guidance is to assess measures in terms of their cost-effectiveness. The cost-effectiveness of a measure typically provides a guide to how much it costs to reduce one tonne of emissions or to improve air quality by 1 μg/m^3. Expressing different measures in this way allows their direct comparison. More importantly it allows prioritisation of measures and should provide the basis for developing a cost-effective action plan.

Precise calculations of cost-effectiveness will not, in most cases, be possible. It is important, however, that local authorities can demonstrate that they have considered a range of options and have attempted to quantify their costs. In drawing up the

measures to be included in an action plan, those measures which achieve greatest air quality improvements for least cost should be included first. Progressively more expensive measures are then added until the target air quality improvement is achieved[1].

Determining cost-effectiveness provides a mechanism for achieving the required air quality improvements for least cost, and therefore provides the optimum action plan in terms of economic efficiency. However, as later sections will illustrate, when prioritising measures for inclusion in an action plan, other criteria are important and should be assessed alongside the traditional economic assessment. These include, but are not confined to, other environmental effects, social impacts, acceptability of options, and secondary economic effects (see Section 6 on assessing the non-air quality effects).

Assessing Cost-Effectiveness

To undertake a full cost-effectiveness assessment can be a detailed and time-consuming activity and, as noted above, local authorities will probably not have to carry out such detailed studies. However, the following methodology might, in some cases, serve as a useful guide.

Firstly, when considering the costs of measures, especially from diverse sources or in different sectors, it is important that economic information is expressed in equivalent terms. There is often a tendency for people to ignore important differences in information that can have major effects on the relative costs of a measure. In interpreting cost data it is important to know when the cost information was compiled, whether the costs have been discounted over time, and what assumptions are included in the estimates with respect to the lifetime of the measure or scheme. Standard methods should be used in any cost analysis. Costs are usually expressed in terms of equivalent annual costs (or annualised costs), so that differences in terms of lifetime can be incorporated in the comparison. These costs can be calculated using the methods outlined in Appendix C, although once again, this is included for information purposes – it is not suggested that local authorities have to follow this particular methodology.

Guidance from the European Environment Agency is available on how cost data should be expressed and how it should be interpreted for stationary abatement technologies. The guidelines can be found on the EEA website (*http://www.eea.eu.int/*) (see environmental themes). A summary is also presented in Appendix C. The same principles apply to non-technical measures for control of mobile sources. However, there are some important differences for such measures.

Most of the cost data in the literature focuses on stationary abatement measures. Less data is available on the costs of non-technical measures, particularly transport measures and economic and fiscal instruments. The reason is that the costs of these schemes are more difficult to assess as there are fewer examples available and they are usually extremely site specific.

[1] However, it must be considered that some measures that are cost-effective in a wider sense may have only a small potential to reduce emissions. This may mean that if a larger reduction in emissions is required, a less cost-effective measure is chosen.

Study Boundaries

In interpreting cost data, it is important that all economic and cost implications are taken into account. This means that the study boundaries must not be artificially truncated. For example the cost implications of an action plan should not be artificially constrained to the geographical area of the authority itself, where there are potential effects in areas outside the authority's control, and it should also consider knock-on or secondary economic effects that arise from measures. It will generally be enough, however, for local authorities to acknowledge in general terms the possible effects of their action plans on surrounding areas; precise calculations of costs and benefits beyond the authority's own boundaries will not be necessary.

To illustrate, previous studies on local transport measures (WS Atkins, IVM) have concluded that some transport schemes might be cost positive, i.e. they generate income. These include road user charging and parking policy. However, these analyses have been constrained to the implementing authority alone - whilst the introduction of such schemes may generate revenue for the local authority, they introduce additional financial cost to the local community and economy, i.e. they merely transfer costs to another group. Moreover, the secondary impacts of such schemes must be considered. Care must be taken that such schemes do not lead to social or economic exclusion, that they do not have knock-on effects on local industry or employment, and that they do not simply shift the problem elsewhere, e.g. to people switching to out of town developments or even other areas. However, by the careful combination of a number of scenarios, the overall net cost can be minimised; such combinations are also more likely to be effective than relying on just one or two options.

Existing Information on the Costs of Measures

Previous studies for the DETR and the European Commission have assessed the cost-effectiveness of measures for air quality improvements (e.g. DETR, AEA Technology Environment, WS Atkins, EC). These data sources provide estimated costs per tonne and costs per $\mu g/m^3$ for PM_{10} and NO_2 for different measures and further details on cost data and methodologies will be provided in the next guidance.

The air quality and non-air quality impacts, and the cost data, can be combined to rank different measures for inclusion in an action plan and to compare against other criteria for assessment. However, it is stressed that more detailed analysis will be needed to properly assess the financial costs of implementing the most promising measures.

References

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Section 6: Non Air Quality Impacts

Having identified the need to develop an air quality action plan or strategy, local authorities must consider their options for the achievement of the air quality objective(s) in question. In assessing these options and identifying potential mitigating measures, it is important that local authorities consider socio-economic and wider environmental impacts from the options and measures, where possible. This will contribute to a local authority's achievement of sustainable development objectives, and will assist with the emerging development of *Community Strategies* for promoting improvements in the social, economic and environmental well-being of their area.

Air Quality Action Plans will work best when they enjoy public support and where they strike a balance between environmental and other objectives or where environmental benefits combine with social and economic benefits (so called win-win-win scenarios). The achievement of air quality objectives must therefore not be considered in isolation. Some measures to improve air quality, such as the implementation of a *Home Zone* or *Low Emissions Zone* may have potentially significant socio-economic impacts which must be explored fully. It is therefore imperative for an authority to consider any measures as a total package, and consider how they might impact when applied together. A series of local traffic management and transport-related measures proposed for the pursuit of securing air quality objectives might not, for example, support local road safety targets or an authority's climate change targets for reducing CO_2 and other greenhouse gases, such as nitrous oxide (N_2O) and methane (CH_4).

An action plan should therefore be developed in conjunction with other processes. Government guidance makes it clear that other issues must be balanced against measures intended to address air quality objectives.

"*Where authorities consider that local transport measures can help improve air quality, they should include them as part of a balanced air quality strategy. Local authorities must ensure that the relative contributions of industry, transport and other sectors to improving air quality are cost-effective and proportionate*". (ref. Par 1.11, LAQM.G2(00)).

"*The actions that authorities take to reduce emissions of air pollutants … are likely to help reduce greenhouse gas emissions too*". (ref. par. 1.12, LAQM.G2(00)).

Socio-Economic Impacts

Socio-economic impacts may occur where local business and industry is affected by certain measures proposed (either directly or indirectly through changes in transport provision). In addition, some initiatives such as vehicle emissions testing or by-pass schemes may impact upon lower socio-economic groups to a greater extent, which

may not be socially acceptable. The **key action points** in relation to assessing the socio-economic impacts of options considered are:

- To liaise with local communities likely to be affected so as to assess the likely impact of the options proposed, using techniques such as surveys, public meetings and focus groups (NSCA, 1999), and consult with *Community Officers* as appropriate.
- Consider the use of techniques as applied in Social Impact Assessments (SIAs) (see Morris & Therivel, 1995).
- Ensure that the action plan is complementary to any emerging *Community Strategies* and *Sustainability Strategies.*
- Ensure that particular sectors or social groups are not unfairly penalised.

Climate Change Programme

Climate change policy is closely associated with LAQM policy, and the Government has set a target to reduce carbon dioxide (CO_2) emissions by 20% below 1990 levels by 2010. Many measures to reduce CO_2 emissions will also deliver other benefits including improvements in air quality. However, some measures to secure local air quality improvements can result in an overall increase in CO_2 emissions, e.g. park and ride schemes. As such, the **key action point** in relation to assessing the impacts of proposed measures on climate change is:

- To assess the impacts of each proposed measure, and group of measures, with regard to any potential increase in CO_2 emission, which may compromise future objectives of the Climate Change Programme.

Local Transport Plans and Travel Plans

Local Transport Plans, Travel Plans (formerly known as Green Transport Plans) and Air Quality Action Plans will all have a significant bearing on each other. Every effort should be made to ensure that measures proposed in LTPs and Travel Plans complement those in the AQAP. Conversely, Action Plans should be checked to ensure that they will not adversely affect the aims and objectives of Transport Plans. In short the plans should, wherever possible, be compatible and any divergence justified. The **key action points** in relation to local transport plans and green travel plans are:

- Ensure that subsequent submissions of the LTP contain policies to improve air quality, particularly in relation to sensitive receptors and designated AQMAs. This may be addressed through the annual progress reports submitted in July each year.
- Promote policies that will advance a modal shift from private vehicle to public vehicle use.
- To encourage the implementation of Travel Plans.

Noise

The European Commission has now published a Draft Directive on the Assessment and Management of Environmental Noise, which is likely to come into force in 2001/2. When implemented this will require an assessment of noise in major urban areas, and from major roads, airports and railways, through noise mapping. This will

lead to the development of noise action plans; local authorities should consider what such an action plan might be and balance that against any Air Quality Action Plan. The **key action point** in relation to noise is:

- Ensure that measures in the AQAP do not adversely impact on noise levels, and that they will complement any future noise strategy.

Waste Management

The Government has recently set targets for waste management to be achieved by 2005, 2010 and 2015. The resultant waste management strategies may impact on AQAPs and vice versa. The **key action points** in relation to waste management are:

- To encourage and promote policies that seek to reduce traffic related impacts from waste transfer activities (waste traffic movements, dust re-suspension).
- Ensure that measures in the AQAP complement those in the Waste Strategy and vice versa, for example in relation to siting of waste management facilities.

Other Non Air Quality Impacts

Other potential non air quality impacts include safety issues (road and personal safety), land-use development issues, financial implications, potential for increased nuisance (e.g. noise), accessibility and visual amenity. There is much scope for local variations in such impacts, and wide variation in political and communal acceptance of potential 'trade-offs'. The **key action points** in relation to assessing the non air quality impacts of options considered are thus:

- Consult widely with interest groups, the community, political decision makers and other stakeholders on specific measures and their potential impacts from the outset;
- Where possible include the identified impacts in the final decision-making process with respect to ranking options for implementation.

To assist with the consideration of as many non air quality impacts as is practicable and possible, potential options and their likely impacts and consequences are provided in Appendix D. The list of options and impacts outlined is by no means an exhaustive list. Local circumstances will influence the extent to which proposed options will impact upon the community, and a local knowledge and understanding is of paramount importance in determining the most effective and more favoured options for the community. It may be advantageous to implement potential initiatives or measures simultaneously. Where, for example, a new road is proposed for which air quality improvement is one objective, options which include provision of non-vehicle travel facilities (e.g. cycleways, footpaths) and public transport facilities (e.g. shelters, improved routing) may be more effective if implemented together than if they were considered as isolated schemes and initiatives.

Some useful references are provided below, some of which illustrate resulting road traffic reduction from a number of transport initiatives.

References

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National Society for Clean Air and Environmental Protection Working Group on Air Quality Action Plans (AQAPs)

Section 7: Perceptions and Practicability

Perceptions of air quality problems and their solutions will have a significant impact on how successful and effective an AQAP will be. In addition, measures proposed must be practicable for the various circumstances of the local authority. Just how practicable the proposed measures within the Action Plan are, may or may not be linked with the perceptions of these measures by the public, politicians, industries and commerce, stakeholders and local authority generally. In this section, measures and options referenced within this guidance document will be reviewed in relation to the concerns and difficulties they might invoke. In addition, the practical implications for a number of mitigating measures will be considered. Where possible, actions to mitigate negative responses from the variety of stakeholders will be reviewed, and suitably practicable actions outlined.

Perceptions

Within this section, the perceptions of four groups have been considered: the public, industry and commerce, politicians and other local authority functions and regulators.

Public Perception

Members of the public should see a number of benefits as a result of an AQAP, including a reduction in vehicle and industrial emissions. Such perceptions may also go wider to include, for example, noise and road safety benefits. The general public perception is that these issues will be dealt with in an Air Quality Action Plan. The **key action points** for consideration are:

- In selling the AQMA to the public, a local authority should emphasise the wider quality of life benefits as well as the air quality and health benefits.
- Emphasise positive aspects of the AQMA in terms of peripheral benefits.

There are two main types of AQMA and each will be perceived differently by the public. It is recognised that other types of AQMA will be designated and some will be a combination of both.

- Air Quality Management Area largely declared because of local traffic emissions (majority of declared areas). In these cases initiatives may be seen negatively as encroaching on freedom of car owners.
- AQMAs largely declared because of local industrial emissions causing exceedances (minority of declared areas). Action to reduce emissions more likely to receive public support and to be perceived positively in the community with a minority having a negative view if they have a strong economic link (e.g. employees, contractors).

Perception by Industry and Commerce

In the main, industry and commerce will perceive Air Quality Action Plans as an

increased cost base for their business, unless offset by some other benefit. For example, a transport manager may feel negative about the cost of either retrofitting his fleet with low emission technology or replacing some of the vehicles with low emission types unless the spin off is significant, e.g. priority access into central areas, reduced cost of vehicle excise licence etc. The **key action points** in relation to industry and commerce are:

- The local authority will have to sell the AQAP through the positive aspects with the industry in question, for example positive consequences for the public relations of the company if it is seen to be 'green'.
- It might be possible to persuade companies that the health and well-being of their staff and the quality of the local environment in an AQMA should have a positive effect on recruitment and retention.

Perception by Politicians

Politicians will be looking at the balance between desirability and benefits of the schemes compared with public acceptance and support for them. The **key action points** in relation to politicians are:

- Examine the political acceptability of each proposed measure and stress positive aspects.
- To ensure that the council is setting a good example by implementing AQAP measures *in-house*.
- Ensure politicians are aware of their legal obligations (i.e. they are required to designate AQMAs and draw up action plans and required to work towards the objectives).

Perception by Other Authority Functions, Regulators and Agencies

Different authority functions will require AQAP measures to complement and integrate within their specific departmental and corporate programmes and strategies. Good working relationships should be fostered between various local authority departments. Reaction to working with other local authority colleagues should be positive, as the underlying principles of LAQM and the Action Plan complement overarching Council initiatives such as Local Agenda 21 and Community Planning, Best Value and EMAS. The **key action point** in relation to other local authority planning functions is:

- Inter-linking with other local authority policies, programmes and strategies within the Action Plan (see Section 2).

With regard to other regulators and agencies, such as the Environment Agency, it will be necessary to foster a positive attitude by working in close partnership with them and with industry to achieve a cost-effective proportionate solution to any specific industrial emissions problem. This is also the case with respect to the Highways Agency. The key action point with regard to other regulators or agencies is:

- Early collaboration and dialogue with regulator or agency.

Specific actions relating to likely perceptions generated by different action plan measures are outlined in Appendix E. It should be noted that this is by no means a comprehensive list and is given for indicative purposes only. Due to the wide array of local circumstances it would be impossible to outline every eventuality.

Practicability

It is important that measures proposed in the AQAP are practicable in order to gain the respect and involvement of other stakeholders in the development of the Action Plan or Strategy. The practicability of any single measure, or more usually, group of measures will be dependent not only on the perceptions of the groups outlined above, but also on local circumstances. This may be in relation to economics, geography, politics, the relationships with some of the key stakeholders involved or the presence of other complementary initiatives and measures.

Some of the practicabilities of the various measures and options have been outlined in Appendix E. It should be noted that this is by no means a comprehensive list and is given for indicative purposes only. Due to the wide array of local circumstances it would be impossible to outline every eventuality.

The **key action points** in relation to assessing the practicability of various measures are:

- Liaise with local authorities or other agencies that have already implemented the proposed action in other locations.
- Liaise with other local authority departments, neighbouring authorities and other agencies and organisations to assess the likely practicability of proposed measures.
- Where the proposed AQAP actions require enforcement for them to be successful, liaise with the enforcing body involved so as to ensure that the measures in question can and will be enforced effectively and the resources will be made available.

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Section 8: Prioritising Options for Action Plans

Having identified the sources responsible for exceedances within the AQMA and calculated their relative contributions (Section 3), developed a list of options (with the assistance of the Wall Chart), assessed the costs and impacts of the options (Sections 4, 5 and 6), and looked at the practicability of each (Section 7), local authorities will need to assess which of the options are preferable using the information they have gathered. This Section discusses possible methods for doing this and highlights some of the issues which need to be considered.

The further a local authority progresses through the Local Air Quality Management process, the more local circumstances and considerations come into play, and therefore the more different local authorities will diverge in their methods and approaches. This means that opinion, and both professional and political judgement, together with the development of consensus will become increasingly valuable, and generic guidance of less worth.

The penultimate stage in the Action Plan development process, immediately prior to the drafting stage, is to prioritise the options generated at earlier stages and analysed through subsequent stages. The intention is to provide an Action Plan in which the "most preferable" options are undertaken first and the "least preferable" last, although to an extent this depends upon what is defined as preferable. In other words, some form of "option ranking" will need to be carried out.

At it simplest level, option ranking involves assigning to each option its cost and the quantified benefit that is expected to accrue from it. The benefit is divided by the cost and the options listed, with those having a large benefit:cost ratio (i.e. high benefit and low cost) appearing towards the top of the list. The Action Plan then consists of proceeding down the list until the air quality objectives can be met; the options lower down the list (with lower benefits and higher costs) may not be implemented at all.

However, this simplified approach makes several fundamental assumptions:

- that all costs and all benefits can have numerical values attached, and that these values are both compatible and comparable;
- that all the costs and benefits have been considered and factored in;
- that all costs and all benefits are to be treated equally;
- that each of the options is equally desirable, or at least that desirability is directly proportional to the benefit:cost ratio;
- that each individual option is both possible and practicable;
- that each agency responsible for each option is willing and able to undertake it;
- that it is desirable only to proceed to the current air quality objectives and that non air quality benefits beyond this are irrelevant;
- or conversely, that options are available to achieve the air quality objectives and that those responsible are prepared and able to implement them all;

- that the options operate in isolation and that there are no synergistic effects;
- that there are no external pressures, for example from other plans and strategies, which will affect the choice of options; and
- that the options under consideration can all be held to be in proportion to the problem.

In reality, these assumptions cannot be ignored and are likely to shape Air Quality Action Plans to a very great extent. Nevertheless, the basic principle of implementing the high benefit/low cost options before low benefit/high cost options is basically sound. However, it is extremely difficult to set out a process for doing this which will apply to all local authority scenarios and circumstances, even at the general level. In the majority of cases, there will be non-numerical costs and benefits or external pressures, which means that option ranking will be strongly influenced and informed by intuitive decision making, professional judgement and, above all, effective collaboration and consultation. In its *Consultation for Local Air Quality Management: The How To Guide*, the NSCA set out a series of principles for consultation:

- **An overall, agreed process**
- **Flexibility**
- Clear scope
- Openness, trust, honesty and transparency
- **Inclusiveness**
- **Common information base**
- Diverse methods to help build common ground
- Shared responsibility for outcomes and implementation
- Attention to detail

Given the complexity of the issues and the need to ensure a common information base, it is likely that the methods used, at least initially, will tend to concentrate on small interest groups, rather than “mass consultation”. To assist in the development of the information base, local authorities could develop a table, much like that used in the Wall Chart, to summarise the information attached to the various options. Completing this table may provide a focus for the consultation process.

Ideally, the outcome of the *options ranking* process is a clear list of numbered options to be implemented in turn. Practically, the more likely result will be a series of groups of varying preference, each with a number of options within them. In this way, the local authority, together with its partners, can start to develop the most appropriate mix of package of options which will form the focus of the Action Plan. It is important that the information flow with respect to the potential effects of the various individual actions and series of actions, in terms of air quality and non air quality impacts, is maintained.

In developing processes for prioritising options for inclusion in Air Quality Action Plans, a number of different approaches exist and there is clear scope for local authorities to develop innovative methods of their own. As more and more authorities declare Air Quality Management Areas and initiate the process of Action Planning, so more approaches will be developed. NSCA will be monitoring the development of AQAPs to inform the next guidance document on developing action plans, for Spring 2001.

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Section 9: Where Do We Go From Here?

This interim report has attempted to provide the basis for initiating the development of an Air Quality Action Plan, and more importantly for outlining the various elements of a plan which require consideration. Currently, few authorities in the UK are in the process of developing their action plans, and as such there is little experience of air quality action planning to learn from.

In Spring 2001, the NSCA will produce a second and more comprehensive piece of guidance, complementing and expanding upon the themes discussed in this interim guidance. It is anticipated that the subsequent guidance will incorporate examples and local authority scenarios to illustrate and demonstrate practice underway, and the intervening period will allow for ideas and experiences from the wider community to be represented.

Action Plans, as with air quality strategies and other elements of the local air quality management process, are not static, and thus will evolve over time. Periodic review of action plans will be necessary to ensure their effectiveness and appropriateness. Guidance on Air Quality Action Planning will therefore evolve and develop to take into account issues emerging over the months ahead.

If you have any comments on this interim report, or any information or experiences of action planning which you consider might be useful for the forthcoming guidance, please contact Tim Williamson at the NSCA:

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Appendix A: Checklists for Local Authorities and Agencies

To assist local authority departments and external agencies with their role in developing and implementing an action plan, a series of checklists are provided below. These checklists are intended to summarise some of the key ways in which the actions and policies of various local authority departments and external agencies can impact on air quality and/or complement the development of Air Quality Action Plans. Local authority environmental health officers may wish to use the checklists in collaboration with planning colleagues, and may wish to provide their planning colleagues with a copy of the checklist.

Local Authority Planning Checklists

Regional and Agency or Authority Checklists

Local Authority Planning Checklists

Land Use Planning

Underpinning any action plan to deliver effective air quality improvement is a Local Plan that recognises the importance of air quality as a criterion along with other wider-environmental criteria. The Town and Country Planning system in the UK controls both the spatial and geographical development, together with the specific characteristics and orientation, of individual schemes and proposals. The long-term strategic planning of settlements, industry and overall infrastructure can affect local air quality as a consequence of traffic generation associated with development. Strategic planning must therefore be sensitive to the need to improve local air quality along with the wider local environment.

Development Control, through processing individual planning applications, is an important tool for promoting more sustainable travel patterns and hence minimising traffic generation; Development Control Planners may also influence the siting of industrial processes which release substances and thereby impact on an AQMA. A Town or City Centre Management Strategy addresses the quality of the built environment within an urban centre and should

focus on encouraging the sustainable movement of people in and around the vicinity of the town or city centre. Action on the part of building control officers can encourage the promotion of emission-reducing heating technologies.

County councils, metropolitan district councils and unitary authorities have a responsibility, as minerals planning authorities, to consider applications for mineral extraction, with respect to potential environmental effects. Waste planning authorities are responsible for developing waste policy and the planning framework in which the waste management industry should establish appropriate waste management facilities.

Checklist 1: Local Authority Land-Use Planners (Strategic and Development Control Planners, Building Control, Town Centre Management)

Guidance is already available on strategic and development planning and the potential for wider-environmental impacts, including air quality. The checklist criteria below is intended to complement the widely-available guidance and provide indicators for planning colleagues involved in the implementation of specific action plan measures and in developing policy for air quality improvement.

Strategic Planners

- Provision of information on large scale planning applications and proposals, which may directly or indirectly cause potential increases in air pollution to environmental health colleagues.
- Provision of guidance for prospective developers, property owners, business ventures on reducing any potential for traffic-generation as a result of any proposals submitted.
- Re-address and enhance policies to promote schemes and initiatives to minimise traffic generation through planning agreements and conditions.

Development Control

- Ensure AQ impacts are considered fully when an *Environmental Impact Assessment* is required (should be required automatically).
- Ensure AQ impacts are considered fully when a *Traffic Impact Assessment* is required (i.e. where increased traffic volumes anticipated are approximately 5%).
- Consider AQ impacts where traffic volumes are anticipated to increase on roads within or near to the Air Quality Management Area.
- Submit regular planning application list to environmental health.

Building Control

- Explore policies to encourage the promotion of emission-reducing technologies in new developments and buildings.

Town Centre Management

- Re-address and enhance policies to promote the more sustainable movement of people in and around the vicinity of the town or city centre.

Checklist 2: Mineral Planning and Waste Management

Mineral Planning

- To encourage and promote policies which seek to reduce traffic-related impacts from mineral extraction activities (freight movement technologies, dust re-suspension).
- To encourage and promote policies that seek to minimise particulate emissions from mineral extraction.

Waste Management

- To encourage and promote policies which seek to reduce traffic-related impacts from waste transfer activities (waste traffic movements, dust re-suspension).

Environmental Health and Quality

Environmental health departments deliver a wide range of services and functions, as well as facilitating LAQM and pollution control, and may include the implementation of the climate change programme and energy policy and strategy. Where possible, strategies should support the requirements of the air quality action plan and where this is not possible, measures should be introduced to offset any conflicts. Pollution control is responsible for the regulation of Part B processes and is a statutory function for environmental health, also being an important function to monitor air quality trends.

Non-statutory functions within environmental health may assist in delivering an air quality action plan, including the implementation of an Environmental Management System across an authority and the implementation of Best Value and performance plans. Such functions may be undertaken by other authority departments within some authorities. Community Planning is emerging as a mechanism for delivering improved socio-economic and environmental well-being in local communities.

Checklist 3: Pollution Control & Environmental Health and Quality

Pollution Control

- Ensure regulation of Part B Processes (and A2 installations under IPPC) complements aims of the Action Plan.
- To ensure that for new processes, chimney height calculations take account of AQS objectives.
- Ensure all boilers (>5MWth) using fuel oil or coal are identified, if not already, through the development of a procedural process during process visits.
- Encourage techniques to suppress dust further from regulated processes.

Environmental Quality

- Ensure programme of monitoring is established to monitor performance of Action Plan in relation to air quality improvements.
- Ensure effective communication between all those involved in developing and ultimately implementing Action Plan is maintained through effective mechanisms (regular meetings, bulletins, and web presence).
- Encourage housing officers to identify properties for home improvement programme focus (see checklist 4).

Checklist 4: Energy Management

Energy Management

- Ensure measures outlined in the Action Plan complement those actions and measures identified within energy management strategies, and conversely ensure that measures in the energy management strategy complement those within the AQAP.
- Encourage home improvement programmes that seek to improve heating system efficiencies, insulation improvement and other such initiatives.

Transport Planning

Where transport is the major contributor to air quality objective exceedances, effective transport planning and management can be used not only to reduce overall emissions in the long term, but also the spatial extent of such emissions. Strategic transport planners are responsible for developing *Local Transport Plans* (LTP), which set out a five year local transport strategy and form the mechanism by which capital is obtained from central Government for implementing local transport schemes. Transport planners in most cases will also be responsible for commuter plans under the umbrella of travel awareness initiatives. Traffic management (or Highway Engineers) are responsible for the implementation of physical highway works, for example road design and traffic calming, and in some cases network management. Policies developed for a council vehicle fleet can impact upon sustainability principles and local air quality.

Checklist 5: Transport Planning, Highways Engineers and Fleet Management

Strategic Transport Planning

- Ensure that subsequent submissions of the LTP contain policies to improve air quality, particularly in relation to sensitive receptors and designated AQMAs. This may be addressed through the annual progress reports submitted in July each year.
- Promote policies that will advance a modal shift from private vehicle to public transport use.
- Encourage the implementation of green commuter plans.
- Focus upon access routes in relation to adverse air quality impacts.

Highways Engineers

- Ensure traffic management schemes implemented complement the aims of the AQAP.
- Seek to undertake joint air quality monitoring schemes to investigate the impacts of traffic management on air quality.
- Focus upon junctions in relation to adverse air quality impacts.

Fleet Management

- Encourage the use of alternatively fuelled vehicles within council fleets.
- Encourage the efficient use of council vehicles (i.e. share cars where possible, provide financial incentives by, for example, changing the mileage system).

Economic Development, Tourism and Regeneration

Economic development planning involves securing and encouraging economic vitality and stability through the implementation of plans, policies and strategies. Stimulating economic regeneration is a key objective for local authorities, and particularly those within historically more deprived regions and localities. Policies and strategies seeking to develop the local economy may unintentionally conflict with the overall aims of an Air Quality Action Plan and strategy. Thus a balance in achieving apparently divergent aims must be sought. The same principle may apply to tourism plans and strategies, which seek to generate economic development, whilst potentially impacting upon the socio-environment of a community.

Checklist 6: Economic Development, Tourism and Regeneration

Economic Development and Regeneration

- Ensure that economic development strategies, regeneration strategies and tourism plans do not have an adverse effect on air quality.
- Ensure that measures outlined in the AQAP complement measures in the economic development strategy and conversely those measures in the economic development strategy complement those within the AQAP.

Tourism

- Where appropriate, ensure that tourism strategies promote measures consistent with the AQAP, e.g. to encourage the use of public transport, promotion of natural habitat and environment and sympathetic means of seeing and using the countryside (cycling, walking).

Sustainable Development

Improving local air quality is embraced within the Government's sustainable development principles, and as such air quality has emerged as a local sustainability indicator for many local authorities. Sustainable development policies within local government are often co-ordinated through the Local Agenda 21 programme, and an Air Quality Action Plan should embrace the overall aims of sustainable strategies within local government.

Checklist 7: Sustainable Development

- Involve the Local Agenda 21 officer (or equivalent) in the Action Planning process. There is close synergy between the AQAP and sustainability strategies.
- Collaborate closely with the Local Agenda 21 officer (or equivalent) in order to exchange information and ensure that the AQAP and LA21 strategy complement each other.
- Utilise the skills of the Local Agenda 21 officer, for example depending on timing, it may be possible to undertake a joint consultation exercise with other elements of the LA21 strategy.

Education Services

The education services of county-level government, or unitary authorities, can play a vital long-term role in incorporating and disseminating information to widely varying audiences, either through established mechanisms or through campaigns and partnership arrangements. Education, along with implementing specific policies and measures to

improve air quality will, in the long-term, be more effective in influencing travel behaviour to a greater extent than policies and measures alone.

Checklist 8: Education Services

- Seek development, or further development, of school curricula in respect of science, society and the environment, such that the links between transport, travel behaviour, social and environmental impacts (including air quality) are explored and explained.
- Develop local campaigns, which seek to inform of the links between health, air quality and the need to develop and implement certain actions (as part of an Action Plan).

Checklist 9: Authority-Wide Initiatives

- Best Value
- EMAS / Environmental Audits
- Local Authority Performance Plans
- Community Planning
- Authority Travel Plans

Chief Executive and Policy Unit

The Chief Executive and Policy Unit of local authorities will be required to endorse decisions relating to action plans, and thus need to be involved with the development of Action Plans for which policy decisions may be affected and financial commitment sought.

Checklist 10: Chief Executive and Policy Unit

- Ensure that Chief Executive and Policy Unit are aware of the need for an AQAP.
- Ensure the measures outlined in the Action Plan do not conflict with council policy.
- Ensure that the time scales for the development and implementation of individual and groups of measures are recognised by the council.
- Marketing and press should anticipate interest from various sectors of the community, and in particular industry, commerce and the general public, and should prepare positive messages accordingly.

Treasury Department

Finance departments will need to be made aware of action plans for which financial commitment may be sought in the long term.

Checklist 11: Treasury Department

- Ensure proposed timetable for Action Plan implementation is recognised and financial implications fully appreciated by Treasury.

Regional and Agency or Authority Checklists

Regional Development Agency (RDA), Welsh Development Agency

Regional Development Agencies were formally established in eight English regions in April 1999, with the ninth, in London, established in July 2000 following the establishment of the Greater London Authority (GLA). Their objective is to co-ordinate regional economic development and regeneration, and to enable the English regions to improve their relative competitiveness and reduce the imbalances that exist within and between regions. RDAs have a statutory duty to further economic development and regeneration, promote business efficiency, investment, competitiveness and employment, whilst also contributing to sustainable development. In Wales, these functions are undertaken by the Welsh Development Agency, which pre-dates both the English RDAs and the National Assembly for Wales.

A local authority must reflect upon how potential air quality improvement measures and options may or may not impact upon the aims and objectives of the Regional Development Plan (RDP), and conversely understand the level to which planning proposals in the RDP may impact upon the effective implementation of measures to improve air quality. It is likely to only be a consideration, where planning proposals are sufficiently large in scale to cause significant impact upon proposals within the Air Quality Action Plan.

Checklist 12: Regional Development Agency (RDA), Welsh Development Agency

- Seek collaboration with the RDA to ensure that any measures outlined in the AQAP complement measures within any regional planning, transportation and regeneration strategies and conversely that proposals within regional strategies complement those within the AQAP.

Government Offices, National Assembly for Wales

Government Offices strengthen the co-ordination of main Government programmes and policies at the local level, and ensure that business and local government have one point of contact in relation to matters including the environment and transport. Sustainable development, regeneration and social inclusion are all issues for which some action planning measures can assist, and Government Offices thus provide an opportunity for helping develop coherent action plans for authorities requiring similar solutions within a particular region. Again, this function is carried out in Wales by the National Assembly, which took on the functions of the Welsh Office when it was formed.

Checklist 13: Government Offices (GO) and National Assembly for Wales

- Seek collaboration with the Government Office or National Assembly for Wales to ensure that any measures outlined in the AQAP complement measures within any regional transport strategy.

Environment Agency (EA)

The Environment Agency currently regulates approximately 2000 of the potentially most polluting or technologically complex industrial processes under Integrated Pollution Control (IPC), Introduced by Part I of the 1990 Environmental Protection Act (EPA90). However, this

is progressively being replaced by the requirements of the Pollution Prevention and Control Regulations, which implement the European Community (EC) Directive 96/61/EC concerning integrated Pollution Prevention and Control ("the IPPC Directive"). The Agency is also required to have regard to the requirements of the National Air Quality Strategy and therefore has a key role to play in helping to deliver the requirements of Action Plans in areas where emissions from major industrial sources are an important contributor to poor air quality.

Where such processes are a significant contributor to a breach of a national air quality limit or objective, the local authority should liaise with the Agency to identify the sites concerned, although, in the majority of cases this will already have been done as part of the review and assessment process. For these processes, the Agency will review and where appropriate amend operating conditions, taking into account the relative costs and benefits of the different pollution control techniques. Since each site must be considered on its merits it will not be possible to identify the percentage reduction in emissions which can be achieved from industrial processes before the review has been completed.

Checklist 14: Environment Agency (EA)

- In areas where Part A processes (or A1 installations) are causing exceedances of the air quality objectives, close collaboration with the regulator is required to ensure an air quality improvement.
- In areas where Part A processes (or A1 installations) are not a significant contributor to any exceedance, ensure contact and collaboration between the regulator and local planning authority is established and maintained.
- In areas where a combination of sources is causing the exceedance, any actions taken need to be cost-effective and proportionate. In order for this to be achieved the local authority will need to work closely with other regulators and organisations.

Highways Agency (HA), Transport for London (TfL), National Assembly for Wales

The Highways Agency is an executive agency of the Department of Environment, Transport and the Regions, and is responsible for maintaining, operating and improving the network of trunk roads and motorways in England on behalf of the Secretary of State. The Agency currently manages and maintains a network of some 6,500 miles of motorways and trunk roads in England. The delivery of reliable trunk roads and motorways as part of an integrated transport system and to support sustainable development are requirements of the Agency. One of their eight key objectives is to minimise the impact of the trunk road network on both the natural and built environment. The functions of the Highways Agency are replicated in Wales by the national Assembly and in London by Transport for London.

For many local authorities in the UK, local air quality management solutions may only be secured though effective partnership with the Agency, National Assembly or TfL, where trunk roads outside of the authorities' own responsibility are the source of air quality problems. Early and effective co-operation with the relevant body will therefore be essential. However, the majority of major urban roads are not the responsibility of the HA and equivalents.

Checklist 15: Highways Agency (HA), Transport For London (TfL), National Assembly For Wales (note – these points can also be applied to local transport planners, see checklist 5).

- Explore any proposed new highway developments, improvements, removal or expansion in relation to specific trunk roads or road sections identified as contributing to predicted AQO exceedances. Identify whether such proposals are likely to have an adverse or beneficial impact on local air quality in such specific locations.
- Where an adverse impact is identified, determine whether action should be focused upon specific junction(s), overall access to road link, traffic management techniques (i.e. speed or flow reductions), or on more national policy measures.
- Consider scope for measures on existing non local authority roads to reduce emissions, including use of variable message signing to encourage use of park and ride and possible scope for junction improvements and/or variable speed limits.

Health Authorities

Health authorities hold health information on the local population and often study the impact of pollution on health; in addition, health authorities are responsible for implementing *Health Improvement Programmes* as a vehicle for developing strategies for shaping local health services. A key feature of this approach is the establishment of *Health Action Zones* (HAZs), which are designed to achieve better co-ordination between health and local authorities, in order to deliver local health improvements. Both initiatives include targets for improving air quality as a prerequisite to improved public health.

Checklist 16: Health Authorities

- Develop liaison to ensure that air quality implications are included within Health Improvement Programmes and HAZ strategies.
- Explore collaboration with respect to research investigating localised effects of air pollution on health.
- Develop health promotion campaigns seeking to link air quality, health and travel behaviour and choice.

Regional Groupings and the role of Neighbouring Local Authorities

Solutions to improving air quality locally within one authority may equate to those required in neighbouring authorities, and indeed certain measures to alleviate a local air quality problem may require implementation external to the authority in question. Collaboration with other authorities within the context of a regional grouping or otherwise will be a fundamental requirement for certain authorities, particularly those dissected with a motorway or trunk road, or where a major industrial source affects a group of authorities.

Checklist 17: Role of Neighbouring Authorities & Regional Groupings

- Identify those sources responsible for AQO exceedances in the authority, which are responsible for exceedances in neighbouring authorities, so as to develop action plan proposals that are consistent and that can be implemented collaboratively for maximum impact.

Appendix B: Transport Emission Reductions

Example 2: Relative Improvements Required from Different Sources

Assuming that a 4μgm^{-3} reduction in annual average NO_2 (from 44μgm^{-3} NO_2 annual average) is required, and that this represents a reduction of 9%, the reduction in NOx can be calculated using a relevant NOx:NO_2 conversion relationship. In this example the assumption is made that:

- 44μgm^{-3} NO_2 equates to 80μgm^{-3} NOx
- 40μgm^{-3} NO_2 equates to 69μgm^{-3} NOx
- 4μgm^{-3} NO_2 reduction equates to 11μgm^{-3} NOx reduction, which represents 14% reduction of NOx.

The local authority has identified the relative source contributions of NOx in this area as 50% road traffic, 20% industry and 30% background (unaccounted sources). As road traffic appears to be the primary source of NOx, the local authority has decided to calculate the percentage improvement in road traffic needed to effect a 14% improvement in NOx (or 11μgm^{-3} reduction):

Traffic contributes 50% of the total 80μgm^{-3} NOx; this 50% contribution is equivalent to a contribution of approximately 40μgm^{-3} NOx from road traffic:

$$\frac{50 \times 80}{100} = \text{Value of NOx contribution from road traffic} = \mathbf{40\mu gm^{-3}}$$

As the local authority wishes to achieve an 11μgm^{-3} reduction in NOx, it is the **objective** to reduce the **road traffic contribution** by 11μgm^{-3} to **29μgm^{-3}**.

Therefore, if all the emission reduction was expected to come from road traffic sources the percentage improvement needed for road traffic can be calculated using the equation:

$$\textbf{Improvement from road traffic} = \frac{\textbf{(Predicted value – Required value)}}{\textbf{Predicted value}} \times 100$$

$$= \frac{(40 - 29)}{40} \times 100$$

$$= 28\%$$

Due to uncertainties and allowing a degree of “head space” for future development, this figure is rounded up to **30%.** A 30% reduction in NOx emissions from road traffic is therefore required to meet the air quality objectives, assuming that road traffic is the only source from which reductions are required.

Example 3: Calculating the Reduction in Vehicle Kilometre Travelled

For this example, the local authority will need to have obtained data from their Stage 3 Review and Assessment relating to percentage vehicle split, and entered these into

Column B, as shown in Table 4, below (it is strongly recommended that a computer spreadsheet package is used for this procedure as it makes the task of altering values and performing calculations easier). If no data on vehicle splits can be obtained, the local authority may use the values in Table 4. Further columns are calculated, as shown in Tables 4 and 5 using the equations in the column headings.

Initially the same local authority, used in Example 1 (see section 4, page 15), decides to reduce cars' kilometres travelled and enters the data in Table 4 into an spreadsheet, with the equations, and tries reducing the car vehicle kilometres by different amounts. The example shown in Table 4 is for a 70% reduction in car kilometres. The local authority identifies that they need to produce one of the following (other combinations can be used):

- a 70% reduction in car kilometres travelled in the area (i.e. N = 70 for cars, N = 0 for other rows);
- a 61% reduction in HGV kilometres travelled in the area (i.e. N = 61 for HGVs, N = 0 for other rows);
- a combination of different traffic types reduced: i.e. 36% reduction in cars and 30% reduction in HGV km travelled (i.e. N = 36 for cars, N = 30 for HGVs, N = 0 for other rows).

It should be noted that the results of methods such as these are based on a number of assumptions and uncertainties, not least of which is the relationship between NO_2 and NOx, which is not linear as this example would appear to suggest. These methods should only be used, therefore, as a screening or pre-assessment tool prior to assembling a final package of options. When this has been done, more rigorous modelling and/or assessment will need to be carried out in order to ascertain a more accurate estimate of the improvements in air quality which can be expected.

Table 4: Calculating percentage improvement for NOx

	A, Road Type Emission Factor (RSK 2000)				B	C	D	N	E	F	G
	Motorway	Rural dual road	Rural single road	Urban road	Percentage of Vehicle split	= A x B	Percentage of Total of column C =C/ΣC	Percentage reduction in vehicle km	New Percentage split =B x (100 - N) 100	=A x E	Percentage improvement =(ΣC-ΣF) x 100 ΣC
Artic HGV	4.3847	5.9337	6.4922	8.1138	0.075	2.6394	0.3931	0	0.0750	0.3289	-
Buses	3.7427	4.724	5.1844	9.2473	0.007	0.2103	0.0313	0	0.0070	0.0262	-
Diesel cars	0.2006	0.1371	0.1865	0.2856	0.08262	0.1330	0.0198	70	0.0248	0.0050	-
Diesel LGV	0.3168	0.2192	0.2841	0.4216	0.008568	0.0218	0.0032	0	0.0086	0.0027	-
M/cycles	0.1184	0.1184	0.1184	0.1184	0.004	0.0038	0.0006	0	0.0040	0.0005	-
Petrol cars	0.6369	0.3914	0.3176	0.2977	0.68238	3.4882	0.5195	70	0.2047	0.1304	-
Petrol LGV	0.6287	0.4356	0.3584	0.3273	0.074928	0.3781	0.0563	0	0.0749	0.0471	-
Rigid HGV	2.4307	2.7319	3.0359	4.1668	0.075	1.4632	0.2179	0	0.0750	0.1823	-
Total, Σ	-	-	-	-	-	8.3377	-	-	-	0.7230	30

Table 5: Calculating percentage improvement for PM_{10}

	A, Road Type Emission Factor (RSK 2000)				B	C	D	N	E	F	G
	Motorway	**Rural dual road**	**Rural single road**	**Urban road**	**Percentage of Vehicle split**	**= A x B**	**Percentage of Total of column C =C/ΣC**	**Percentage reduction in vehicle km**	**New Percentage split =B x (100 - N) / 100**	**=A x E**	**Percentage improvement =(ΣC-ΣF) x 100 / ΣC**
Artic HGV	0.1298	0.1867	0.2088	0.3205	*	**	**	**	**	**	-
Buses	0.1411	0.2272	0.2459	0.2923	*	**	**	**	**	**	-
Diesel cars	0.0597	0.0249	0.0267	0.0442	*	**	**	**	**	**	-
Diesel LGV	0.1730	0.0926	0.0944	0.1309	*	**	**	**	**	**	-
M/cycles	0.0874	0.0874	0.0874	0.0874	*	**	**	**	**	**	-
Petrol cars	0.0112	0.0112	0.0112	0.0112	*	**	**	**	**	**	-
Petrol LGV	0.0223	0.0223	0.0223	0.0223	*	**	**	**	**	**	-
Rigid HGV	0.1208	0.1717	0.1921	0.2984	*	**	**	**	**	**	-
Total, Σ	-	-	-	-	-	**	-	-	**	**	**

* Data needs to be inputted by LA, or taken from Table 4 if unknown. ** Data to be calculated by LA as indicated by equations in second row.

Summary of the columns:

- A refers to the emission factors for the various road types for each vehicle type. These can be found on the LRC website (RSK, 2000);
- B is the column in which the percentage vehicle splits are entered by the local authority;
- C calculates the relative contribution of each vehicle type for a particular road type;
- D calculates the percentage contribution of each vehicle type for a particular road type;
- N is the percentage reduction in vehicle km for each vehicle type, to be chosen by the local authority;
- E is the new percentage vehicle splits related after the percentage reduction, N, has been taken into account;
- F calculates the new relative contribution of each vehicle type, for a particular road type, after the percentage reduction, N, has been taken into account;
- G is the percentage improvement that is calculated after the percentage reduction, N, has been taken into account.

Appendix C: Cost-Effectiveness Calculations

Standard methods should be used in any cost analysis. Costs are usually expressed in terms of an equivalent annual cost (or annualised cost), to factor differences in terms of lifetime in the comparison. These costs can be calculated using formula such as the one below.

$$\mathrm{PVC}_0^k = \sum_{t=0}^{\mathrm{T}^k} \left[\mathrm{NRC}_t^k + \mathrm{ERC}_t^k + \mathrm{NERC}_t^k\right] \circ \left[1+r\right]^{-t}$$

- PVC the present value of the total cost stream for environmental protection measure *k* in year zero,
- NRC the non-recurring cost of environmental protection measure *k* in period *t*,
- ERC the energy recurring costs to operate environmental protection measure *k* in period *t*,
- NERC the non-energy recurring costs to operate environmental protection measure *k* in period *t*,
- t, the operating life of environmental protection measure *k*, and
- r = the appropriate discount rate.

Guidance is available on how cost data should be expressed and how it should be interpreted for stationary abatement technologies by the European Environment Agency. A summary is provided below.

The EEA summary guidelines ('Guidelines for defining and documenting data on costs of possible environmental protection measures', EEA 2000) are:

- Pollutant definitions and assumptions regarding scope of pollutant categories should always be given wherever there is any possibility of ambiguity.
- Sufficient detail of the pollution source should be given to enable comparison with similar processes and to avoid ambiguity. It is recommended that published source sector classifications should be used wherever possible.
- Sufficient detail of the environmental protection measure should be given to avoid ambiguity, to define its performance characteristics, and to clarify any special circumstances limiting applicability of the measure.
- It is essential that reported costs are defined: what is included, what is excluded, how they have been attributed or apportioned. It is recommended that costs are also explained in physical terms such as quantity of materials, and as unit prices.
- As a minimum, all data should have a background discussion of the key uncertainties.
- The year in which the following data apply should always be given:
  - cost data;
  - currency exchange rates;
  - data describing control technologies (efficiency, applicability) and process technologies;
  - emissions to the environment.
- The sources and origins of all data should be recorded as precisely as possible so that data may be traced at a later date if necessary.
- As a minimum, any discount/interest rates used should be recorded.
- If cost data are adjusted for inflation or changes in price through time, then the method used should be recorded and any index used should be recorded and referenced.
- If determining annual cost data, the approach that has been used to derive the annual costs should be recorded, along with all underlying assumptions.

Appendix D: Non Air Quality Impacts of Options and Policies

Options and Measures

Option Proposal	Non Air Quality Benefits	Potential Disadvantages	Knock-On Consequences
Transport (Road)			
Increase public transport provision	• More effective use of road space • Reduces social exclusion for non-car owners • Increases personal travel choice • Encourages more social interaction • Encourages market-place competition and innovation	• High level of economic and financial commitment required for potential infrastructure requirements • Extensive land take may be required (e.g. for bus lanes, depots etc.)	• Potential need to increase local taxes to fund projects • Potentially unsuitable for rural areas • Expenditure on infrastructure needed may cause reduced spending capability elsewhere
'Park and Ride' schemes	• More effective use of road space • Reduces city or town centre congestion • Encourages behavioural change in travel patterns • Increases local employment opportunity	• Good frequency of service vital; infrequency a detraction • May increase short trips • May discourage whole-journey use of public transport • Of real benefit to car-owning community only	• Siting of parking crucial. Must offer speed and convenience • Requires large land take (often in green belt) • Effective vehicle security and personal safety requirements
Use of cleaner and alternative fuels by Council fleet	• Potential for noise-reduction technology use and therefore quieter fleet • Improvement of authority environmental profile • Potential for fuel efficiency and subsequent financial savings • Encourages local innovation	• May increase CO_2 and other greenhouse gas emissions • Requires substantial investment in filling stations • LPG depots potentially require greater space	• Higher maintenance required • May potentially affect choice in fleet vehicles

Option Proposal	Non Air Quality Benefits	Potential Disadvantages	Knock-On Consequences
Low Emission Zones **(LEZs)**	• Improved overall perception of an area • Overall improvement to urban environment and long-term improvement to built environment • Encourage development of alternative technologies, fuels and mobility modes	• Potential for social prejudice of individuals owning older vehicles • Enforcement difficulties and resource cost	• Potential for no overall emission reductions for urban area as a whole • Potential displacement of vehicles and emissions to other localities • May encourage fleet transition
Vehicle emission testing	• Reduction in gross polluting vehicles • Increases overall awareness in fuel efficiency and environmental impacts • Encourages increased personal awareness and accountability for travel behaviour	• Difficulty with public relations for local authority • Financial cost potentially very high for implementation	
Home Zones (low car dependency areas and car-free developments)	• Reduces potential for accidents and injury • Improved overall local environment and quality of life for residents • Encourages safer streets and increased community activity and interaction • Reduces ambient noise levels from traffic	• Potential increase in noise from activities such as ball games and skateboarding • Reduced parking availability may impact upon property values • Enforcement difficulties	• May encourage more sensitive building design and architectural innovation • Potential for increased parking activity nearby • Need for local services to be provided in close proximity to residents
20 mph Zones (residential traffic zones)	• Reduces potential for accidents and injury • Encourages safer streets and increased community activity and interaction • Potential for reduction in overall noise levels	• Reduction in noise and overall traffic levels may compromise pedestrian and cyclist safety • Potential for increase in overall travel times locally • Enforcement difficulties	• Potential for traffic to be displaced elsewhere

Option Proposal	Non Air Quality Benefits	Potential Disadvantages	Knock-On Consequences
Pedestrianisation of town centres	• Improved perception of town centres • Reduces potential for accidents and injury • Potential for increased trade and local economic activity • Improved overall urban, town environment • Encourages healthier modes of movement • Long-term protection of built environment • Encourages social interaction of town centre users • Reduction in overall noise levels • Improve visual amenity	• Reduced accessibility for local centre residents • Perceived loss of trade in the short-term • Reduction in overall traffic levels, but with some limited vehicle access may compromise safety • Provision for less mobile, disabled or infirm may be compromised	• Need to improve public transport for easy access to area of pedestrianisation • Potential displacement of traffic elsewhere in locality • Potential for increased commercial deliveries out-of-hours
Bypasses (preferably with traffic reduction schemes)	• Reduced congestion for small rural towns in particular • Encourages constant traffic flow • Reduces travel time and transportation costs for business and commerce	• May increase CO_2 and other greenhouse gas emissions • Potential loss of passing trade for community • Loss of environmental amenity, open space, pasture • Loss of visual amenity for some members of community • Nuisance during construction • Potential for water pollution from road drainage • Increases overall demand for road space rather than suppressing demand	• Sustainability and prosperity of town may be higher priority • Potential isolation of community through which bypass is constructed

Option Proposal	Non Air Quality Benefits	Potential Disadvantages	Knock-On Consequences
Rail			
Metros or light transit systems	• Fast, potentially efficient and effective transport mode • Reduces city and town centre congestion • Can improve visual amenity of centre and urban environment	• Not flexible; only really effective in large urban conurbations • Dedicated new track required or else will displace traffic from roads network • Expensive infrastructure requirements • May increase CO_2 and other greenhouse gas emissions	• Needs to be part of an integrated transport strategy i.e. transport nodes (stations etc.) must be integrated with other forms of transport
Extension of rail station network (i.e. new stations and re-opening of former stations)	• Identification of demand may encourage investment by local rail companies • Encourages more effective use of rail infrastructure • Provides more travel choice	• Extensive collaboration with fragmented railway industry • Potential for increasing some vehicle movement in locality • Further pressure on already near-capacity rail network	• Requires high level of strategic investment which may be prohibitive • Conversely, demonstration of an increase in demand for rail travel may encourage strategic investment in the long term • Must be integrated with other forms of transport
Air			
Development of 'Green Transport Plan' (for staff and airport services)	• Reduction of overall traffic movements within airport and travel to airport • Reduce congestion peaks • Reduce journey time of staff and services • Increases employment opportunity locally	• Potential need for large-scale infrastructure investment	• May encourage a more sustainable approach to managing ground services
Development of 'Green Transport Plan' (for air travel commuters)	• Reduction of overall traffic movements within airport and travel to airport • Reduce congestion peaks • Reduce journey time for passengers • Increases employment opportunity locally	• Potential need for large-scale infrastructure investment	• May encourage a more sustainable approach to personal travel behaviour

Option Proposal	Non Air Quality Benefits	Potential Disadvantages	Knock-On Consequences
Exploration of reduced aircraft emissions or movements	• Encourages dialogue, communication and interaction between airport authorities and local authorities • Addresses potential environmental nuisance concerns	• Requires national agreements • Potential compromise on development of airport business and market position	• Long-term reduction in aircraft emissions a function of national policy • May influence steady increase in passenger growth
Water			
Reduction in cargo-unloading related emissions at docks	• Improved visual amenity • Potential for improvements to health and safety • Encourages innovation and technological advances • Reduces other environmental nuisance	• Whilst generally controlled through LAPC, may require long-term planning control • Potentially expensive to implement	• May encourage more sensitive and sustainable methods of working in the long-term
Reductions in Industrial Emissions			
Changes to process technology	• Encourages innovation and competition • Can potentially reduce input requirements and thereby encourage more effective use of resources • Potential for reducing acid rain precursors	• Financial investment high • May require more stringent health & safety considerations • May require more material input which may subsequently require more transportation and energy use	• May prove economically unviable • May result in increased production of solids in some industry (e.g. gypsum as a by-product), for which no extensive market exists and thus disposal a problem.
Reduced productivity and output	• Reduction in associated transportation of goods • Reduced energy requirement, increased fuel efficiency • Potential for reducing acid rain precursors	• Potential for a need to reduce workforce	• Consequences for local economy and industry reliant upon outputs • Socio-economic implications for local community
Use of abatement techniques and technology	• Encourages innovation and competition • Potential for improvements in other environmental areas (e.g. nuisance, noise level reductions) • Reduction in soiling of buildings	• Possible visual impacts • May cause production of further or special wastes • Increase in skilled maintenance required, and opportunities for employment	• Long-term financial implications for industrial sector business, which may in turn affect the overall market stake of a product or services

Option Proposal	Non Air Quality Benefits	Potential Disadvantages	Knock-On Consequences
Reduction in related-industrial activity emissions (e.g. stockpile dust, vehicle spillage)	• Improved visual amenity • Encourages implementation of environmental management regime • Potential for reducing nuisance	• Potential for water pollution • Increase in water resources required	

Policies and Strategies

Option Proposal	Non Air Quality Benefits	Disadvantages	Knock-On Consequences
Transport Related Policy			
Integrated Transport Policy	• Encourages local competition and innovation • Reduces economic burden of increasing travel times for business and industry • Greater social inclusion encouraged with more travel choice		• Requires extensive financial commitment, and support from stakeholders and government, local and central
Travelwise scheme for employees	• Reduced congestion (peak hour particularly) • Encourages overall health and fitness improvement in workforce	• Insensitive implementation can potentially alienate staff	• Shows leadership • May encourage behavioural change and an overall long-term change in travel patterns
'Safe Routes to School' initiative	• Reduction in peak-hour traffic congestion • Promotes health and overall well-being of school children • Potential for reduction in transport-related costs for individual families	• Perceived safety concerns (road and personal safety) • Financially infrastructure costs may cause a reduction in spending on other services • Some school locations may not be suitable and may be alienated	• Fosters more neighbourly interaction and support for school

Option Proposal	Non Air Quality Benefits	Disadvantages	Knock-On Consequences
Travel plans	• Reduced on and off-site congestion • Reduced on-road parking • Improve business environmental profile and credentials • Fosters improved relations between employers, clients, employees and local residents	• May cause employee recruitment difficulties and may disadvantage certain clients or business sectors economically	• Needs to address sensitive mobility issues for certain sectors of the workforces, e.g. disabled employees and employees with young children
Cycling promotion policy	• Encourages improvements in overall fitness and health • Requires low level of investment generally speaking, and minimal maintenance • Encourages greater social interaction • Reduces costs for individual commuters and travellers • Fuel efficient, and energy requirements low in comparison to other transport modes	• Potential conflict with other transport modes if sharing road or land space (i.e. may slow bus lanes, conflict with motorcycle use, pedestrians) • Require work-based secure and safe facilities for employees	• Need to address long-term potential increase in cycling as a commuting and leisure activity with respect to land-use and compromise of other forms of travel and movement • Need to address cycling provision with other transport modes, e.g. cycle parks at train and bus stations
Walking promotion policy	• Encourages improvements in overall physical and mental fitness and health • Requires minimal financial support and investment • Encourages social interaction	• Potential safety compromise with cyclists and other shared-land space users • Personal safety issues	• Sensitive planning for long-term safety of pedestrians and minimising distances important considerations if walking to become an effective travel mode
Promote motorcycle travel policy	• Potentially less polluting, more fuel efficient and less energy intensive than four wheel vehicles • Reduce congestion • Require less land-take for use and parking	• Potential for compromising cyclist, pedestrian and other road user safety. • Potential for increasing local noise levels	• Increased level of motorcycle and scooter use will need sensitive planning in relation to other road users and pedestrians, with sensible enforcing of speed restrictions
Bus Quality Partnerships	• Increased public transport provision and choice • Encourages local employment opportunities and innovation		• Carefully managed partnerships will assist towards the provision of a more effective service altogether

Option Proposal	Non Air Quality Benefits	Disadvantages	Knock-On Consequences
Environmental Policy			
Environmental Management System implementation (for the overall reduction in emissions from various activities)	• Energy reduction, increased efficiency and a reduction in associated running and transportation costs • Wider environmental benefits • Fosters a more sensitive approach to business and industrial activity	• May demand increased human resources with resulting costs	• Improved public relations • Encourages leadership and innovation • Improves the overall awareness and understanding of sustainability issues
Smoke Control Areas (if not already established)	• Improvement to overall urban and built environment • Reduces transportation requirements • Less CO_2 emissions and acid rain precursors • Encourages more efficient combustion and heating	• May affect the local economy of a community • Social exclusion issues of the community within the Area may arise	• Reduces demand for coal and increases demand for cleaner fuels
Corporate Policy			
Purchasing Policy	• Sensitive fuel and vehicle purchasing can increase fuel effectiveness and energy efficiency • Careful management can reduce number of travel trips and distances travelled with respect to material and services • Environmental and social impacts can be reduced through the sensitive purchasing of specific products and services	• Environmental and social impact of services and goods often compromised through cost	• Fosters sustainable development principles

Option Proposal	Non Air Quality Benefits	Disadvantages	Knock-On Consequences
Energy Policy			
Promotion of more sustainable energy sources (e.g. wave, solar, wind)	• Reduction in fossil and conventional fuel use and associated reduction in emissions of acid rain precursors • Provides opportunity for innovation, technological advancement and employment • Can provide opportunity for leisure (i.e. tidal barrage)	• Impact upon local, often rural, visual amenity • Can potentially require extensive land-take • Significant and permanent change to local environment (e.g. tidal barrage)	• Fosters sustainable development principles
Planning Policy			
Unitary development or local planning policy (for securing reduced emissions)	• Numerous potential socio-economic impacts of individual schemes, planning initiatives and developments (e.g. access, regenerative impacts) • Often secures general environmental improvements to the natural, urban and built environment (e.g. visual, noise)	• Long-term policies and proposals may detract from securing air quality objectives in the short to medium term	• Fosters sustainable development principles
Out or edge of town supermarket development policy	• Reduces congestion in town or urban centre • Improve the overall urban and built environment in town or urban centre	• Potential for reduced commercial prosperity of centre • May reduce potential for regeneration of urban centre • Reduces effective accessibility of some trade to certain sectors of the community (e.g. non-car owners, cyclists, the disabled)	• In the longer term may impact upon urban centres and divert investment from main centres
Planning Conditions (including Section 106 agreements)	• Provides potential capital expenditure for specific sustainable travel schemes and initiatives • Provides potential revenue, for transport services and partnerships to be developed • Provides potential restraining mechanism to prevent certain travel behaviour	• May increase cost of a development or scheme such that it becomes financially unfeasible	• Consistency required in council planning policy and approach to imposing conditions

Appendix E: Perceptions and Practicability

The following table outlines the perceptions and practicability of various measures and options.

Action Plan Measure/ Option	Perception	Action Required	Practicability/Applicability
Transport			
Low Emission Zone, Home Zone and Clear Zone	• Low income groups with old polluting vehicles will be more affected and marginalized • Restriction on freedom to travel	• Ensure good public transport infrastructure with good interchange facilities at reasonable cost • To emphasise benefits of the zone, e.g. improved quality of life through reduced smoke, emissions, noise and improved safety	• Practical once permitting and enforcement potential difficulties are overcome • LEZ is not practicable where transport infrastructure is poor, and expensive leading to social exclusion. Requires an efficient permitting system, preferably electronic and supporting infrastructure
Traffic management measures (traffic calming, road closure, re-routing, 20 mph zones etc.)	• Restriction of freedom to travel • May lead to increased emissions and noise per vehicle • Reduce fuel efficiency • Increases traffic movements elsewhere	• To emphasise overall benefits e.g. noise reduction, safety and not just air quality impacts	• Practical only if sufficient alternative low emission and readily accessible public transport is available • Enforcement responsibility and degree of enforcement
Reallocating road space e.g. High Occupancy Vehicle Lane, Bus Priority Scheme, Cycle Lanes	• Another 'anti-car' initiative, reduced road space and hence greater congestion • Too expensive for little return	• To emphasise improved journey time through discouraging single-person commuting • Provision of time-tables, cycling facilities etc.	• Will be effective only if targeted for example to reduce single person commuting, with fast efficient public transport system • Need to work with large employers to encourage cycling, car share schemes, green travel plans etc.

Action Plan Measure/ Option	Perception	Action Required	Practicability/Applicability
Park and Ride schemes	• Reduced road space resulting in a hindrance to road users	• Emphasise quicker improved travel through use of variable message signs, effective time-tabling etc. • Need to ensure regular, clean and reliable bus service	• P&R needs to be one measure in an integrated transport policy, needs complementary measures such as reductions in town centre parking and pedestrianisation
Congestion charging and tolling	• More taxes for motorists who are already charged heavily for fuel etc. • Revenue will not support improved transport services locally	• Effectively publicise the proposed use of revenue received	• Only acceptable if revenue is used to enhance transport infrastructure, and substantial other investment is made in public transport alternatives
Work place parking charges	• Unfair restriction on employee and employer	• To provide assistance through bus quality partnerships and assisting with green commuter plans	• Must be supported in terms of assisting with the formulation of effective green commuting and transport plans e.g. through interlinking content of Bus Quality Partnerships. If not done and support to employers not given, then charges/cost may pass on to employees without a change in travel behaviour
Vehicle emission testing	• Motorist may not be aware of their vehicle emission problem • Motorist not in control of vehicle emissions, therefore cannot be held accountable • Doesn't secure improvement	• To ensure enforcement policy is fair and equitable • Encourage active public participation in seeking to maintain and drive vehicles sensitively and appropriately	• Effective remediation of the most polluting vehicles will only occur if Government amend system to allow the accused to remedy defect in 14 days or remove vehicle from road use in order for the fine to be waived • Social exclusion implications as low income groups are more likely recipients of fixed penalty tickets
Pedestrianisation	• Restriction of freedom to travel • Objections from delivery firms • Potential reduced trade	• Emphasise overall built and natural environmental benefits as well as air quality benefits, such as encouraging more social interaction, visiting and thereby increasing trade	• Not practicable in all locations; mainly within compact areas of city and urban centres • Requires minimal infrastructure costs

Action Plan Measure/ Option	Perception	Action Required	Practicability/Applicability
Use of cleaner and alternative fuels and vehicle technologies	• Low income groups will be more greatly affected • Problems of availability of fuels • Cost and investment required too great	• Need to address the problems of fuel availability • Explore more fuel efficient, cost-effective technologies for council fleet • Encourage take up externally	• Probably only practicable for fleets such as delivery firms in the short to medium term
Safe Routes to School Schemes	• Not flexible for work and school needs of family • Personal and road safety concerns	• Highlight positive health benefits to child and parent through information campaign • Overcome negative concerns of personal and road safety through information campaign	• Applicable in some cases where safety of children is not compromised • Needs to be linked to other strategies
Travelwise Schemes and Travel Plans	• Another anti-car initiative • No facilities at work for cyclists • No flexibility for car sharing	• Highlight non air quality benefits e.g. quicker journey times and flexibility through information campaign • Encourage provision of facilities for cyclists • Encourage planners to endorse conditions	• Only practicable for large employers or where scales of economy are such that measures can be effective or where alternative transport exists or can be developed • Requires investment and full support
Bypasses	• Some positive perceptions and some (possibly extreme) negative perceptions should be expected	• Present it to public as one of a number of options and establish pros and cons using public participatory techniques. Possibly use techniques from EIA	• Needs to be politically acceptable in order to be practicable • Should ensure that it is the BPEO before proceeding
Expansion or introduction of light transit systems, trams, metros etc.	• Positive and negative perceptions likely • Trams take up too much road space • Too expensive	• Disseminate information relating to successful schemes • Highlight funding sources • Securing partnership funding where applicable	• Practicable only where substantial resources and investment are available • Likely only to be practicable in urban areas with potentially larger user community

Action Plan Measure/ Option	Perception	Action Required	Practicability/Applicability
Walking and cycling strategies and policies	• Council spending too much tax payers money on non-effective measures • Too expensive for limited return	• Disseminate information relating to successful schemes • Highlight funding sources • Securing partnership funding where applicable	• Practicable only in areas where people perceive it to be safe enough to cycle and walk • Often won't be practicable in rural areas where distances travelled are too far
Airport strategies	• Aircraft represent a greater source of pollution than the related traffic • Local authority officers have control on aircraft emissions	• Emphasise that most emissions affecting LAQM result from ground traffic movements • Highlight non air quality benefits of transport strategy e.g. improved journey times and greater flexibility	• Only practicable around larger airports where alternative public transport is either in place, or will be implemented as part of the strategy, and where there is scope to reduce ground travel movements
Industry			
Changes to process technology	• Both positive and negative perceptions likely • Perceptions from industry that it will be an additional cost • Perceptions from local community that it will impact on local jobs	• To work closely with enforcers and industry concerned towards cost-effective solutions • Where possible to involve the workforce and local community in decision making process	• Practicability of an individual scheme may depend on operational or regulatory requirements, as well as costs. For IPPC installations emission standards beyond BAT can be only imposed if an EU Directive limit value is likely to be exceeded, not where the UK objective is more stringent
Use of abatement techniques and technology	• Perceptions from industry that it will be an additional cost • Perceptions from local community that the additional cost will impact on local jobs	• To work closely with enforcers and industry concerned towards cost-effective solutions • For new processes, chimney height assessments undertaken under the Clean Air Act, EPA90 need to consider the AQS objectives	• Practicability of an individual scheme may depend on operational or regulatory requirements, as well as costs. For IPPC installations emission standards beyond BAT can only be imposed if an EU Directive limit value is likely to be exceeded, not where the UK objective is more stringent
Reduction in related industrial activity emissions (e.g. stockpile dust, vehicle spillage)	• Perceptions from industry that it will be an additional cost	• To work closely with enforcers and industry concerned towards cost-effective solutions	• Only practicable for certain industries