Report

Air Quality Review and Assessment - Stage 4

A Report produced for Strabane District Council

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AEAT IN CONFIDENCE

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DOE NI Stage 4 requirements compliance checklist
This section has been introduced to indicate where the work expected by DoE NI in a Stage 4 air quality review and assessment can be found in this document. Only PM_{10} is considered in this Stage 4.

Work area	Included or considered?	Location within the report and comments
Monitoring		
• Has further monitoring been undertaken?	Yes	Section 5.3
• Is the 'totality' of the monitoring effort sufficient?		
• Has monitoring confirmed 2004 exceedances?	Yes	Section 5.3
• Has sufficient detail of QA/QC procedures been provided?	Yes	Section 5.3
• Has monitoring amended the conclusions of Stage 3?	No	Section 5.3
Modelling		
• Has further modelling been undertaken?	Yes	Section 6
• Is the further modelling considered appropriate?		
• Has the model been appropriately validated?	Yes	Section 6.4
• Has modelling confirmed 2004 exceedances?	Yes / No	Section 6.6
• Has modelling amended the conclusions of Stage 3?	Yes/No	Section 6.6
General		
• Have both the magnitude and geographical extent of any exceedences been further changed?	Yes	Section 6.6
• Has the decision to declare an AQMA been reversed at Stage 4?	Yes/No	Section 6.6
• Is this decision soundly based?		
• Has the authority taken account of the new vehicle emission factors	N/A	
• Has the authority considered source apportionment?	Yes	Section 6.8
• Has the authority considered the cost effectiveness of different abatement options?	N/A	
• Has the authority considered feasibility and effectiveness of different abatement options?	Yes	Section 6.9
• Has the authority considered the extent to which air quality improvement is required?	Yes	Section 6.7

Work area	Included or considered?	Location within the report and comments
Monitoring & modelling work		
• Have monitoring uncertainties been addressed fully?	Yes	Section 5.3
• Does the additional monitoring assessment appear sufficiently robust?		
• Have modelling uncertainties been addressed?	Yes	Section 6.5
• Has the model been carefully validated?	Yes	Section 6.4
• Does the overall modelling assessment appear sufficiently robust?		
AQO exceedances & AQMA declaration		
• Have areas of exceedence been further defined?	Yes	Section 6.6
• Is the decision to amend or revoke the AQMA(s) at Stage 4, soundly based?		Section 6.6
• Is the decision reached based principally on monitoring?		Section 5.3
• Is the decision reached based principally on modelling?		Section 6.6
General		
• Has the authority focused on areas already identified as predicted to exceed objectives?	Yes	Section
• Has consideration been given to the exposure of individuals in relevant locations?	Yes	Section 6.6
• Has the authority considered new national policy developments?	Yes	Section 7.1
• Has the authority considered new local developments?	Yes	Section 6.9.2
• Does the report reach the expected conclusions? (in part/full?)		
• Has the authority undertaken further liaison with other agencies (in particular DOENI?)	Yes	Section 8

Executive Summary

The UK Government published its strategic policy framework for air quality management in 1995 establishing national strategies and policies on air quality which culminated in the Environment Act, 1995. The Air Quality Strategy provides a framework for air quality control through air quality management and air quality standards. These and other air quality standards[1] and their objectives[2] have been enacted through the Air Quality Regulations in 1997 and 2000.

Strabane District Council has completed three stages of Air Quality Review and Assessment. The results of this indicated that air quality objectives for particulates (PM_{10}) were unlikely to be met in six high density domestic fuel burning areas. The six areas were:

- The Head of the Town
- Ballycolman
- Melmount
- Newtownstewart
- Castlederg
- Sion Mills

The modelling in the Stage 3 assessment showed that it was unlikely that there would be an exceedence of the sulphur dioxide (SO_2) objectives in all the six areas modelled.

As a result, Strabane District Council was required to declare an Air Quality Management Area (AQMA) for PM_{10} to cover these six areas. The Council is now obliged to undertake a more accurate and detailed assessment of Air Quality in the AQMAs (Stage 4). This report fulfils this requirement.

The revised and improved modelling technique undertaken as part of this Stage 4 report has shown that it is likely that there will be an exceedence of the 2004 PM_{10} objectives in only three of the six areas modelled. In Ballycolman, Head of the Town and Newtownstewart, the model predicts an exceedence of the 2004 PM_{10} objectives with current domestic fuel burning practices, in accordance with the Stage 3 Report.

In Castlederg PM_{10} concentrations are predicted to be very close to the 2004 objective and therefore it is recommended that an air quality management area is still declared in this area.

In Melmount and Sion Mills, it is now predicted that the PM_{10} objectives are unlikely to be exceeded in contrast to the previous Stage 3 report and therefore it is recommended that an air quality management area is no longer declared.

The following scenarios were considered to try and reduce the emissions of PM_{10} and hence concentrations:

1. The % reduction in solid fuel burning required in each of the grid squares was estimated to produce compliance with the relevant objectives in 2004 and 2010.

2. The impact on local PM_{10} concentrations of allowing only smokeless fuels to be burnt in each of the six areas was estimated

[1] Refers to standards recommended by the Expert Panel on Air Quality Standards. Recommended standards are set purely with regard to scientific and medical evidence on the effects of the particular pollutants on health, at levels at which risks to public health, including vulnerable groups, are very small or regarded as negligible.

[2] Refers to objectives in the Strategy for each of the eight pollutants. The objectives provide policy targets by outlining what should be achieved in the light of the air quality standards and other relevant factors and are expressed as a given ambient concentration to be achieved within a given timescale.

3. The impact of switching all solid fuel burning to oil on local PM_{10} concentrations.

In summary, the effects of these scenarios were:

- It was estimated that in Castlederg, Sion Mills and Melmount, the 2004 PM_{10} objectives will be met with no further reduction in PM_{10} emissions. A 42%, 17.5% and 35% reduction in solid fuel burning would be required to meet the 2004 PM_{10} objectives in the Head of the Town, Ballycolman and Newtownstewart areas respectively. All the six grid squares would require a large reduction in solid fuel burning if the 2010 PM_{10} objectives were to be met.

- Only allowing smokeless fuels to be burnt in Ballycolman, Castlederg, Melmount and Sion Mills had the effect of reducing PM_{10} emissions enough to prevent an exceedence of the 2004 PM_{10} objectives. In the Head of the Town and Newtownstewart, whilst only allowing smokeless fuels to be burnt has the effect of reducing PM_{10} concentrations substantially, this is not enough to prevent an exceedence of the 2004 PM_{10} objectives.

- The result of switching all solid fuel burning to oil had the effect of reducing the PM10 concentrations dramatically in all of the areas modelled to well below the 2004 and 2010 PM_{10} objectives.

Acronyms and definitions

ADMS	an atmospheric dispersion model
AQDD	an EU directive (part of EU law) - Common Position on Air Quality Daughter Directives, commonly referred to as the Air Quality Daughter Directive
AQMA	Air Quality Management Area
AQS	Air Quality Strategy
AP	Action Plan
AUN	Automatic Urban Network (DEFRA funded network)
base case	In the context of this report, the emissions or concentrations predicted at the date of the relevant air quality objective (2004 for PM_{10})
Defra	Department of the Environment, Food and Rural Affairs
DOE NI	Department of the Environment, Northern Ireland
EPA	Environmental Protection Act
EPAQS	Expert Panel on Air Quality Standards (UK panel)
EU	European Union
GIS	Geographical Information System
Limit Value	An EU definition for an air quality standard of a pollutant listed in the air quality directives
n	number of pairs of data
NAEI	National Atmospheric Emission Inventory
PM10	particulates with less than 10 μm in size
ppb	parts per billion
receptor	In the context of this study, the relevant location where air quality is assessed or predicted (for example, houses, hospitals and schools)
SD	standard deviation (of a range of data)
SO_2	Sulphur dioxide

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1 Introduction to the Stage 4 assessment

This section outlines the reason why Strabane District Council commissioned this further dispersion modelling as part of their Stage 4 air quality review and assessment, and briefly explains what a Stage 4 air quality review and assessment is.

1.1 PURPOSE OF THE STUDY

Strabane District Council has completed a Stage 3 Air Quality Review and Assessment (Netcen, 2003). The results of that indicted that exceedences of objectives for PM_{10} were likely in six high density domestic fuel burning areas. As a result of that air quality review and assessment, Strabane District Council was required to declare air quality management areas (AQMAs) covering these areas.

Strabane now requires further review and assessment of its air quality – a Stage 4 review and assessment – as specified under Section 84 of the Environment Act (1995).

1.2 BRIEF EXPLANATION OF A STAGE 4 AIR QUALITY REVIEW AND ASSESSMENT

The 1995 Environment Act places duties on local authorities with regard to local air quality review and, where potential problems are identified, the management of local air quality. The air quality review is designed as a multi-stage process, with progressively more complex assessments at each stage.

If a local authority declares an air quality management area, Section 84(1) of the Environment Act 1995 requires that local authority to carry out a further assessment of existing and likely future air quality in the AQMA. This further assessment is called a Stage 4 air quality review and assessment, and is intended to supplement information the authority already has.

For each pollutant where there is an exceedence of the air quality objectives, the Stage 4 should calculate:

- how great an improvement is needed; and
- the extent to which different sources contribute to the problem (source apportionment).

1.3 OVERVIEW OF APPROACH TAKEN

The general approach taken to this Stage 4 assessment was to:

- Identify the improvement needed in concentrations of PM_{10} at selected receptors in the Air Quality Management Areas declared by Strabane, including the receptors where the greatest improvements were needed;
- Consider recent continuous monitoring at the Springhill Park site;
- Use monitoring data from the PM_{10} continuous monitor located at Springhill Park in a high density residential fuel burning area to assess the ambient concentrations produced by the domestic fuel burning and to calibrate the output of the PM_{10} modelling study;
- Present the concentrations as contour plots of concentrations;
- Identify the contributions of the relevant sources to the exceedences (domestic fuel burning, background sources, and other relevant sources);
- Consider three scenarios to improve air quality and identify the improvements in air quality that might be possible for particles (PM_{10});
- Consider any changes that are needed to the existing Air Quality Management Area;
- Consider the feasibilities of implementing the options in a simple way

1.4 RELEVANT DEFRA DOCUMENTATION USED

This report has used the guidance in LAQM.TG(03), published in February 2003.

1.5 NUMBERING OF TABLES AND FIGURES

The numbering scheme is not sequential, and the figures and tables are numbered according to the chapter or section that they relate to.

1.6 POLLUTANTS CONSIDERED IN THIS REPORT

Strabane District Council are considering declaring six AQMAs for particles (PM_{10}), and therefore this is the only pollutant considered in this report.

1.7 STRUCTURE OF THE REPORT

The report is structured as follows:

- **Section 1** (this section) gives an overview of the work
- **Section 2** gives the background to this study; summarises the UK Air Quality Strategy and the function of a Stage 4 air quality review and assessment;
- **Section 3** contains information about Stage 4 Air Quality Review and Assessments and Action Plans. It explains the relationships between the Stage 4 and Action Plans, what each document should contain, and the timescales for producing the documents;
- **Section 4** lists the key information used in this review and assessment;
- **Section 5** summarises the work that was done at Stage 3 and the areas of exceedence of the air quality objectives for PM_{10}. Monitoring data is presented to confirm the predicted concentrations in the Air Quality Management Area and to generally assess concentrations in the six AQMAs.
- **Section 6** presents the Stage 4 modelling, which includes predictions of concentrations of PM_{10} in 2004 with business as usual and three scenarios.
- **Section 7** highlights the implications of this Stage 4 assessment for Strabane, including any changes that may be needed to the current extent of the current Air Quality Management Area and comments on the effects that new national policy developments have had, and may have in the future, on the predicted air quality in Strabane;
- **Section 8** summarises what the next steps are for Strabane District Council in the review and assessment process.

2 The UK Air Quality Strategy

2.1 THE NEED FOR AN AIR QUALITY STRATEGY

After agreement of a Common Position on the Air Quality Daughter Directives (AQDD), in June 1998 at the European Union Environment Council, the government published its proposals for review of the National Air Quality Strategy (in 1999). Subsequently the Air Quality Strategy for England, Scotland, Wales and Northern Ireland was published in January 2000.

The NI Environment Order came into operation in January 2003 and implements both the European Air Framework Directive 96/62EC and the UK Air Quality Strategy. The Expert Panel on Air Quality Standards (EPAQS) has proposed new national air quality standards for the UK.

The NI Environment Order 2002 provides the framework for LAs to review air quality and for implementation of an AQMA. It is issued by the Department of the Environment in Northern Ireland under Article 16 of the Environment (NI) Order 2002. Under article 16 of the order, District Councils and other relevant authorities are required to have regard to this guidance when carrying out any of their duties under, or by virtue of Part III of the order. The guidance the document sets out is outlined in Table 2.1 below.

Table 2.1: NI Environment Order 2002 key Guidance:

▪ The statutory background and the legislative framework within which relevant authorities have to work
▪ The new principles behind reviews and assessments of air quality up to 2010 and the recommended steps that relevant authorities should take
▪ The timetable for reviews and assessments up to 2010
▪ How district councils should handle the designation of AQMAs
▪ How relevant authorities should handle the drawing up and implementation of action plans
▪ Recommendations and suggestions on taking forward the development of local and regional air quality strategies
▪ Suggestions of how relevant authorities should consult and liase with others
▪ Local transport measures which Roads Service might wish to consider
▪ The general principles behind air quality and land use planning; and
▪ How enforcing authorities should use powers of entry under Article 19 of the Order

2.2 OVERVIEW OF THE PRINCIPLES AND MAIN ELEMENTS OF THE NATIONAL AIR QUALITY STRATEGY

The main elements of the AQS can be summarised as follows:

- The use of a health effects based approach using national air quality standards and objectives.
- The use of policies by which the objectives can be achieved and which include the input of important actors such as industry, transportation bodies and local authorities.
- The predetermination of timescales with target dates of 2003, 2004, 2005, 2008 and 2010 for the achievement of objectives and a commitment to review the Strategy every three years.

It is intended that the AQS will provide a framework for the improvement of air quality that is both clear and workable. In order to achieve this, the Strategy is based on several principles which include:

- the provision of a statement of the Government's general aims regarding air quality;
- clear and measurable targets;
- a balance between local and national action and
- a transparent and flexible framework.

Co-operation and participation by different economic and governmental sectors is also encouraged within the context of existing and potential future international policy commitments.

2.2.1 National Air Quality Standards

At the centre of the AQS is the use of national air quality standards to enable air quality to be measured and assessed. These also provide the means by which objectives and timescales for the achievement of objectives can be set. Most of the proposed standards have been based on the available information concerning the health effects resulting from different ambient concentrations of selected pollutants and are the consensus view of medical experts on the Expert Panel on Air Quality Standards (EPAQS). These standards and associated specific objectives to be achieved between 2003 and 2008 are shown in Table 2.2. The table shows the standards in ppb and $\mu g\ m^{-3}$ with the number of exceedences that are permitted (where applicable) and the equivalent percentile.

Specific objectives relate either to achieving the full standard or, where use has been made of a short averaging period, objectives are sometimes expressed in terms of percentile compliance. The use of percentiles means that a limited number of exceedences of the air quality standard over a particular timescale, usually a year, are permitted. This is to account for unusual meteorological conditions or particular events such as November 5th. For example, if an objective is to be complied with at the 99.9th percentile, then 99.9% of measurements at each location must be at or below the level specified.

Table 2.2. Proposed Objectives included in the Air Quality Regulations (NI) 2003 for the purpose of Local Air Quality Management.

Pollutant	Air Quality Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 μgm^{-3} 3.25 μgm^{-3}	Running annual mean Running annual mean	31.12.2003 31.12.2010
1,3 Butadiene	2.25 μgm^{-3}	Running annual mean	31.12.2003
Carbon Monoxide	10.0 mgm^{3}	Maximum daily running 8-hour mean	31.12.2003
Lead	0.5 μgm^{-3} 0.25 mgm3	Annual mean Annual mean	31.12.2003 31.12.2008
Nitrogen Dioxide[1]	200 μgm^{-3} no to be exceeded more than 18 times a year 40 μgm^{-3}	1 hour mean annual mean	31.12.2005 31.12.2005
Particles (PM_{10})[2] **Gravimetric**[3]	50 μgm^{-3} not to be exceeded more than 35 times a year 40 μgm^{-3}	24 hour mean annual mean	31.12.2004 31.12.2004
Sulphur Dioxide	350 μgm^{-3} not to be exceeded more than 24 times per year 125 μgm^{-3} not to be exceeded more than 3 times per year 266 μgm^{-3} not to be exceeded more than 35 times per year	1 hour mean 24 hour mean 15 minute mean	31.12.2004 31.12.2004 31.12.2005

Notes
1. The objectives for nitrogen dioxide are provisional.
2. There are likely to be new particles objectives for 2010, not in regulation at present, expected after the review of the EU's first Air Quality Daughter Directive (2004).
3. Measured using the European gravimetric transfer standard or equivalent.

2.2.2 Relationship between the UK National Air Quality Standards and EU air quality Limit Values

As a member state of the EU, the UK must comply with EU Directives.

There are three EU ambient air quality directives that the UK has transposed in to UK law. These are:

- **96/62/EC** Council Directive of 27 September 1996 on ambient air quality assessment and management. (the Ambient Air Framework Directive)
- **1999/30/EC** Council Directive of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide, oxides of nitrogen, particulate matter and lead in ambient air. (the First Daughter Directive)
- **2000/69/EC** Directive of the European Parliament and the Council of 16 Nov 2000 relating to limit values for benzene and carbon monoxide in ambient air. (the Second Daughter Directive)

The first and second daughter directives contain air quality Limit Values for the pollutants that are listed in the directives. The United Kingdom (i.e. Great Britain and Northern Ireland) must comply with these Limit Values. The UK air quality strategy should allow the UK to comply with the EU Air Quality Daughter Directives, but the UK air quality strategy also includes some stricter national objectives for some pollutants, for example, the 15-minute sulphur dioxide objective.

The Government is ultimately responsibility for achieving the EU limit values. However, it is important that Local Air Quality Management is used as a tool to ensure that the necessary action is taken at local level to work towards achieving the EU limit values by the dates specified in those EU Directives.

2.2.3 Policies in place to allow the objectives for the pollutants in AQS to be achieved

The policy framework to allow these objectives to be achieved is one that that takes a local air quality management approach. This is superimposed upon existing national and international regulations in order to effectively tackle local air quality issues as well as issues relating to wider spatial scales. National and EC policies that already exist provide a good basis for progress towards the air quality objectives set for 2003 to 2008. For example, the Environmental Protection Act 1990 allows for the monitoring and control of emissions from industrial processes and various EC Directives have ensured that road transport emission and fuel standards are in place. These policies are being developed to include more stringent controls. Recent developments in the UK include the announcement by the Environment Agency in January 2000 on controls on emissions of SO_2 from coal and oil fired power stations. This system of controls means that by the end of 2005 coal and oil fired power stations will meet the air quality standards set out in the AQS.

Local air quality management provides a strategic role for local authorities in response to particular air quality problems experienced at a local level. This builds upon current air quality control responsibilities and places an emphasis on bringing together issues relating to transport, waste, energy and planning in an integrated way. This integrated approach involves a number of different aspects. It includes the development of an appropriate local framework that allows air quality issues to be considered alongside other issues relating to polluting activity. It should also enable co-operation with and participation by the general public in addition to other transport, industrial and governmental authorities.

An important part of the Strategy is the requirement for local authorities to carry out air quality reviews and assessments of their area against which current and future compliance with air quality standards can be measured. Over the longer term, these will also enable the effects of policies to be studied and therefore help in the development of future policy. The Government has prepared guidance to help local authorities to use the most appropriate tools and methods for conducting a

review and assessment of air quality in their District. This is part of a package of guidance being prepared to assist with the practicalities of implementing the AQS. Other guidance covers air quality and land use planning, air quality and traffic management and the development of local air quality action plans and strategies.

2.2.4 Timescales to achieve the objectives

In most local authorities in the UK, objectives will be met for most of the pollutants within the timescale of the objectives shown in Table 2.2. It is important to note that the objectives for NO_2 remain provisional. The Government has recognised the problems associated with achieving the standard for ozone and this will not therefore be a statutory requirement. Ozone is a secondary pollutant and transboundary in nature and it is recognised that local authorities themselves can exert little influence on concentrations when they are the result of regional primary emission patterns.

2.2.5 New particle objectives (not included in regulations)

The Government and the Devolved Administrations have adopted two Air Quality Objectives for fine particles ($PM_{10)}$, which are equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives vary depending on whether the Local Authority is in Scotland or the remainder of the UK. The objectives relevant to Strabane District Council are 40 μgm^{-3} as the annual mean, and 50 μgm^{-3} as the fixed 24-hour mean to be exceeded on no more than 35 days per year, to be achieved by the end of 2004. In 2010 there is a provisional objective of an annual mean of 20 μgm^{-3} and a 24 hour mean of 50 μgm^{-3} not to be exceeded more than 7 times a year.

2.3 AIR QUALITY REVIEWS

A range of Technical Guidance has been issued to enable air quality to be monitored, modelled, reviewed and assessed in an appropriate and consistent fashion. This includes the latest version of LAQM.TG(03) February 2003, on 'Local Air Quality Management: Technical Guidance. This review and assessment has considered the procedures set out in this technical guidance.

The primary objective of undertaking a review of air quality is to identify any areas that are unlikely to meet national air quality objectives and ensure that air quality is considered in local authority decision making processes. The complexity and detail required in a review depends on the risk of failing to achieve air quality objectives. At present Northern Ireland District Councils are engaged in the 3 staged approach of review and assessment. All three stages of review and assessment may be necessary and every authority is expected to undertake at least a first stage review and assessment of air quality in their authority area. The Stages are briefly described in the following table, Table 2.3.

Table 2.3 Brief details of Stages in the Air Quality Review and Assessment process

Stage	Objective	Approach	Outcome
First Stage Review and Assessment	• Identify all significant pollutant sources within or outside of the authority's area.	• Compile and collate a list of potentially significant pollution sources using the assessment criteria described in the Pollutant Specific Guidance	
	• Identify those pollutants where there is a **risk** of exceeding the air quality objectives, and for which further investigation is needed.	• Identify sources requiring further investigation.	• Decision about whether a Stage 2 Review and Assessment is needed for one or more pollutants. If not, no further review and assessment is necessary.
Second Stage Review and Assessment	• Further screening of significant sources to determine whether there is a significant risk of the air quality objectives being exceeded.	• Use of screening models or monitoring methods to assess whether there is a risk of exceeding the air quality objectives.	
	• Identify those pollutants where there is a **risk** of exceeding the objectives, and for which further investigation is needed.	• The assessment need only consider those locations where the highest likely concentrations are expected, and where public exposure is relevant.	• Decision about whether a Stage 3 Review and Assessment is needed for one or more pollutants. If, as a result of estimations of ground level concentrations at suitable receptors, a local authority judges that there is no significant risk of not achieving an air quality objective, it can be confident that an Air Quality Management Area (AQMA) will not be required. • However, if there is doubt that an air quality objective will be achieved a third stage review should be conducted.

Table 2.3 (contd.) Brief details of Stages in the Review and Assessment process

Stage	Objective	Approach	Outcome
Third Stage Review and Assessment	• Accurate and detailed assessment of both current and future air quality. Assess the **likelihood** of the air quality objectives being exceeded.	• Use of validated modelling and quality-assured monitoring methods to determine current and future pollutant concentrations.	
	• Identify the geographical boundary of any exceedences, and description of those areas, if any, proposed to be designated as an AQMA.	• The assessment will need to consider all locations where public exposure is relevant. For each pollutant of concern, it may be necessary to construct a detailed emissions inventory and model the extent, location and frequency of potential air quality exceedences.	• Determine the location of any necessary Air Quality Management Areas (AQMAs). Once an AQMA has been identified, there are further sets of requirements to be considered. • A further assessment of air quality in the AQMA is required within 12 months which will enable the degree to which air quality objectives will not be met and the sources of pollution that contribute to this to be determined. A local authority must also prepare a written action plan for achievement of the air quality objective. Both air quality reviews and action plans are to be made publicly available.

Table 2.3 (contd.) Brief details of Stages in the Review and Assessment process

Stage	Objective	Approach	Outcome
Fourth Stage Review and Assessment **(to support the Action Plan)**	• Further accurate and detailed assessment of both current and future air quality. Should concentrate on areas where the Stage 3 assessment indicated exceedences of the objectives are likely.	• Use of validated modelling and quality-assured monitoring methods to determine current and future pollutant concentrations.	• Confirm outcome of original AQMA designation and alter if necessary (for example, as a result of changes in the emission factors used in the modelling)
	• Source apportionment in regions where there are exceedences. Understand contributions from traffic, industrial, domestic and background sources.	• Analyse modelling results.	• Understand the contributions from the various sources, and therefore select the source where action can be taken to reduce emissions
	• Assess a range of scenarios to improve air quality and reduce or eliminate the risk of air quality objectives being exceeded.	• Liaise with stakeholders such as the Highways Agency, the Environment Agency and the local industry to help define scenarios	• Identify the most likely scenarios to improve air quality and use these in the modelling. Incorporate scenarios into any Action Plan produced.
	• Identify the geographical boundaries of any exceedences in the scenarios.	• Analyse modelling results.	• Incorporate modelling results of the scenarios into any Action Plan produced. Consider how to implement any Action Plan to improve air quality.

Northern Ireland Local authorities are expected to have completed their third stage review and assessment (if necessary) of air quality by December 2003. A further review will also need to be completed for the purposes of the Act before the target date of April 2007.

2.4 LOCATIONS THAT THE REVIEW AND ASSESSMENT MUST CONCENTRATE ON

For the purpose of review and assessment, the authority should focus their work on locations where members of the public are likely to be exposed over the averaging period of the objective. Table 2.4 summarises the locations where the objectives should and should not apply.

Table 2.4 Typical locations where the objectives should and should not apply

Averaging Period	Pollutants	Objectives *should* apply at …	Objectives should *not* generally apply at …
Annual mean	• 1,3 Butadiene • Benzene • Lead • Nitrogen dioxide • Particulate Matter (PM_{10})	• All background locations where members of the public might be regularly exposed.	• Building facades of offices or other places of work where members of the public do not have regular access.
		• Building facades of residential properties, schools, hospitals, libraries etc.	• Gardens of residential properties.
			• Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term
24 hour mean and 8-hour mean	• Carbon monoxide • Particulate Matter (PM_{10}) • Sulphur dioxide	• All locations where the annual mean objective would apply.	• Kerbside sites (as opposed to locations at the building facade), or any other location where public exposure is expected to be short term.
		• Gardens of residential properties.	

Table 2.4 (contd.) Typical locations where the objectives should and should not apply

Averaging Period	Pollutants	Objectives should apply at …	Objectives should generally not apply at …
1 hour mean	• Nitrogen dioxide • Sulphur dioxide	• All locations where the annual mean and 24 and 8-hour mean objectives apply.	• Kerbside sites where the public would not be expected to have regular access.
		• Kerbside sites (e.g. pavements of busy shopping streets).	
		• Those parts of car parks and railway stations etc. which are not fully enclosed.	
		• Any outdoor locations to which the public might reasonably expected to have access.	
15 minute mean	• Sulphur dioxide	• All locations where members of the public might reasonably be exposed for a period of 15 minutes or longer.	

It is unnecessary to consider exceedences of the objectives at any location where public exposure over the relevant averaging period would be unrealistic, and the locations should represent non-occupational exposure.

Key Points

- The Environment (Northern Ireland) Order 2002 has required the development of a National Air Quality Strategy for the control of air quality
- A central element in the Strategy is the use of air quality standards and associated objectives based on human health effects that have been included in the Air Quality Regulations.
- The Strategy uses a local air quality management approach in addition to existing national and international legislation. It promotes an integrated approach to air quality control by the various actors and agencies involved.
- Air quality objectives, with the exception of ozone, are to be achieved by specified dates up to the end of 2010.
- A number of air quality reviews are required in order to assess compliance with air quality objectives. The number of reviews necessary depends on the likelihood of achieving the objectives.

3 Stage 4 Air Quality Review and Assessment and Action Planning

This section contains information about Stage 4 Air Quality Review and Assessments and Action Plans. It explains the relationships between the Stage 4 and Action Plans, what each document should contain, and the timescales for producing the documents.

3.1 THE RELATIONSHIPS BETWEEN A STAGE 4 AIR QUALITY REVIEW AND ASSESSMENT AND AN ACTION PLAN

If a local authority declares an air quality management area, Section 84(1) of the Environment Act 1995 requires that local authority to carry out a further assessment of existing and likely future air quality in the AQMA. This further assessment is called a Stage 4 air quality review and assessment, and is intended to supplement information the authority already has. It is a duty of the LA to complete this Stage 4 air quality review and assessment.

For each pollutant where there is an exceedence of the air quality, the Stage 4 should calculate:

- how great an improvement is needed; and
- the extent to which different sources contribute to the problem (source apportionment of traffic, industrial, domestic and background – if appropriate).

This should give a clear picture of the sources which authorities can control or influence. It should ensure that Action Plans strike a balance between the contribution from local authorities and the contribution that must come from other sectors. It should allow them to target their responses more effectively and ensure that the relative contributions of industry, transport and other sectors are cost effective and proportionate. It should include, in particular, an estimate of the costs and feasibility of different abatement options to allow for the development of proportionate and effective Action Plans (although this information could be included within the Action Plan, rather than the Stage 4). Further liaison with other agencies (including in particular, the Department of the Environment Northern Ireland) is likely to be essential.

Essentially, producing the Stage 4 air quality review and assessment and the Action Plan are activities that the LA can completed in parallel, rather than sequentially.

3.2 RECENT DEFRA GUIDANCE ON STAGE 4 AIR QUALITY REVIEW AND ASSESSMENT

Defra and DOE NI have recently issues guidance on what they expect in a Stage 4 (UWE, 03). This expands on the information that is available in LAQM.G1(00) - Framework for review and assessment of air quality.

Essentially, the Stage 4 provides the technical justification for the measures an authority includes in its Action Plan. Defra expect that the Stage 4 will allow Local Authorities:

- To calculate more accurately how much of an improvement in air quality is needed to deliver the air quality objectives within the AQMA
- To refine their knowledge of the sources of pollution so that air quality Action Plans can be properly targeted
- To take account of national policy developments that may come to light after the AQMA declaration
- To take account of local policy developments, for example, the introduction of gas to housing executive homes in Northern Ireland
- To carry out more intensive monitoring in the problem areas to confirm earlier findings
- To corroborate other assumptions on which the designation of the AQMA was based and to check that the original designation is still valid, and does not need amending
- To respond to comments made by statutory consultees (if there were any relevant comments made)

3.3 ACTION PLANS

Local authorities are required to prepare a written Action Plan for each AQMA setting out the actions they intend to take in pursuit of the air quality objectives. This has to include a timetable for implementing the plan.

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

The Action Plan should also contain simple estimates of the costs and feasibilities of implementing those scenarios. The LA can then identify which scenario(s) offer the most cost-effective or cost-beneficial way of improving air quality.

3.4 STAGE 4 AND ACTION PLAN TIMESCALES

The Environment Act does not set any deadline for completing Action Plans, but the Government expects authorities to begin preparing them as soon as they have designated an AQMA, and in parallel with their further assessment of air quality required under section 84(1) of the Environment Act. Authorities should not wait until they have completed their further assessment of air quality before beginning their Action Plans. They should aim to consult on their draft AQMA Action Plans within 9-12 months of designation, and should have AQMA Action Plans in place within 12-18 months of designation.

Local authorities are required under section 84(2)(a) of the Environment Act to report on the further assessment of air quality (i.e. the Stage 4 Air Quality Review and Assessment) within 12 months of designating the Air Quality Management Area.

4 Information used to support this assessment

This section lists the key information used in this review and assessment.

4.1 MAPS

Netcen purchased digital OS landline data of the six one km^2 areas which were identified in the Stage 3 Review and Assessment as requiring further assessment.
Individual buildings (receptors) were identified from the electronic OS Landline maps of the areas.

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4.2 FUEL USE SURVEY DATA

Strabane District Council commissioned Mallett & Associates Research Consultancy to carry out a domestic fuel survey in six areas identified in the Stage 2 Review and Assessment. The results of this survey have been used in the modelling undertaken for this report. The survey aimed to determine the following:

- The types and quantities of fuels used in the domestic sector
- Seasonal use of heating fuels
- The types of heating appliances used
- The total number of persons who live in coal burning households in each of the six designated survey areas.
- The total number of houses that burn coal in each of the survey areas.

The aim was to take a 15% random sample of households in three high density housing areas in Strabane and a 10% random sample in the lower density areas (Castlederg, Newtownstewart and Sion Mills).

Table 6.3.1 Estimated number of houses in each grid area and the achieved number of surveys.

Grid Area	No. houses	Respondents	% asked
Head of town	560	81	14.5
Ballycolman	1266	187	14.8
Melmount	724	106	14.6
Newtownstewart	477	49	10.3
Castelderg	589	58	9.8
Sion Mills	505	50	9.9

Overall, oil was the most popular primary heating source in all grid areas combined (61.2% of all households). Coal accounted for 35.4% of all households as the main heating source and an additional 14% of all households reported using coal as a secondary source of heat. The results of the survey are shown in Appendix 1.

4.3 AMBIENT MONITORING

4.3.1 Particles (PM_{10}).
PM_{10} concentrations are/were monitored:

- At Springhill Park (OS Grid Reference 2351, 3972) using a continuous monitor since April 2002.

4.4 METEOROLOGICAL DATA USED IN THE DISPERSION MODELLING

Hourly sequential meteorological data for Aldergrove was obtained for 1999 from the Meteorological Office for input into the ADMS dispersion model. The year 1999 is considered to be representative of the meteorological conditions in a typical year.

4.5 EMISSION FACTORS USED IN THIS REVIEW AND ASSESSMENT

The PM_{10} emissions arising from domestic fuel combustion were taken from the UK emission factor database (www.naei.org.uk). This web site is managed by Netcen on behalf of Defra.

5 Stage 4 Review and Assessment for PM10

This section summarises

- the work that was done at Stage 3 and the areas of exceedence of the air quality objectives for PM_{10};
- the additional monitoring that has been done after Stage 3 to confirm the predicted concentrations in the Air Quality Management Areas.

The Stage 4 modelling, which includes predictions of concentrations of PM_{10} for a range of Action Plan scenarios to improve air quality is shown in Section 6.

5.1 LATEST STANDARDS AND OBJECTIVES FOR PM10

The government and the devolved administrations have adopted two air quality objectives for fine particles (PM_{10}), which are the equivalent to the EU Stage 1 limit values in the first Air Quality Daughter Directive. The objectives are:

- An annual mean of 40 $\mu g/m^3$.
- A 24 hour mean of 50 $\mu g/m^3$ not to be exceeded more than 35 days per year (This is equivalent to the 90.4 percentile daily mean).

The EU has also set indicative limit values for PM_{10} which are to be achieved by 1st January 2010. These stage 2 limit values are considerably more stringent and are:

- For Northern Ireland, a 24 hour mean of 50 $\mu g/m^3$ not to be exceeded more than 7 days per year and an annual mean of 20 $\mu g/m^3$ to be achieved by the end of 2010;

The 24 hour objective is more stringent than the annual mean objective in 2004. However, the opposite is true in 2010, and the annual mean objective is more stringent than the 24 hour objective.

5.2 KEY FINDINGS OF THE STAGE 3 REVIEW AND ASSESSMENT

The Stage 2 air quality assessment for Strabane District Council identified areas that required further assessment of particulates (PM_{10}). A Stage 3 Review and Assessment was completed, which involved detailed dispersion modelling of six one kilometre squared areas with high density domestic fuel burning to predict areas of exceedence of the PM_{10} objectives (Netcen, 2003).

The report concluded that exceedences of the PM_{10} objective were likely in all six one kilometre squared areas. As a result of the Stage 3 assessment, Strabane District Council are considering declaring AMQAs in all six areas for PM_{10} arising from domestic fuel burning.

5.3 MONITORING

5.3.1 Continuous monitoring

Continuous monitoring of PM_{10} has been carried out since April 2002 by a Beta Attenuation monitor (BAM) at a site at Springhill Park in the Head of the Town area (OS Grid Reference 2351, 3972). The concentrations recorded have been used to validate the results of the Stage 4 modelling carried out in this study.

QA/QC of continuous monitoring data
PM_{10} concentrations have been recorded since April 2002 at Springhill Park. The data has been ratified to the QA/QC standards used in the Defra network by Netcen.

Summary statistics
Table 5.3.1 shows the daily average measured gravimetric concentrations throughout the latest year of monitoring.

Table 5.3.1 Summary of continuous PM_{10} data from 26th April 2002 to 25th April 2003 inclusively.

	Concentration, μg m^{-3} (gravimetric)
	PM10
Annual average	45
90th percentile daily mean	85
Data capture	96.9%

The monitoring shows that at this location, both the annual mean and the 24 hour mean PM_{10} objective is unlikely to be achieved by the end of 2004.

6 Stage 4 modelling

6.1 SUMMARY OF THE MODELS USED IN THIS STAGE 4 ASSESSMENT

A revised and improved modelling approach has been used in this Stage 4 assessment as opposed to that used in the Stage 3 assessment. This new approach was possible due to the purchase of digital landline data. This enabled the centre co-ordinate of each house to be accurately obtained. In the previous Stage 3 assessment only paper maps were available. The paper maps were produced in 1992 and it has been found that there are now several new areas of housing which are shown in the digital maps but were not shown in the paper version.

Digital Landline data was obtained from Ordnance Survey Northern Ireland. This was used to obtain the centre co-ordinate of each of the houses within the six grids. Each co-ordinate represented a chimney through which the emissions to the air were vented. Each emission was modelled as a point source.

The Netcen proprietary LADSUrban model has then been used to predict the PM_{10} concentrations arising from domestic fuel burning in the six grids. It has been specially developed for Review and Assessments by Netcen. The model has made use of ADMS-3.1 to provide dispersion kernels over a grid. ADMS could not be used on its own as there is a limit of 100 point sources that can be modelled. In Ballycolman alone there are estimated to be 1,266 houses.

6.2 SOURCES OF BACKGROUND (NON-DOMESTIC FUEL COMBUSTION) EMISSIONS DATA

Background concentrations of particulates (PM_{10}) have been taken from the UK National Atmospheric Emissions Inventory (www.naei.org.uk) and scaled to the year of interest where necessary.

6.3 EMISSION FACTORS USED FOR THE MODELLING

The PM_{10} emissions arising from domestic fuel combustion were taken from the UK emission factor database (www.naei.org.uk). This web site is managed by Netcen on behalf of Defra.

Table 6.3 PM_{10} emissions arising from domestic fuel combustion

Fuel type	PM10	Units
Anthracite	3.59	kt/mt fuel burnt
Burning Oil	0.01	kt/mt fuel burnt
Coal	10	kt/mt fuel burnt
SSF	5.6	kt/mt fuel burnt
Wood	7.9	kt/mt fuel burnt

Source: UK emission factor database (www.naei.org.uk)
SSF = solid smokeless fuel

These emission factors have been used to derive emissions arising from each house in each grid square.

6.4 MODEL BIAS

Calibration is the process where the concentrations of the model are adjusted to agree with local air quality monitoring data – the modelled concentrations are adjusted for any bias. In this case, the model has been used to predict concentrations at the site of the continuous monitor at Springhill Park.

The purpose of this adjustment was to ensure that the modelled concentrations equalled the measured values at the monitoring site.

Table 6.4 shows the main elements of the calculation for PM_{10}.

Table 6.4 Main elements of the reference calculation for PM_{10}.

Element	Factor used	PM10 concentration ($\mu g\ m^{-3}$)	Source of factor or Model used
Measured concentration Measured concentration at the Springhill Park site (April 2002 - April 2003)		45	Monitoring (annual mean)
Background concentration at monitoring site in 2003		14.2	NAEI
Modelled concentrations at Springhill Park Modelled contribution of domestic emissions at monitoring site		13.7	ADMS (annual average)
Model bias correction PM_{10} monitored minus PM_{10} background	=(45 – 14.2)	30.8	
Difference (bias in the model)	(30.8/13.7) =	2.25	Model under Predicting at the Strabane site

Note : Totals may not necessarily agree with the sum of their components due to rounding**.**

6.5 UNCERTAINTIES IN THE MODELLED CONCENTRATIONS

The calculations have not taken account of:

- Uncertainties in the fuel use survey as only 10 - 15% of households were questioned;
- Uncertainties in how the burning of domestic fuel might change between when the survey was undertaken and 2004;
- Uncertainty resulting from year to year variations in atmospheric conditions;
- Model errors at the receptor sites;
- Model errors at the reference site;

- Uncertainty in the location of the monitor with respect to local sources;
- Uncertainty in emission factors.

The 24 hour mean is the most stringent of the PM_{10} standards in 2004 and therefore this has been depicted in the contour plots, as if this objective is met then it is likely that so too will the annual average objective. The LADS model provides the results in terms of the annual mean. To convert annual average PM_{10} concentrations to an approximate figure for the 90^{th} percentile of the 24 hour mean, the annual average concentration has been multiplied by 1.89. This has been calculated from the Springhill Park site over a year of monitoring.

In 2010 the reverse is the case and the annual mean objective is the most stringent of the PM_{10} objectives. Therefore the comparisons with the 2010 objectives are provided in terms of the annual mean objective.

6.6 RESULTS OF THE PM_{10} MODELLING (BAU).

6.6.1 Head of the Town

Figure 6.6.1 shows the predicted 90.4 percentile daily mean PM_{10} concentrations in the Head of the Town in 2004. The results show that with the current fuel burning mix the daily mean PM_{10} objective is predicted to be exceeded in a dense area of housing to the East of the Mourne River.

6.6.2 Ballycolman

Figure 6.6.2 shows the predicted 90.4 percentile daily mean PM_{10} concentrations in Ballycolman in 2004. The results show that with the current fuel burning mix the daily mean PM_{10} objective is predicted to be exceeded in a small area of housing to the West of the Mourne River. Whilst on average only 26% of residential households burn coal in this area, there are a very large number of houses. This contributes to the high PM_{10} concentrations found in this area.

6.6.3 Melmount

Figure 6.6.3 shows the predicted 90.4 percentile daily mean PM_{10} concentrations in Melmount. The results show that with the current fuel burning mix, the daily mean PM_{10} objective is **not** predicted to be exceeded in 2004. This is primarily due to the Melmount area having a low percentage of people burning coal.

6.6.4 Newtownstewart

Figure 6.6.4 shows the predicted 90.4 percentile daily mean PM_{10} concentrations in Newtownstewart in 2004. The results show that with the current fuel burning mix the daily mean 2004 PM_{10} objective is predicted to be exceeded in the Mourne Park area where the highest density of housing is found. High PM_{10} concentrations are predicted in this area due to the high percentage of people burning coal in this area (61%).

6.6.5 Castlederg

Figure 6.6.5 shows the predicted 90.4 percentile daily mean PM_{10} concentrations in Castlederg in 2004. The results show that with the current fuel burning mix, the daily mean PM_{10} objective is **not** predicted to be exceeded in 2004. This is primarily due to the Castlederg area having a low number of residential houses. However, due to the predicted PM_{10} concentrations only being marginally below the objective, it is suggested that an air quality management area is maintained in this area.

6.6.6 Sion Mills

Figure 6.6.6 shows the predicted 90.4 percentile daily mean PM_{10} concentrations in Sion Mills. The results show that with the current fuel burning mix, the daily mean PM_{10} objective is **not** predicted to be exceeded in 2004. This is primarily due to the Sion Mills area having a low number of residential houses.

6.7 IMPROVEMENTS NEEDED IN AIR QUALITY

6.7.1 The improvement that is needed – general points

A key step in the Stage 4 Review and Assessment process is to identify the improvements needed in air quality, when there are exceedences of the UK air quality objectives.

An important point to note is that the Local Authority does not need to attempt to improve air quality beyond the air quality objective that is being exceeded. For example, an AQMA may have been declared for PM_{10}, and for administrative reasons, the boundary of the AQMA may include houses where the concentrations of PM_{10} are not predicted to exceed the daily mean objective of 50 $\mu g/m^3$ (with 35 exceedences). Let us say the maximum exceedence of the daily mean PM10 objective at a relevant receptor in the AQMA was 40. The maximum improvement that would be needed in this example will be 5 exceedences. In this example, this will mean that some houses in the AQMA will experience concentrations of PM10 possibly much lower than the daily mean PM_{10} objective.

6.7.2 Magnitude of exceedence of the air quality objectives – the improvements expected to be needed

The maximum exceedence of the 90^{th} percentile 24 hour mean PM_{10} air quality objective in each of the six areas are shown in the table below.

Table 6.7.2 The Improvement in 90.4 percentile daily mean PM_{10} concentrations needed at receptors exposed to the highest predicted concentrations (in 2004).

Name of area modelled	**Specific receptors identified**	**Max 90.4 percentile daily conc. of PM10 predicted for 2004.**	**Improvement required to achieve 90.4 percentile daily mean of 50 $\mu g/m^3$**
		($\mu g/m^3$)	**($\mu g/m^3$)**
Head of the Town	Springhill Park	85	35
Ballycolman	Ballycolman	62	12
Melmount	Carlton Drive	37	None required
Newtownstewart	Mourne Park	72	22
Castlederg	Hill View	49	None required
Sion Mills	Main Street	46	None required

Note: Figures have been rounded up to whole integers.

6.8 SOURCE APPORTIONMENT OF 'BASE CASE' PREDICTIONS

Source apportionment is the process whereby the contributions from the sources of a pollutant are determined. In this study, the relevant sources could include: traffic; domestic fuel combustion; local background; and industrial. This allows the most important source or sources to be identified and options to reduce ambient concentrations of pollutants can then be considered and assessed.

In the Stage 4 assessment, the source apportionment should:

- Confirm that exceedences of PM_{10} are due to domestic fuel combustion (for Strabane)
- Quantify what proportion of the exceedences of PM_{10} are due to background emissions, or, local emissions from domestic combustion in the local area. This will help determine whether local management measures could have a significant impact on reducing emissions in the area of exceedence, or, whether national measures would be a suitable approach to achieving the air quality objectives.

6.8.1 What is the 'base case'?

The base case in this assessment is defined as the PM_{10} concentrations that are predicted in the absence of any measures to improve air quality in any of the six, 1 kilometre square grids identified in Strabane District Council. The source apportionment work has been carried out for the base case.

6.8.2 Sources of pollution considered

We have considered the effect of the following sources in this Stage 4 assessment at each of the receptors considered:

- Background - general local from the NAEI
- Domestic fuel combustion

Within each of the six, one kilometre grids there are no major roads that will contribute significantly to the local annual mean and 90.4 percentile daily mean PM_{10} concentrations. The effect of any minor roads such as these will be included in the local PM_{10} background concentrations.

Table 6.8.2 Sources apportionment of PM_{10} ($\mu g/m^3$) in areas in Strabane with the greatest predicted exceedences of the daily mean objective in 2004 (results are shown in terms of annual mean PM_{10} concentrations).

Name of area modelled	Specific receptors considered	Background	Domestic fuel combustion	Total
Head of the Town	Houses on Springhill Park	14 (32%)	31 (68%)	45 (100%)
Ballycolman	Ballycolman	14 (43%)	19 (57%)	33 (100%)
Melmount	Carlton Drive	14 (70%)	6 (30%)	20 (100%)
Castlederg	Hill View	13 (34%)	25 (66%)	38 (100%)
Newtownstewart	Mourne Park	13 (50%)	13 (50%)	26 (100%)
Sion Mills	Main Street	14 (58%)	10 (42%)	24 (100%)

Note : Totals may not necessarily agree with the sum of their components due to rounding.

6.8.3 Key findings of the source apportionment

For PM_{10} concentrations in areas where exceedences are predicted with business as usual in 2004 (Head of the Town, Ballycolman and Newtownstewart) plus Castlederg, the majority comes from domestic fuel combustion. Background concentrations in these areas contribute 32% to 50%. Therefore in these three areas the exceedences of the PM_{10} objectives are a problem that can be controlled locally.

6.9 OPTIONS CONSIDERED TO IMPROVE AIR QUALITY AND THE EFFECTS OF THOSE OPTIONS

6.9.1 The options (Action Plan scenarios) considered

Of the pollutants in the UK Air Quality Strategy, exceedences are predicted for the 2004 PM_{10} objective in three of the six areas modelled in Strabane. These exceedences are related to the high levels of domestic fuel combustion in these areas.

Therefore, the scenarios that Strabane have considered are designed to reduce emissions from domestic fuel combustion.

The three scenarios are:

1. Estimating the percentage reduction in solid fuel burning houses required in each of the grid squares to produce compliance with the relevant objectives in 2004 and 2010;

2. Estimate the impact on local PM_{10} concentrations of only allowing smokeless fuels to be burnt;

3. Estimate the impact of switching all solid fuel burning to oil.

A general option that would apply to all the scenarios considered is to reduce the general background concentrations (i.e. concentrations over a scale of hundreds of metres) of PM_{10}. For Strabane, background concentrations are not atypically high, in comparison with local authorities with broadly similar densities of industry and roads. This background concentration of PM_{10} is composed of a combination of very diluted distant sources (traffic and industry from many kilometres away) and more local sources (traffic in the region and domestic fuel combustion).

For Strabane, attempting to reduce the general background of PM_{10} is not an option. This can only be achieved by national measures, for example, by introducing tighter measures on UK industrial emissions, or on vehicle emissions in general, or by limiting general traffic growth through fiscal measures.

6.9.2 Effects of those options on concentrations compared to BAU.

The percentage reduction in solid fuel burning required to produce compliance with the PM_{10} objectives in 2004 and 2010.

Figure 6.9.2A shows the 90^{th} percentile daily mean PM_{10} concentrations with solid fuel burning reduced by **42%** in the Head of the Town area in 2004. The results of the modelling showed that a reduction in solid fuel burning of this order of magnitude was required in order for the 2004 PM_{10} objectives to be met at all relevant receptor locations in this area. In order for the 2010 PM_{10} objectives to be met a reduction in solid fuel burning of 81% is required (Figure 6.9.2B).

Figure 6.9.2C shows the 90th percentile daily mean PM_{10} concentrations with solid fuel burning reduced by **17.5%** for the Ballycolman area in 2004. The results of the modelling showed that a reduction in solid fuel burning of this order of magnitude was required in order for the 2004 PM10 objectives to be met at all relevant receptor locations in this area. In order for the 2010 PM_{10} objectives to be met a reduction in solid fuel burning of 73% is required (Figure 6.9.2D).

Figure 6.9.2E shows the 90th percentile daily mean PM_{10} concentrations with solid fuel burning reduced by **35%** for the Newtownstewart area in 2004. The results of the modelling showed that a reduction in solid fuel burning of this order of magnitude was required in order for the 2004 PM10 objectives to be met at all relevant receptor locations in this area. In order for the 2010 PM_{10} objectives to be met a reduction in solid fuel burning of 80% is required (Figure 6.9.2F).

In Melmount, Castlederg and Sion Mills, the PM_{10} objectives in 2004 are predicted to be met with no changes to the domestic fuel burning regime. In Melmount no further reductions in solid fuel burning are required in order for the PM_{10} objectives in 2010 to be met (Figure 6.9.2G). However, to meet the 2010 objectives in Castlederg and Sion Mills a reduction in solid fuel burning of 48% in both areas is required (Figures 6.9.2H and J).

The impact on local PM_{10} concentrations of only allowing smokeless fuels to be burnt in each of the six areas.

The results of the modelling show that the impact of only allowing smokeless fuels to be burnt in the Ballycolman, Melmount, Castlederg and Sion Mills areas reduces the PM_{10} concentrations enough to achieve the 2004 PM_{10} objectives. In the Head of the Town and Newtownstewart, whilst PM_{10} concentrations are reduced, it is not enough to achieve the PM_{10} objectives in 2004. (Figures 6.9.2K - P).

The impact of switching all solid burning to oil.

If only oil is allowed to be burnt in the six areas, a substantial reduction in PM_{10} concentrations is predicted and all areas are predicted to meet the 2004 PM_{10} (Figures 6.9.2Q - V) and 2010 objectives.

7 Implications of this Stage 4 air quality review and assessment for Strabane

This section highlights the implications of this Stage 4 assessment for Strabane District Council.

The section:

- comments on the effects that new national policy developments have had and may have in the future on the predicted air quality in Strabane
- explains any changes that may be needed to the current extent of the current Air Quality Management Area

7.1 EFFECTS OF NEW NATIONAL POLICY DEVELOPMENTS

Defra and DOE NI have specified that the Stage 4 assessment must comment on any changes that new national policy developments may have had on the outcome of the air quality review and assessment process.

It has been assumed that the current fuel burning practices (base case) hold true in future years. However, there are two key issues that may affect domestic fuel burning in Strabane in the future:

- The Northern Ireland Housing Executive (NIHE) fuel appliance conversion programme
- The increased take up of mains gas

7.1.1 The NIHE fuel appliance conversion programme

During the 1970s and 1980s solid fuel systems were put into public sector properties. Oil was not used due to the crisis in the world-wide market. The NIHE have been running a conversion programme since 1996, to replace central heating systems in properties with oil or gas. Since 2000, only oil (where gas is not available) and gas have been offered as the replacement fuel. Out of 110,000 NIHE properties, 40,000 use oil or gas. 50,000 properties use solid fuels, while 20,000 use electricity for heating.

The rate of conversion is 9,000 properties a year (a third of which are gas) – and the solid fuel properties are being prioritised for conversion first. This could mean that all solid fuel has been phased out in the public sector housing stock by 2010.

7.1.2 Take up of natural gas

With the building of two pipelines (to Londonderry, and between Greater Belfast and the Republic of Ireland), there is an understanding that other geographical locations outside of Greater Belfast could receive gas by 2010 depending on issue of licenses and the development of networks.

7.2 CHANGES TO THE AIR QUALITY MANAGEMENT AREA AS A RESULT OF THIS STAGE 4 MODELLING

DOE NI have specified that the Stage 4 assessment must comment on any changes that might be necessary to extent of the AQMA as a result of the Stage 4 modelling.

The following table summarises any changes that might be needed.

Table 7.2 Summary of changes to the Air Quality Management Area in Strabane as a result of this Stage 4 assessment

Name of area modelled	**Changes recommended to the existing Air Quality Management Area (PM10)**
Head of the Town	AQMA to remain in place
Ballycolman	AQMA to remain in place
Melmount	AQMA revoked
Newtownstewart	AQMA to remain in place
Castlederg	AQMA to remain in place
Sion Mills	AQMA revoked

8 The next steps for Strabane District Council

This section outlines the next steps that Strabane District Council should take when they receive and accept this Stage 4 air quality assessment.

8.1 OBTAINING DOE NI APPROVAL

DOE NI will need to approve this Stage 4 assessment. After Strabane have read through and if necessary commented on this report, they should send a copy of this report to DOE NI. DOE will then forward the critique of the work to Strabane District Council.

Strabane should then forward a copy of this critique to **Netcen**. Strabane should also consider if they could answer any of the questions directly.

8.2 LOCAL CONSULTATION ON THIS STAGE 4 ASSESSMENT

Strabane can ask for feedback from stakeholders who may be interested in the outcome of this Stage 4 air quality review and assessment. Important local stakeholders may include:

External to Strabane District Council

- Adjoining local authorities

Within Strabane District Council

- Local residents in the AQMA
- The planning department
- Other departments in the authority who's decisions directly or indirectly affect types and quantities of domestic fuel burnt in the district

Our experience, and the experience of other Local Authorities suggests that efficient ways of disseminating the information include:

- placing the report on the local authority web site
- producing a small poster for display in the local authority offices
- producing a small poster for display in other public places (post offices, libraries etc.)

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Appendices

CONTENTS

Appendix 1
Fuel use survey

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