Spelthorne Borough Council

Air Quality Strategy "Action Plan"

January 2005

CONTACT DETAILS

Spelthorne Borough Council is interested in receiving your views on this Air Quality Action Plan. If you wish to pass your thoughts on to us please send them to:

Tracey Willmott-French
Principal Pollution Control Officer
Spelthorne Borough Council
Council Offices
Knowle Green
Staines
Middlesex
TW18 1BX

Telephone: 01784 446259
Fax: 01784 446437

Email: t.willmott-french@spelthorne.gov.uk

Spelthorne Website: http://www.spelthorne.gov.uk

GLOSSARY OF TERMS

General

Air Quality	A general description of the extent to which the atmosphere contains pollutants principally from man-made sources.
Ambient	Describes conditions that are found in the atmosphere to which individuals may be exposed.
AQMA	Air Quality Management Area
BAA	BAA Plc
Background	A diffusion tube monitoring position typically in a residential housing area at least 50 metres in any direction from any busy road with continuous moving traffic.
CERC	Cambridge Environmental Research Consultants Ltd
CES	Consultants in Environmental Sciences Ltd
CBA	Chris Blandford Associates
Cost-Benefit Analysis	Statutory requirement for any proposed air quality action plan, and provide a means of informed decision-making. Cost-effectiveness is determination by analysing the emission-effect chain. These range from £/tonne abated to £/(£-worth of effect). Explicit benefits analysis can help justify actions, and identify potential pitfalls in Action Plan development.
DETR	Department of the Environment, Transport and the Regions, now superseded by DEFRA.
Diffusion Tubes	Are passive gas collection devices consisting of a small tube (7cmx1cm) containing a chemical absorbent. After exposure, the absorbed gas (e.g. NO2) is determined by chemical analysis. Diffusion tubes (samplers) are used to determine relatively long period average concentrations, typically weekly, fortnightly or monthly.
DoE	Department of the Environment
EA	Environment Agency
EC	European Community
Emission Rate	The rate at which a source emits a given pollutant, expressed as mass of pollutant emitted per unit time or distance travelled as required.
EPAQS	Expert Panel on Air Quality Standards (which was set up by the Department of the Environment).
HA	Highways Agency
Intermediate	A diffusion tube monitoring position where a tube is located 20 - 30 metres back from the kerb of a busy road.
IPC	Integrated Pollution Control
Kerbside	A diffusion tube monitoring position where a tube is located on or close to a pavement of a busy road where people walk. Typically a worst-case position where highest levels of pollutants are likely to be found.
LAHT5	Local Authorities Heathrow Terminal 5 Group
LAPC	Local Air Pollution Control
LAQM	Local Air Quality Management
LAQS	Local Air Quality Strategy
NAQS	National Air Quality Strategy
Part A or B Process	An industrial processes prescribed under the Environmental Protection (Prescribed Processes and Substances) Regulation 1991 as amended. Emissions from these processes are controlled by the Environment Agency in the case of Integrated Pollution Control (IPC) for Part A2 processes (more polluting) and by Local Authorities in the case of Local Authority Air Pollution Control (LAPC) for Part A2 and B processes, the lesser polluting processes.
Pollutants	Primary are substances emitted to the atmosphere as that substance. Secondary are formed from primary pollutants by chemical reactions in the atmosphere
QUARG	Quality of Urban Air Review Group
Running Average	An average (or mean) calculated over a specified number of consecutive hours or days within the period
Secondary Particles	Produced by condensation of gaseous material through gas-particle conversion processes and comprises mainly sulphate and nitrates.
Sensitive Location	A location (or receptor) where people might be subject to a change in air quality. In this context people would include susceptible people in locations such as schools and hospitals.
SEPA	Scottish Environmental Protection Agency

T5	Terminal 5.
UKNAQS	United Kingdom National Air Quality Strategy
USANAAQS	United States National Ambient Air Quality Standards
VOC	Volatile Organic Compounds

Substances

Benzene	A hydrocarbon that is a component of some solvents and fuels. It is emitted from a wide variety of combustion and transportation sources. It can also be released by evaporation from the use and storage of some hydrocarbons. Chemical formula: C6H6.
Carbon monoxide	A chemical compound formed from the partial combustion of a fuel containing carbon (for example, motor fuel). Chemical formula: CO.
Lead	A metal that is added to a proportion of petrol sold in the UK to improve combustion. Lead compounds are emitted from the exhausts of vehicles using leaded petrol. Chemical symbol: Pb.
Nitric oxide	A chemical compound formed during the combustion of compounds containing nitrogen (N), from any high-temperature combustion in the presence of air, and by secondary processes in the atmosphere. A component of oxides of nitrogen. Nitric oxide is the predominant oxide of nitrogen produced in the combustion process. Chemical formula: NO.
Nitrogen dioxide	A chemical compound formed during the combustion of compounds containing nitrogen (N), from any high temperature combustion process in the presence of excess air (or oxygen; O2) and by secondary processes in the atmosphere. A component of oxides of nitrogen chemical formula: NO2.
Nitrogen Oxides	See Oxides of Nitrogen.
Oxides of Nitrogen	A group of chemical compounds that may be inter-converted in the atmosphere. The principal oxides of nitrogen are nitric oxide and nitrogen dioxide. Usual chemical formula: NOx.
Oxygen	A naturally occurring molecule that makes up approximately 20% of the earth's atmosphere. Chemical formula: O2.
Particulate Matter	Very small particles of any material. They may be natural (for example, wind generated dust), or man-made (for example, smoke from combustion processes).
PM10	Particulate matter with a median aerodynamic diameter of less than 10 microns (10-6m or 10µm).
Sulphur dioxide	A chemical compound formed during the combustion of any fuel containing sulphur(s) in air. Chemical formula: SO2.

Units

k	kilo (10^3) hence 1 km = 1000m; kg = 1000g
m	milli (10^{-3}) hence 1 mg = 0.001g
µ	micro (10-6) hence l µg = 0.000001g; 1 mg = 1000µg
n	nano (10-9) hence 1 nm = 0.000001 mm
l	litre
g	gram
kg	kilogram
mg	milligram
µg	microgram
te or t	tonne, equivalent to one thousand kilograms
µg/m³ (micrograms per cubic metre)	A unit of concentration. A pollutant concentration of one microgram per cubic metre indicates that one cubic metre of air contains 10^{-6} grams (or 1µg) of the pollutant.
ppm (parts per million)	A unit of concentration. A pollutant concentration of one part per million indicates that in a given volume of air, 10-6 of that volume is occupied by the pollutant.
ppb (parts per billion)	A unit of concentration. A pollutant concentration of one part per billion indicates that in a given volume or air, 10-9 of that volume is occupied by the pollutant.

Conversion Factors	(@ 20°C and 1 atmosphere pressure)
NO2 (ppb) * 1.913	= NO2 (µg/m³)
NO (ppb) * 1.248	= NO (µg/m³)
NO (ppm) * 1.165	= NO (mg/m³)
SO2 (ppb) * 1.913	= SO2 (µg/m³)
O3 (ppb) * 1.996	= O3 (µg/m³)
NMHC (ppm) * 0.667	= NMHC (mg/m³)
Benzene (ppb) * 3.245	= benzene (µg/m³)
1,3 butadiene (ppb) * 2.247	= 1,3 butadiene (µg/m³)

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EXECUTIVE SUMMARY

As detailed within Spelthorne's 4th stage Review & Assessment of air quality, it is predicted that the National Air Quality Strategy's (NAQS) annual objective for nitrogen dioxide will be exceeded at a number of hotspot locations in Spelthorne (section 1 refers). The principal source of the nitrogen dioxide levels within Spelthorne is from road vehicles using Highway Agency controlled roads and Surrey County Council controlled roads (section 4.0 refers).

This report summarises the actions that will be taken by Spelthorne Borough Council, Surrey County Council and other stakeholders to improve air quality and tackle the causes of the elevated nitrogen dioxide across the borough, and in particular at exceedance locations.

On their own, it is not within Spelthorne Borough Council's gift to bring about reductions in nitrogen dioxide emissions; this can only be attained by the Council working together with it's partners, the Highways Agency, and in particular Surrey County Council; and other stakeholders such as BAA. However, achievement of the NAQS objectives for 2005 will not be a realistic possibility at all locations within the borough of Spelthorne. It will only be through the development and implementation of effective national policies, programmes and projects that NAQS objectives will be achieved in areas adjacent to these continuing exceedance locations.

The Control of Emissions From Surrey County Council Controlled Roads

The actions detailed within this action plan in respect of controlling of emissions emanating from Surrey County Council controlled roads are aimed at widening peoples choice of transport alternatives and reducing the dependency on the car as a means of private transportation. While infrastructure alterations that purely offer solutions to increase road traffic flow rates can reduce pollution levels within the immediate vicinity, this is a short-term solution. The environmental and economic costs of this approach are too high, moreover, they have been found to generate even greater traffic growth, which exacerbates the problem in the long-term. It therefore follows that the only real sustainable options available for the reduction of emissions from road vehicles using SCC controlled roads is through:

- Widening travel choice and encourage more journeys by public transport, cycle or walking as a result of enhancing the public transport, cycle and pedestrian network and facilities;
- Bringing about the long-term reduction of emissions from vehicles transporting children to school;
- Managing traffic and restraining the demand for travel;
- Providing a more integrated transport system;
- Planning and managing the highway network;
- Helping to make freight distribution more sustainable;

With the exception of Sunbury Cross, it is anticipated that the measures detailed within this action plan will satisfactory reduce nitrogen dioxide levels sufficiently so that the NAQS annual objective for nitrogen dioxide will not be exceeded. At Sunbury Cross however, it remains likely that the NAQS annual objective for nitrogen dioxide will be exceeded beyond December 2005[1]. The question as to whether this exceedance will continue beyond 2010[2] is being considered as part of a "detailed assessment" of air quality which currently being undertaken by Spelthorne Borough Council.

The Surrey County Council transport related component of this air quality action plan is currently separate from the Local Transport Plan; however, it will be integrated into the next Local Transport Plan, which will be published in 2006. This will allow air quality problems arising from Surrey County Council roads to be dealt with in a more corporate and multi-disciplinary way. The close links formed between Spelthorne Borough Council and Surrey County Council will remain unaffected by this integration as the Council and the County Council will continue to work together to reduce emissions from County Council roads within Spelthorne.

The Control of Emissions From Highways Agency Controlled Roads

The Highways Agency has initiated a number of actions that will help reduce emissions from road vehicles using its roads. However, even with the implementation of these actions, it is likely that the NAQS annual objective for nitrogen dioxide will continue to be exceeded at various locations adjacent to the M25 and the M3 where members of the pubic are likely be exposed to elevated levels of nitrogen dioxide beyond 2005.

Achieval of the NAQS objectives along these roads will require a very significant reduction in traffic flows. However this is unlikely to happen as there are no alternative forms of transport that could cope with the enormous extra demand and provide equivalent journey times that are required. Consequently, it will only be through the development and implementation of effective national policies, programmes and projects that NAQS objectives will be achieved in areas adjacent to these Highway Agency controlled roads.

Consultation

In the development of this action plan we have sought and taken account of the views and concerns of a number interested parties, including those of local businesses and members of the community. Further details in respect of whom we consulted and how, along with their opinions is provided in section 3.

[1] The NAQS annual objective of 40 $\mu g/m^3$ must be achieved by 31 December 2005;

[2] The European Union's Air Quality Framework and Daughter Directive prescribed limit value for nitrogen dioxide of 40 $\mu g/m^3$ (as measured as an annual mean) must be achieved by 2010.

1.0 CONCLUSIONS OF THE 4TH STAGE REVIEW & ASSESSMENT

1.1 Nitrogen dioxide

The modelling study carried out for the 4th Stage review and assessment predicted the likelihood that the annual average National Air Quality Strategy (NAQS) objective for nitrogen dioxide (NO_2) will be exceeded in 2005 at various locations within the borough of Spelthorne. Areas of predicted exceedance are those adjoining the busiest roads and junctions, and in particulate the A30, M3 and M25.

The annual average concentrations of NO_2 are predicted to be highest in the northwest of the Borough, reaching more than 26 ppb (50 $\mu g/m^3$) along the M25. Elsewhere in the Borough concentrations are generally predicted to be below the NAQS objective value.

Stage 4 predictions indicate that members of the public will not be exposed to elevated levels of NO_2 in respect of the NAQS 99.79th percentile hourly average objective at any location within the Borough, consequently, this hourly objective will not be exceeded at any location within the borough of Spelthorne.

1.2 Particulate matter

Stage 4 predictions indicate that neither the 90.41st percentile of the daily maximum running 24-hour mean (50 μgm^3) or the annual average (40 μgm^3) NAQS objectives for 2004 would be exceeded at any location within the borough of Spelthorne where members of the pubic would reasonably be exposed.

1.3 Declaration of the Air Quality Management Area

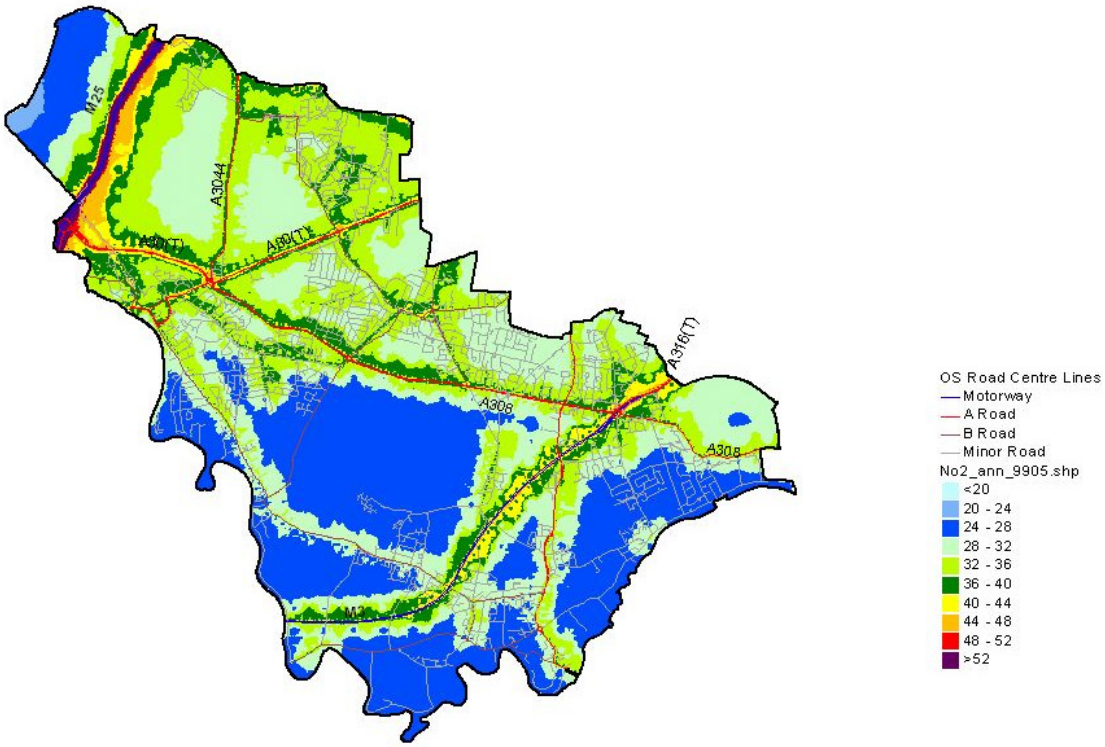
In December 1999, the whole of the borough of Spelthorne was declared an air quality management area (AQMA). This was in response to predictions made through the 3rd Stage assessment that the NAQS objectives for NO_x would be exceeded, for both annual average concentration and the 99.79th percentile of hourly average concentration in the areas of Stanwell Moor, Stanwell, Ashford and Staines (figure 1.3 below refers).

When the Council set the AQMA boundary in 1999, it recognised that there was a level of uncertainty present within the modelling process and that the potential existed for residents of the Borough to be exposed to pollutants across a wider area than suggested by the modelling study. In consideration of this risk, Spelthorne Borough Council adopted a precautionary approached and declared whole of the Borough as an AQMA. Further details on this issue can be found within the Stage 3 report which can be viewed on-line at the Councils website (www.spelthorne.gov.uk), or it can be viewed by contacting the Environmental Health team.

The modelling carried out as part of the 4th Stage of the review and assessment of air quality determined that the 99.79th percentile hourly average NO_2 objective for 2005 will not be exceeded at any location within the borough of Spelthorne where members of the pubic

could reasonably be exposed. The 4th Stage predictions are more accurate than those of the 3rd Stage due to improvements in the ADMS-Urban model and recent revisions of the emissions inventory data used in the set-up of the model. Further explanations of the improvements and revisions can be found within appendix 3 of the Stage 4 Review and Assessment report on the Council's website.

Figure 1.3: Annual Average Nitrogen Dioxide concentrations (µg/m3) for 2005 (NAQS objective 40 µg/m3).



1.4 The Revision

Guidance LAQM.TG4(00) states that "local authorities should not consider exceedances of objectives at any location where relevant public exposure would not be realistic." The reason being that the objective levels for NO_2 are for the protection of public health.

In light of the fact that the stage 4 review and assessment of air quality determined that the 99.79th percentile of hourly average concentration for NO_2 will not be exceeded at any location within the Borough where members of the public will be exposed, therefore the air quality management area has been revised such that the Spelthorne Borough Council no longer declares for the 99.79th percentile of hourly average concentration for NO_2.

It should be noted that no change has been made to the declaration of the AQMA in terms of the annual average NO_2 concentrations. While the Stage 4 assessment shows a significant reduction in the extent of the exceedance area in terms of the annual average

NO_2, there is still uncertainty about the effects of wind direction. The prevailing wind direction within the Spelthorne area is south-westerly; therefore generally emissions from Heathrow Airport are not blown into the Spelthorne area. However, at times the winds come from the northerly direction, which causes emissions from Heathrow Airport to be blown over the northern part of the Borough of Spelthorne, which could result in elevated concentrations of ground level NO_2.

2.0 THE REDUCTION OF NITROGEN DIOXIDE EMISSIONS TO AIR

2.1 European Measures for the Reduction of Air Pollution

Air quality is a key indicator for Europe's progression towards achieving sustainable development, a goal of which is the protection people's health and the environment. For the last 20 years, the European Union has been legislating for the control of emissions of air pollutants and the introduction of air quality objectives.

Consolidation of the various pieces of legislation has resulted in the Air Quality Framework Directive setting out a strategic framework for tackling ambient air quality through assessment and management. Under this Directive provision has been made for the development of a series of daughter directives covering 12 specific pollutants.

The first Daughter Directive (which sets limits for nitrogen dioxide and small particles for 2005 and 2010) has already been adopted into UK legislation via the Environment Act 1995. Other European initiatives for improving air quality through the control of emissions to the atmosphere include:

- The Auto-Oil Programme made provision for the introduced stringent emission standards from all new cars and light vans sold from 1 January 2001 (known as Euro III Standards); emissions standards will be further tightened (Euro IV standard) from 1 January 2006.
  * Stringent emission standards were introduced for heavy-duty diesel engines in 2000. By 2005, heavy-duty diesel vehicles will need to be fitted with particulate traps that can reduce PM_{10} emissions by up to 90%;
  * Cleaner specification standards for petrol and diesel sold from 1 January 2000 and 2005, including the general ban on lead in petrol in January 2000;
- The Large Combustion Plant Directive which further reduces sulphur dioxide, nitrogen dioxide emissions, and particulate emissions from new large combustion plant such as power stations, large boilers, and refinery boilers;
- The National Emissions Ceilings Directive which sets maximum limits for emissions from each EU Member State of sulphur dioxide, nitrogen dioxide, ammonia and volatile organic compounds to be achieved by 2010;
- The Ozone Daughter Directive which sets maximum limits for emissions from each EU Member State that contributes to the formation of ground-level ozone;
- The Solvents Directive which will reduce VOC emissions from specific industrial installations by 57% by 2007, when compared to a 1990 baseline;

2.2 National Measures for the Reduction of Air Pollution

All national policies are shaped by European legislation, which has resulted in EU legislation being incorporated into UK policy through the introduction of new legislation or its integration into existing legislation. Examples of UK policy having direct control of air quality include:

- The Environmental Protection Act, 1990 – which made provision for the setting of emission

limits and environmental quality standards for pollutants, and on the total amounts of pollutants that could be emitted;

- The Environment Act, 1995 – which made provision for the for a National Air Quality Strategy and the introduction of the "Local Air Quality Management" system;
- The Pollution and Prevention Control Act, 1999 – which is replacing Part 1 of the 1990 Environmental Protection Act, for the control of emissions to the environment (including air) from specified industrial processes.

In addition to the national policies that have a direct influence over air quality, there are numerous other policies that are integral to improving air quality.

- Land-use planning - which requires local authorities to consider air quality when preparing their development plans, transport plans, and when determining planning applications.
- The 10-year plan for Transport - which sets out an investment programme for reducing traffic congestion, improving public transport, increasing personal travel choices, and cut pollution levels.

As can be seen above, European and national policy has been integrated to actively reduce pollution and improve air quality. In order to implement policy in a cost-effective and locally applicable manner local authorities have been given the responsibility for much of its delivery.

2.3 Regional and Local Partnerships for the Improvement of Air Quality

The NAQS points out that "air pollution does not respect local authority boundaries and there is much to be gained if local authorities act collectively in an air quality management grouping to address air quality over a much larger area, in conjunction with other agencies, as appropriate." The NAQS also states that local authorities should liaise and co-operate with neighbouring and county authorities.

In assessing and implementing the options that the Spelthorne Borough Council can take forward to improve air quality, it should be made clear that the Council cannot meet the NAQS objectives through its own actions, achieving the NAQS objectives can only be done by working in partnership with a number of different organisations including neighbouring local authorities, other statutory agencies (e.g. Highways Agency, Environment Agency), residents and local businesses to ensure that the proposed measures are successfully implemented.

Spelthorne Borough Council is positioned such that it adjoins 2 distinct regional air quality groups, these being the Surrey Air Quality Group and the West London Air Quality Group. In consideration of the above, and in line with recommendations for the improvement of air quality over the wider area, Spelthorne Borough Council is a member of both air quality groups, working to improve air quality, both for Spelthorne and that of its neighbouring local authorities, which due to the transboundary nature of air pollution are largely one and the same.

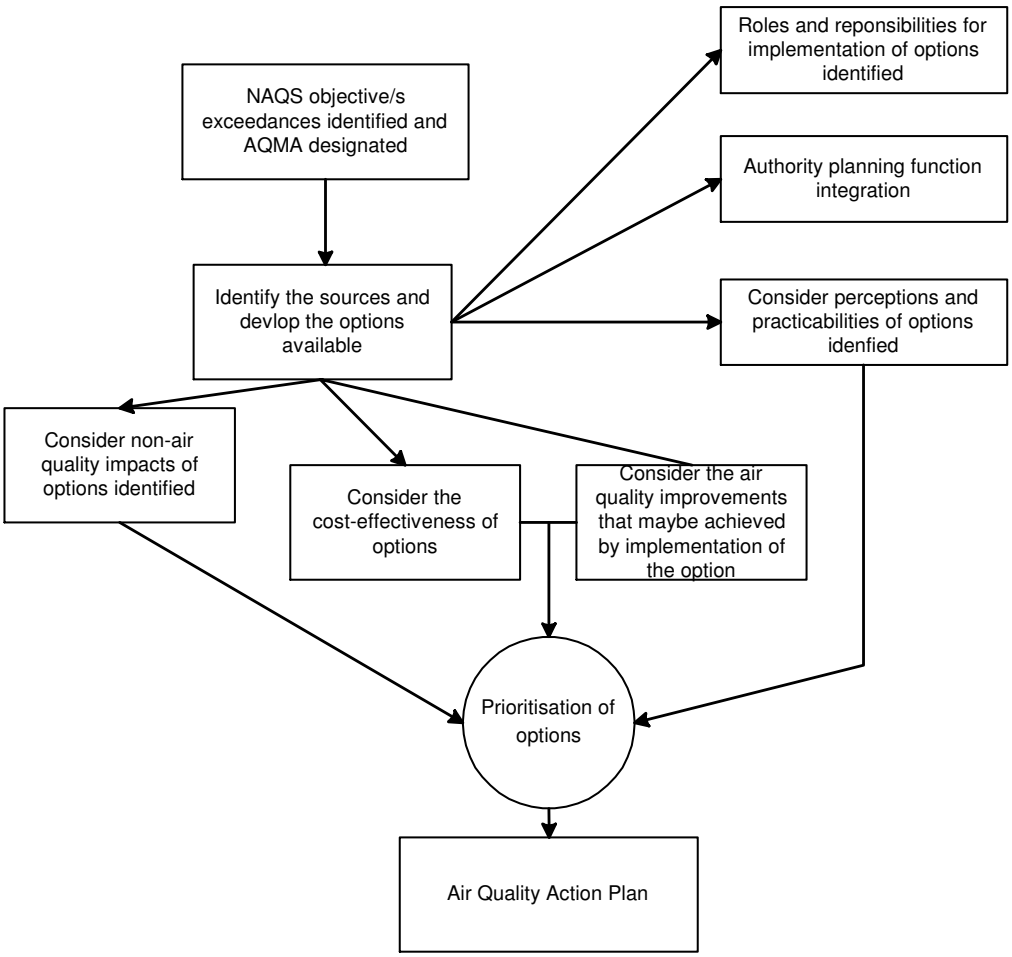
2.4 Local Measures for the Reduction of Air Pollution

The NAQS sets out a process for implementation of local air quality management (LAQM) by local authorities. The process requires all local authorities to review and assess their air quality. If it is found that any of the 7 pollution objectives are predicted to be exceeded by the dates specified in the NAQS, the locality in which the exceedance occurs must designate that area an air quality management area (AQMA).

2.5 The Development of an Action Plan

Where an AQMA has been designated, section 84(2) of the Environment Act 1995 requires the local authority to draw up an action plan setting out what it intends to do to meet the NAQS objectives and the timescales in which those actions will be implemented. Guidance states that the purpose of the "Air Quality Action Plan" (AQAP) is to "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".

Figure 2.5: The Process for Developing an Air Quality Action Plan



Source: NSCA, Air Quality Action Plans: Interim Guidance

In the development of AQAP Guidance (LAQM.TG(03)) advises Local Authorities:

- Action plan development should involve all relevant local authority professionals and departments to ensure a properly balanced and corporately integrated approach to improving air quality. This requires there to be effective links between all relevant departments (environmental health, planning, transport planning and management, energy reduction, waste management, economic development);
- Action plan development should involve other relevant agencies, in particular, the County Council, the Environment Agency and the Highways Agency, neighbouring local authorities, and the Public Health Care Trust;
- Action plan development should involve effective consultation and interaction with the general public (local residents, community groups and local businesses) to ensure that their views are taken into consideration, and to enlist their support for the air quality action plan;
- To strike an appropriate balance between the use of regulatory powers and other non-regulatory measures;
- To ensure that the relative contributions of industry, transport and individuals to air quality improvement are cost-effective and proportionate;
- To carefully assess the options available to them to improve air within the AQMA; and
- To appraise and where possible quantify the wider environmental, economic and social consequences of each option.

In the development of this "air quality action plan" the following documents have been considered:

- Spelthorne's "4th Stage Air Quality Review & Assessment";
- Spelthorne's "Air Quality Upgrading & Screening Assessment";
- Spelthorne's Community Plan;
- Surrey's Local Transport Plan;
- Spelthorne's Local Development Plan;
- Supplementary Planning Guidance: A Parking Strategy For Surrey, March 2003
- Spelthorne's *Draft* Health Promotion Strategy;
- Spelthorne Corporate Plan (2004-2007)
- Best Value Performance Plan;
- Local Air Quality Management Technical Guidance LAQM.TG(03);
- Local Air Quality Management Technical Guidance LAQM.PG(03);
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland: Addendum;

3.0 WHAT THE PUBLIC THINK SHOULD BE DONE TO REDUCE NO_2 LEVELS WITHIN SPELTHORNE

Local authorities are required to consult widely with those who have an interest in air quality. The purpose of consultation is to give interested parties the opportunity to make known their views and to allow areas of concern to be highlighted.

It is this Authority's aim to keep everyone in Spelthorne informed and to notify consultees of progress and findings throughout the various stages of the process. Accordingly, in the development of this air quality management action plan, Spelthorne Borough Council sought the opinion of its statutory consultees (listed below), its residents and the business community. A list of the consultees and the mechanisms for consultation are provided below:

Statutory Consultees

- The Secretary of State;
- The Environment Agency;
- The Highways Authority;
- Surrey County Council;
- The Mayor of London;
- Neighbouring local authorities (the London Borough of Hillingdon; the London Borough of Hounslow; the London Borough of Richmond upon Thames; Slough Borough Council; the Royal Borough of Windsor and Maidenhead; and Runnymede Borough Council.

Departments within Spelthorne Borough Council

- Planning Policy
- Development Control
- Environment Services

Method of Consultation

In the development of this AQAP, the opinions of Spelthorne's residential and business communities have been sought on the many different issues relating to air quality. Principally this has been carried out through a series of workshops attended by representative members of the borough of Spelthorne comprising:

- Residents of Spelthorne - these representatives were randomly selected from the Borough of Spelthorne's Environmental Health database of persons who in the past have contacted the Environmental Health Department to express their concern with regard to air quality issues;
- The Student Council - the Student Council is a body of young people between 11 and 19 years of age who attend school or college in the Spelthorne area. Members of the Student Council are elected to sit on the Student Council by their school/college;
- Representatives of Spelthorne's business community – among others these included the

Spelthorne's Chamber of Commerce, BUPA, and London United Buses;

- Representatives of public bodies and agencies – including the Highways Agency, the Environment Agency, Surrey County Council, and neighbouring local authorities;

Issues raised during the workshops included the negative impacts such as the effect that elevated levels of NO_2 may have on people's health; and the perceived potential harmful effects on Spelthorne's community that some actions may cause, such as the burden those actions such as congestion charging may place on individuals and businesses within the Borough. Positive aspects were also considered, such as the enhanced quality of life that would result from increased socialisation due to people using alternative modes of travel other than the isolation of the private car.

A summary of the main actions that the representative members of the borough of Spelthorne considered would be effective in reducing NO_2 to below NAQS levels are detained in box 3.1 below:

Box 3.1: A summary of actions considered to be effective in reducing NO_2 levels

- Create a vision of how Spelthorne would achieve clean air through traffic reduction and ensure that business supports that vision to implementation. This needs a well-cemented partnership so that everybody feeling they are working towards something permanent. There must also be a political commitment to move towards it;
- Work with the bus companies to ensure the Borough is bus friendly and the network of routes is well publicised and supported;
- Better integration of transport networks so it is possible to take the bus to catch the train, etc;
- Run hotspot campaigns to reduce unnecessary journeys and reduce congestion in a tactical way;
- Keep facilities local to ensure people don't have to drive to them;
- Ensure that Spelthorne Borough Council is pro-active in resisting development that may have a negative impact on air quality;
- Lobby Central Government and invest money to ensure technology works to reduce emissions from vehicles;
- Ensure that the Council is doing everything it can to minimise their own impact on the environment;
- Place more emphasis on other methods of transport and the provision of facilities to use them. For example integrated cycle-lanes and showers at work. Most agreed that the only long term way to tackle to the causes of the air quality problem was to improve the alternative facilities to an extent where it was beneficial for people to use them rather than to take away liberties like using the car and force people on to public transport;
- Ensure that the monitoring of air quality monitoring within the Borough is the best it can be. Make the resulting information available to the community.
- Raise the community's awareness about air pollution issues, and provide encouragement and information so that behaviours can be changed in a manner that will improve air quality.
- The consultees would like information about the air quality of the area and an understanding on the actions being taken forward.

In addition to the workshops mentioned above, individual views of the community have been sought. A survey was placed in the September 2002 issue of the "The Bulletin"; the Borough's monthly magazine. The questionnaire was also made available electronically through the Borough of Spelthorne's website (www.spelthorne.gov.uk).

Table 3.1: A summary of specific things actions members of the community would like to see being done to improve the air quality in the area considered to be effective in reducing NO_2 levels.

ACTIONS	%
Reduce or restrict further growth at H/row	17
Better public transport	13
Better traffic controls/reduce queuing	12
Avoid car use for school runs	8
Restrict/reduce lorry traffic	7
Tree Planting	7
Improved facilities for cyclists	6
Reduce residential bonfires	5
Car Share	4
Reduce/enforce speed limits	3
Monitoring/curbing of exhaust emissions	3
Use of vehicles for long journeys only	2
Encourage use of alternative fuels	2
Alternative power generation	1
Congestion Charging	1
Home Zone Streets	1
Reduce number of lanes on M25	1
No bonfires (except 5/11)	1
Reroute aircraft away from housing	1
Reduce no. cars visiting waste centres	1
Encourage families to have only 1 car	1
Walking buses scheme	1
School buses	1
Free bus passes for elderly/disabled	1
Improved segregated cycle lanes	1
Car Share to schools	1
Strict vehicle emission testing with fines	1

The opinions and suggestions given by the representatives of Spelthorne obtained from both the workshops and the survey have been taken into consideration in the development of Spelthorne's air quality action plan.

4.0 NITROGEN DIOXIDE SOURCES WITHIN SPELTHORNE

4.1 Source Apportionment

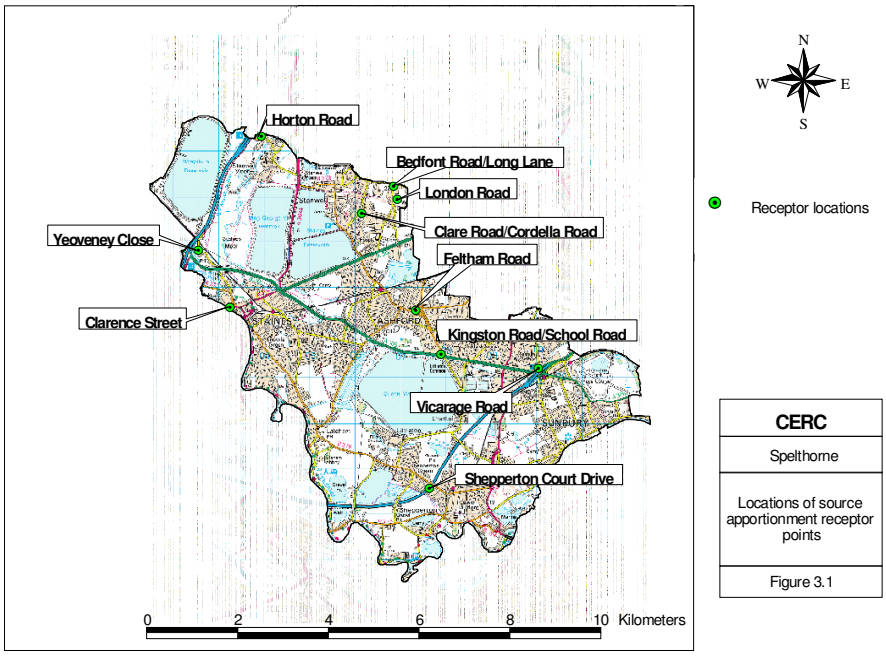
Prior to considering the actions required to reduce Nitrogen dioxide (NO_2) emissions within an AQMA, it is essential that an understanding of the extent that the different sources of emissions contribute to exceedances be obtained. This allows the selection of the most cost-effective actions to be targeted upon reducing emissions from those sources responsible for the greatest proportion of emissions. In order to obtain such an understanding it is necessary to make an assessment of the relative contribution of the different source types make to the air pollution within the AQMA.

To facilitate this, 10 receptor locations were selected from within the borough of Spelthorne where members of the public are regularly present, and may be exposed over the averaging period (annual or hourly) to elevated levels of nitrogen dioxide. These receptor locations are shown in table 4.1 and figure 4.1 below.

Table 4.1: Source Apportionment Receptor Locations

ID	Description	Location	Annual average NO_2 concentration (µg/m³)	Annual average PM_{10} concentration (µg/m³)
1	Yeoveney Close, Staines	502554, 172803	45.0	24.7
2	Horton Road, Stanwell	503931, 175307	42.4	24.5
3	Bedfont Road/Long Lane, Stanwell	506860, 174198	38.3	23.8
4	Vicarage Road, Sunbury	510039, 170191	43.1	24.7
5	Shepperton Court Drive, Sunbury	507646, 167550	37.0	24.1
6	London Road, Ashford	506937, 173924	33.1	23.3
7	Clarence Street, Staines	503241, 171544	40.3	24.9
8	Kingston Road/ School Road	507910, 170506	38.6	23.7
9	Feltham Road, Ashford	507336, 171488	40.0	24.0
10	Clare Road/ Cordella Road	506150, 173600	34.1	23.4

Figure 4.1: Locations of source Apportionment Receptor Locations



4.2 The Source Apportionment Study

Nitrogen dioxide (NO_2) and nitric oxide (NO) are collectively referred to as NO_x. All combustion processes produce some NO_x, mainly in the form of NO, which is then converted to NO_2. The amount of NO_2 created will depend on many factors including emissions from other sources in the area. Therefore the total NO_2 concentration cannot be broken down simply into concentrations resulting from different sources, as it will depend on emissions from the other sources in the area. Consequently, the source apportionment study has been carried out using NO_x concentrations, assuming that all NO_x is NO_2. This will give an indication of which sources are contributing most to the concentrations of NO_2; however, the results should be treated with caution because, for example, a 10% reduction in NO_x concentrations will not bring about a 10% reduction in NO_2 concentrations.

The pollutant concentrations occurring at any location are the result of emissions from a wide range of sources of different types and in different locations. The modelling carried out for the review and assessment of air quality considered all the emission sources in the area whilst taking into account the effect of emissions from outside the area by using rural background concentration data. Emissions data for the model was taken from four different sources: the emissions inventory for Heathrow, 1998; the London Atmospheric Emissions Inventory (LAEI), supplied by the Greater London Authority (GLA), February 2002; the Surrey Traffic Model; and the February 2002 emissions inventory for Slough. Meteorological data from Heathrow for the year 1999 were used in the modelling. Background concentration data were obtained from rural monitoring sites and adjusted to be appropriate for year 2005. The emissions and annual average concentrations have been apportioned in the following ways:

- By major source group;
- Breakdown of traffic sources by vehicle type;
- Breakdown of traffic sources by road type, i.e. which organisation has responsibility;
- Breakdown of traffic sources into Heathrow and non-Heathrow traffic;
- Breakdown of Heathrow airport sources; and
- Breakdown of Heathrow airborne aircraft sources by height.

The source apportionment study has been carried out to predict emissions and concentrations in 2005 for NO_x using the models EMIT and ADMS-Urban. Spelthorne Borough Council commissioned CERC (Cambridge Environmental Research Consultants Ltd) to carry out the source apportionment work.

The source apportionment exercise reported here quantifies the relative contribution of each source group to the total emissions, and to the resulting annual average ground level concentration at 10 receptor locations throughout the Borough of Spelthorne.

4.3 Apportionment of Emissions Sources

4.3.1 Apportionment of Emissions by source group

Emissions

The emissions from all the sources in the borough have been divided according to their source type. The total emissions from each source group from within the borough, the study area and the entire area covered by the emissions inventories have been calculated. The contributions to the ground level concentrations from each source group, due to emissions from the entire inventory area, have been calculated at each of the receptor locations. The source types used are:

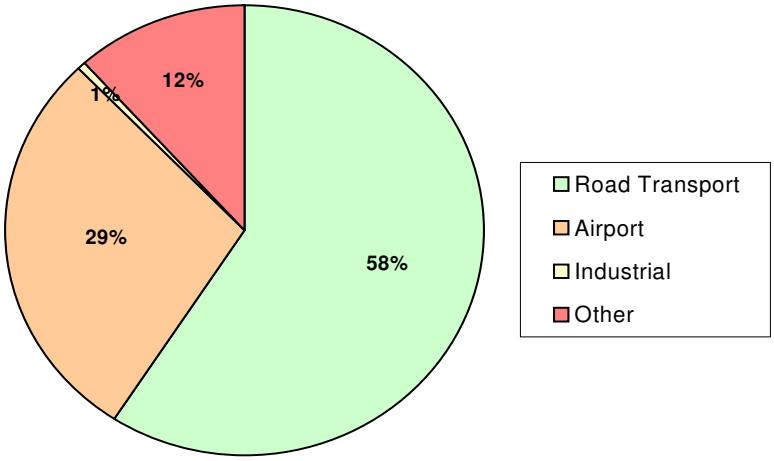
- Major road sources;
- Heathrow Airport sources, including airborne aircraft, taxiing and aircraft holding, heating, and on-site traffic, car parks and taxi ranks;
- Industrial, including Part A's, Part B's and boilers rated greater than 2 megawatt; and
- Other sources, including other transport sources and commercial and domestic fuel use.

Table 4.2 shows the emissions of NO_x from within Spelthorne, from within the West London area, and from the whole area covered by the emissions inventory broken down into the major source groups. These emissions are shown represented as a percentage of the total emissions in figure 4.2 below.

Table 4.2: NO_x emissions broken down by source type (*tonnes per year)*

	Major roads	Airport	Industrial	Other	Total
Spelthorne	712	347	6	139	1204
West London	2573	3438	201	1125	7337
EI area	17248	6243	17592	24191	65275

Figure 4.2: Emissions of NO_x from within Spelthorne.



The NO_x levels within the Borough entitled 'Other' sources in the above table include road transport outside the Borough of Spelthorne; space heating within domestic and commercial premises; and railway transport sources.

Concentrations

Figure 4.3 shows the contributions of each of the source groups given above to the total annual average NO_x concentrations at each of the receptor points considered in the study. Figure 4.4 shows these values as percentages of the totals. The concentrations presented are those resulting from emissions over the whole of London not just from within Spelthorne.

Figure 4.3: Contribution of major source groups to annual average NO_x concentrations

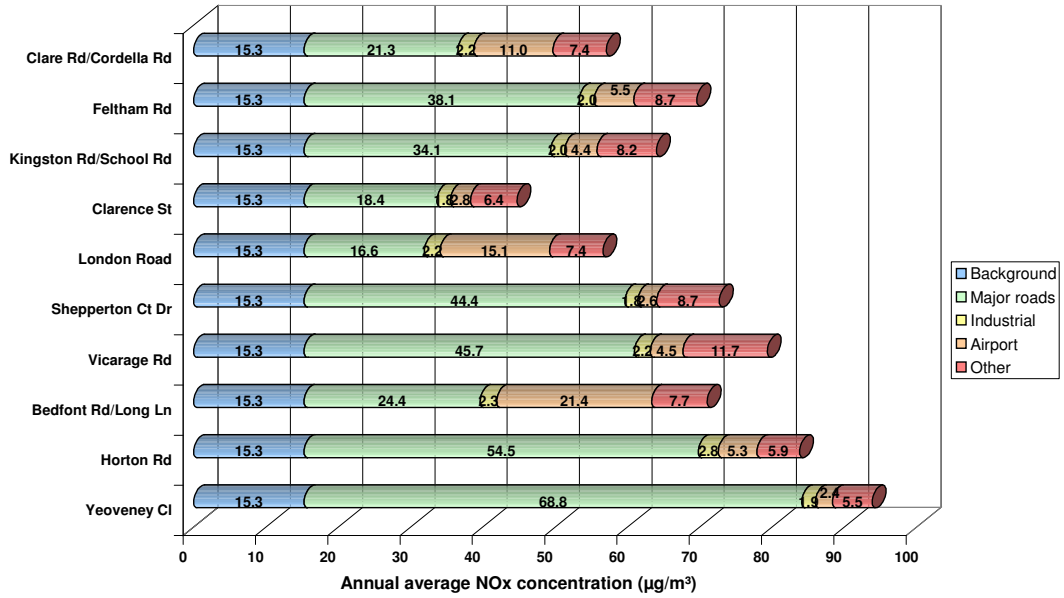
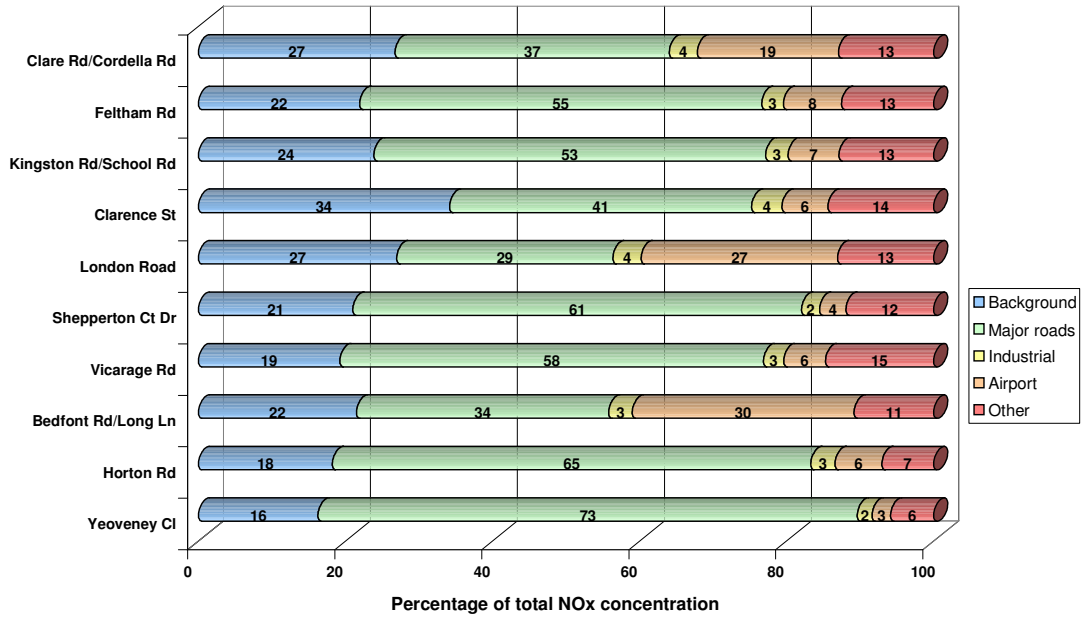


Figure 4.4: Percentage contribution of major source groups to annual average NO_x concentrations



4.3.2 Breakdown of traffic emissions by vehicle type

Emissions

In this section all the traffic emissions have been split into the following vehicle types.

- Cars & motorcycles;
- Light Goods Vehicles (LGVs);
- Heavy Goods Vehicles (HGVs); and
- Buses & Coaches.

Tables 4.3 shows the breakdown of traffic emissions of NO_x from within Spelthorne, from within the Spelthorne and West London area, and from within the whole emissions inventory area. Figure 4.5 shows the emissions from within the borough represented as a pie chart.

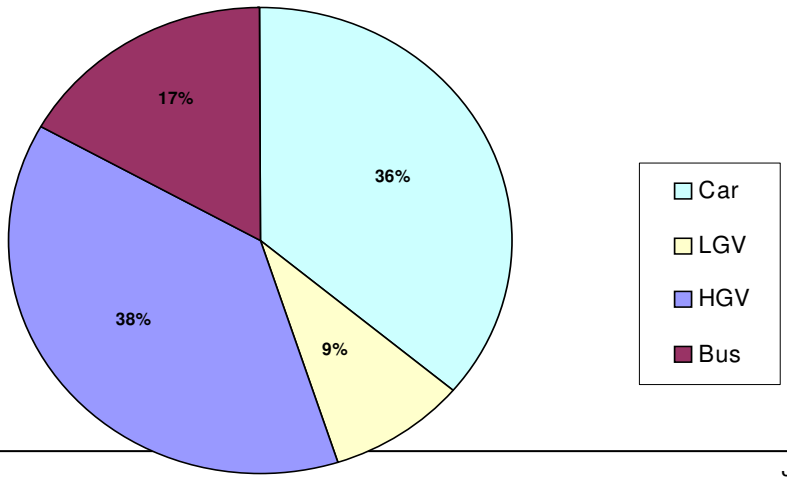
The assessment of apportionment determined that emissions from cars and HGV's are of similar proportions (approximately 37%), which is typical of the wider study area. Buses contribute 17% of the NO_x emissions from road vehicles within Spelthorne. The maximum contribution to the total emissions of NO_x from traffic within Spelthorne is from HGV's, which contribute 38%.

The contribution to the annual average concentrations of NO_x from traffic sources varies depending on the receptor location considered. The percentage contribution of each traffic type to the annual average NO_x concentration is approximately the same at each of the receptor points with the major contributions being from cars and HGV's.

Table 4.3: Emissions of NO_x from different vehicle types

	Cars		LGV		HGV		Bus	
	T/yr	%	T/yr	%	T/yr	%	T/yr	%
Spelthorne	257	36	64	9	271	38	121	17
West London	964	37	250	10	950	37	410	16
EI area	6129	36	1861	11	7027	41	2231	13

Figure 4.5: NO_x emissions from different vehicle types within Spelthorne



Concentrations

The annual average NO_x concentrations resulting from each vehicle type have been calculated at each of the receptor points and these are shown in Figure 4.6. Figure 4.7 shows the percentage contribution of each source group to the total annual average NO_x concentration resulting from traffic emissions. Note that the concentrations presented are those resulting from emissions over the whole of London not just from within Spelthorne.

Figure 4.6: Contribution of different vehicle types to annual average NO_x concentrations

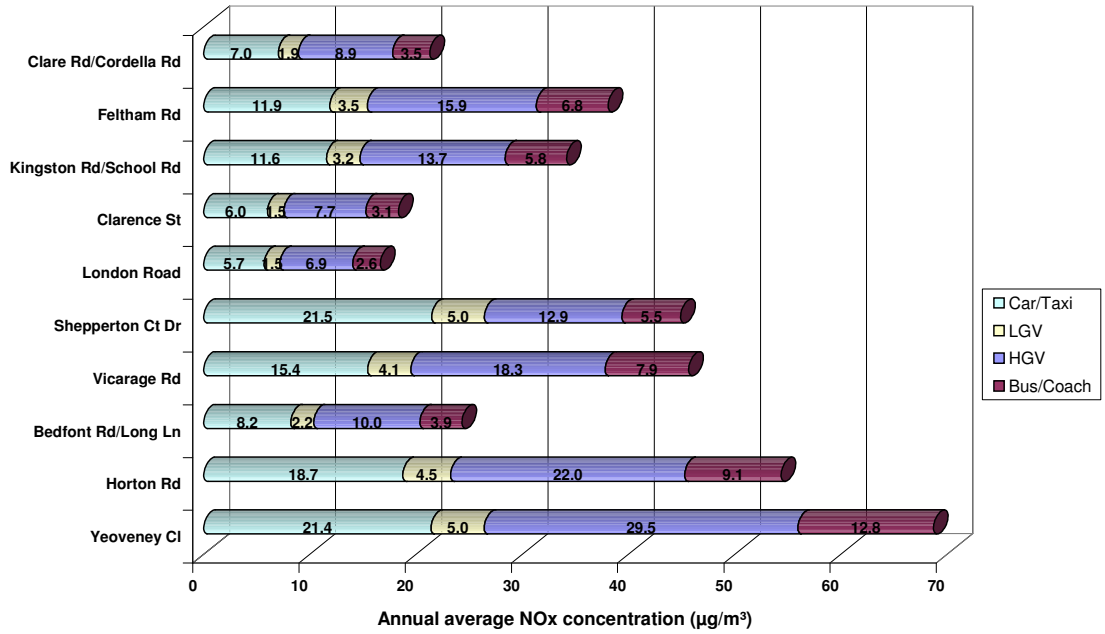
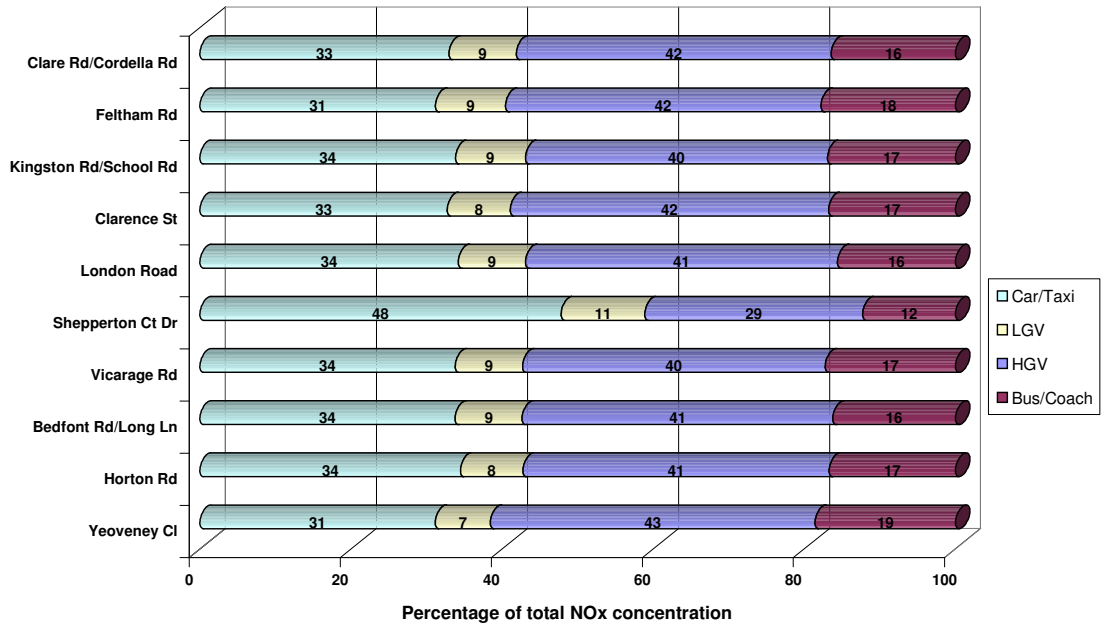


Figure 4.7: Percentage contribution of different vehicle types to annual average NO_x concentrations



4.3.3 Breakdown of traffic emissions by road types

Emissions

The major roads in the West London area are the responsibility of one of the following organisations:

- The Highways Agency;
- Transport for London (TfL);
- Surrey County Council; or
- The Local Authority

The emissions from each group of roads have been considered separately and the concentrations resulting from each group have been calculated at each of the receptor points considered.

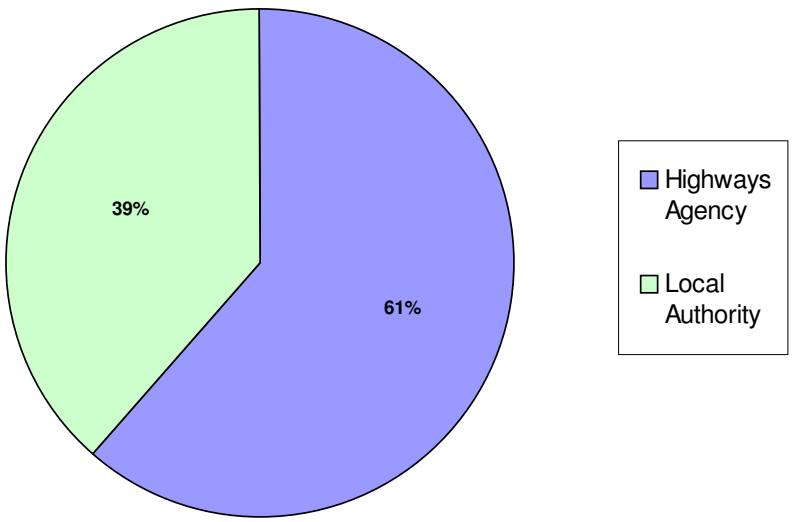
Table 4.4 shows the emissions of NO_x from the different road groups, in Spelthorne and in the West London area, and the percentage of the total major road emissions. Figure 4.8 shows a pie chart of the breakdown of major road emissions within the borough.

Table 4.4: NO_x emissions from different road types

	Highways Agency		Surrey County Council	
	T/yr	% of total	T/yr	% of total
Spelthorne	810	61	508	39

Roads for which the Highways Agency is responsible contribute the most NO_x emissions from major roads within Spelthorne. The roads within Spelthorne that come under the responsibility of the Highways Agency are the M25, M3, A30, and A316, which contribute 61% of the total NO_x emissions emanating from road vehicles.

Figure 4.8: NO_x emissions from different road types in Spelthorne



Concentrations

The annual average concentration of NO_x resulting from emissions from each road group has been predicted at the receptor points in the borough. Figure 4.9 shows the contribution of each road type to the total, and Figure 4.10 shows these contributions as percentages of the total concentration resulting from traffic emissions.

Figure 4.9: Contribution of different road types to annual average NO_x concentrations

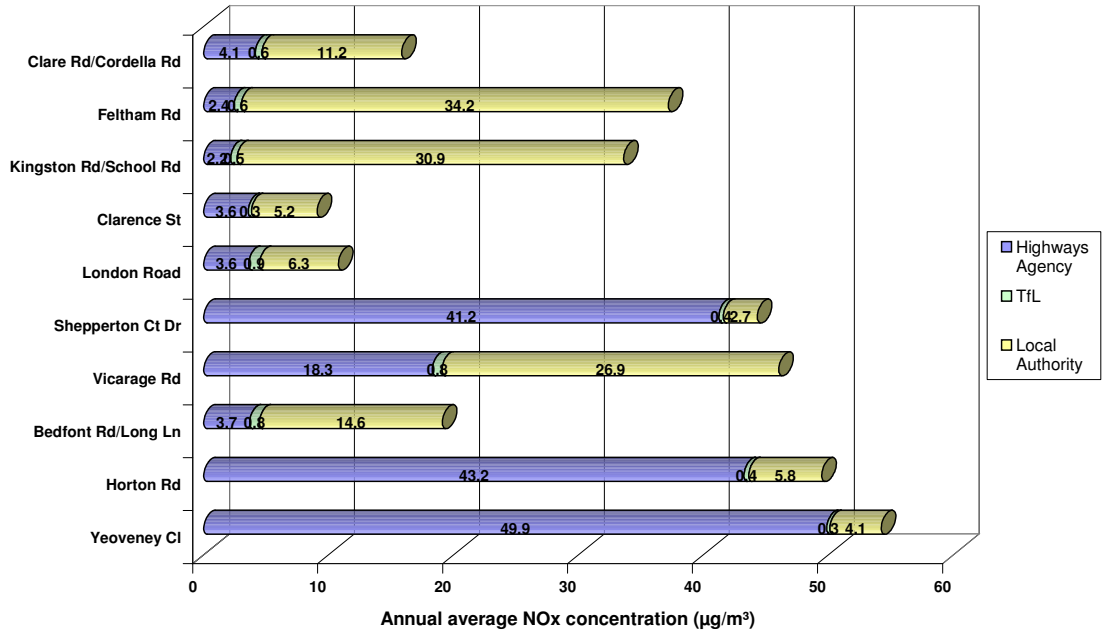
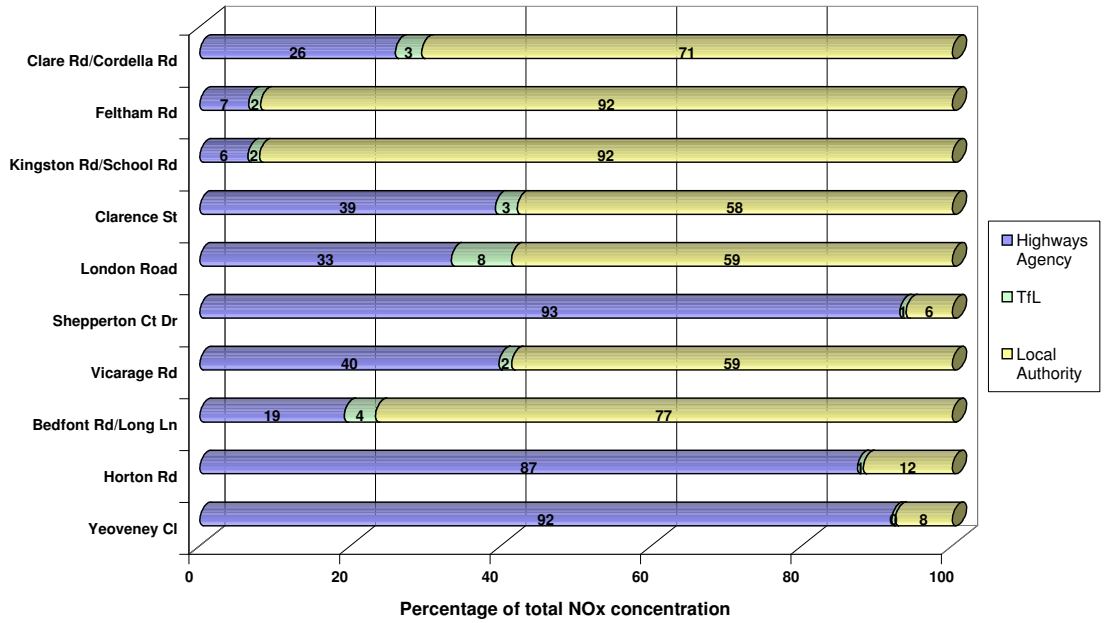


Figure 4.10: Percentage contribution of different road types to annual average NO_x concentrations from major roads



4.3.4 Breakdown of traffic emissions into Heathrow & non-Heathrow traffic

Emissions

The Heathrow Emissions Inventory gives a total traffic flow and a flow due to Heathrow traffic for each road covered by the inventory. The emissions for the roads in the inventory have therefore been broken down into the following groups:

- Heathrow traffic;
- Non-Heathrow traffic; and
- Traffic on roads for which no Heathrow/non-Heathrow split is available (hereafter labelled "other roads")

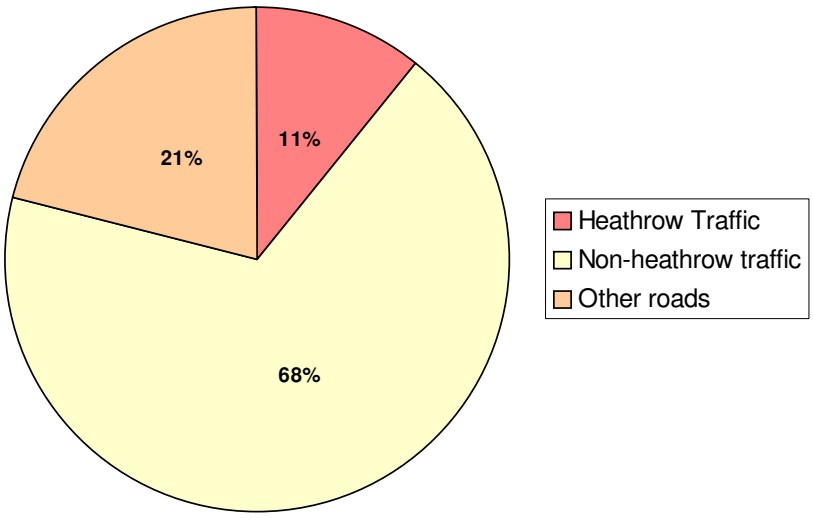
The emissions from each group have been considered separately and the annual average concentrations resulting from each group have been calculated at each of the receptor points considered. The emissions of NO_x from the different road groups and the percentage of the total major road emissions are shown in table 4.5 below.

Table 4.5: NO_x emissions from Heathrow & non-Heathrow traffic

	Heathrow traffic		Non-Heathrow traffic		Other roads	
	T/yr	% of total	T/yr	% of total	T/yr	% of total
Spelthorne	130	11	820	68	256	21

Emissions from traffic associated with Heathrow Airport contribute 11% of the total emissions of NO_x emanating from roads within Spelthorne; non-Heathrow traffic contributes 68% with the remainder undefined.

Figure 4.11: NO_x emissions from different road types in Spelthorne



Concentrations

Annual Average NO_x Levels at Receptor Sites due to Heathrow Airport traffic

The annual average concentration of NO_x resulting from emissions from each road type has been predicted at the receptor location points in the borough. Figure 4.13 shows these contributions as percentages of the total concentrations.

Figure 4.12: Contribution of Heathrow traffic to annual average NOx concentrations

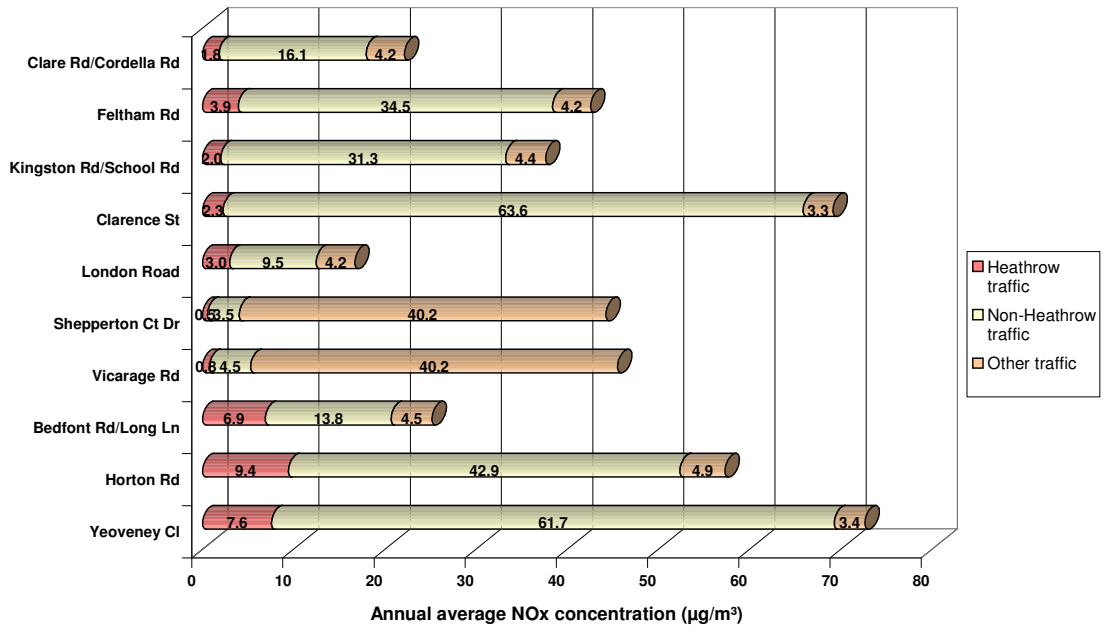
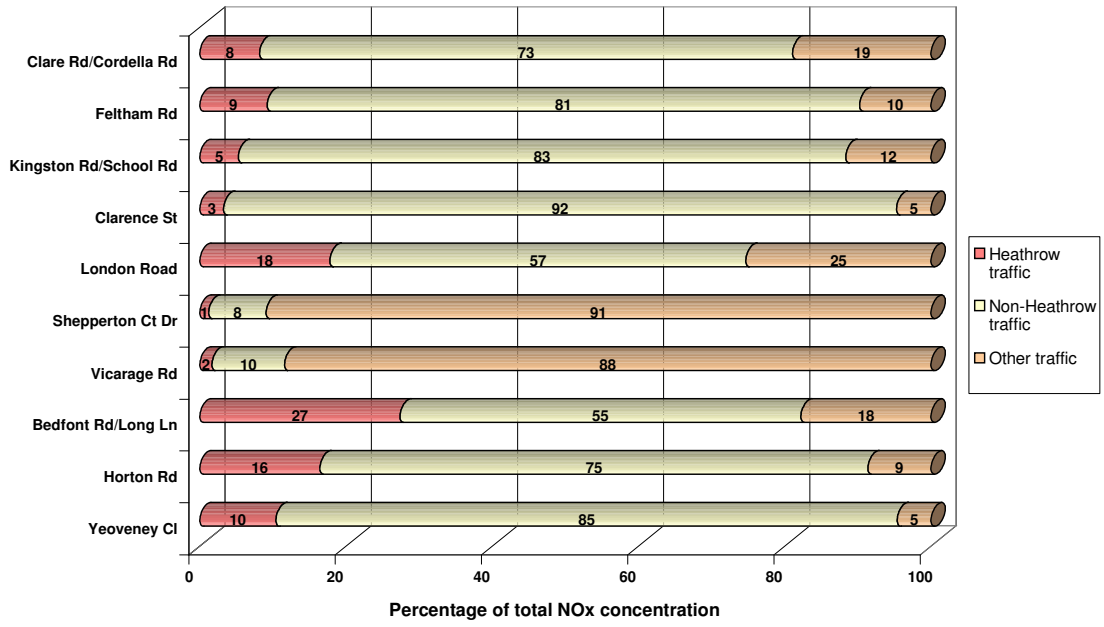


Figure 4.13: Percentage contribution of Heathrow traffic to annual average NOx concentrations from major roads



4.3.5 Breakdown of Heathrow Airport Emission Sources

Emissions from Heathrow Airport have been broken down according to the following source types:

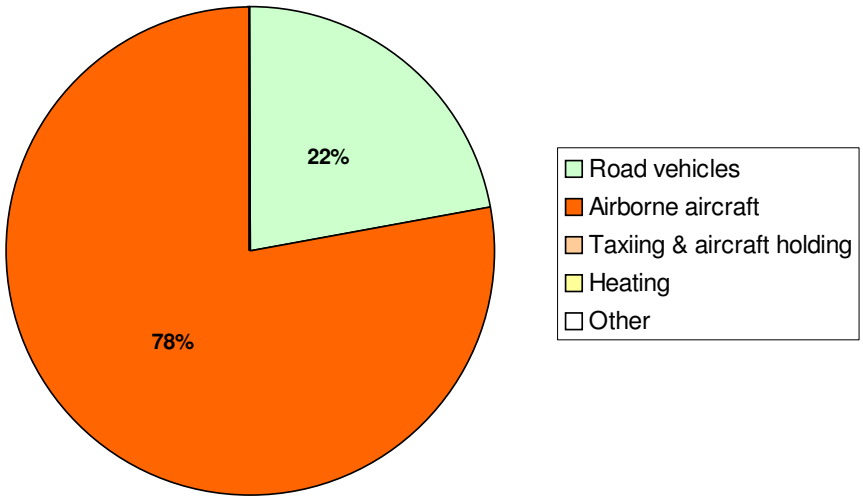
- Emissions from road vehicles, including Heathrow traffic, on-site traffic, car parks and taxi ranks;
- Emissions from airborne aircraft;
- Emissions from aircraft taxiing and holding;
- Emissions from heating; and
- Other emissions.

Based upon information provided by the Heathrow Airport Emissions Inventory, 11% of the total NO_x emissions from road vehicles are due to traffic flows throughout the borough of Spelthorne known to be associated with activities associated with Heathrow Airport, accounting for 22% of the total NO_x emissions emitted by activities associated with Heathrow Airport. The remaining 78% of the total NO_x emissions emitted by activities associated with Heathrow Airport are airport related emissions from within Spelthorne only; that is, airborne aircraft and road traffic only. It does not take into account airport related sources outside the borough, such as the 'on-airport' sources such as taxiing, airside vehicles etc. The contribution to the annual average concentrations of NO_x from each road group varies depending on the receptor location considered.

Table 4.6: NO_x Emissions from Heathrow Airport

	Road vehicles		Airborne aircraft		Taxiing & aircraft holding		Heating		Other	
	(T/yr)	% of total	(T/yr)	% of total	(T/yr)	% of total	(T/yr)	% of total	(T/yr)	% of total
Spelthorne	130	22	447	78	trace	-	trace	-	trace	-

Figure 4.14: NOx emissions from different Heathrow source groups in Spelthorne



Concentrations

Heathrow Airport is the second highest cause of nitrogen dioxide emissions within the Borough of Spelthorne. Being responsible for 29% of the total NO_x emissions within the Borough of Spelthorne. These emissions arise almost wholly a result of road vehicles and airborne aircraft. Figure 4.16 shows, as a percentage, the contribution of NO_x at each of the receptor locations arising from the from the source groups within Heathrow Airport.

The locations of these emissions relative to the receptor locations are dependent upon the receptor's location with respect to the airport. At receptor locations close to the airport, the airport emissions will contribute significantly to ground level concentrations (up to about 32%). However, in the south of the borough the airport emissions will be much less significant, and contribute less than 10% of the ground level concentrations.

Figure 4.15: Contribution of Heathrow sources to annual average NOx concentrations

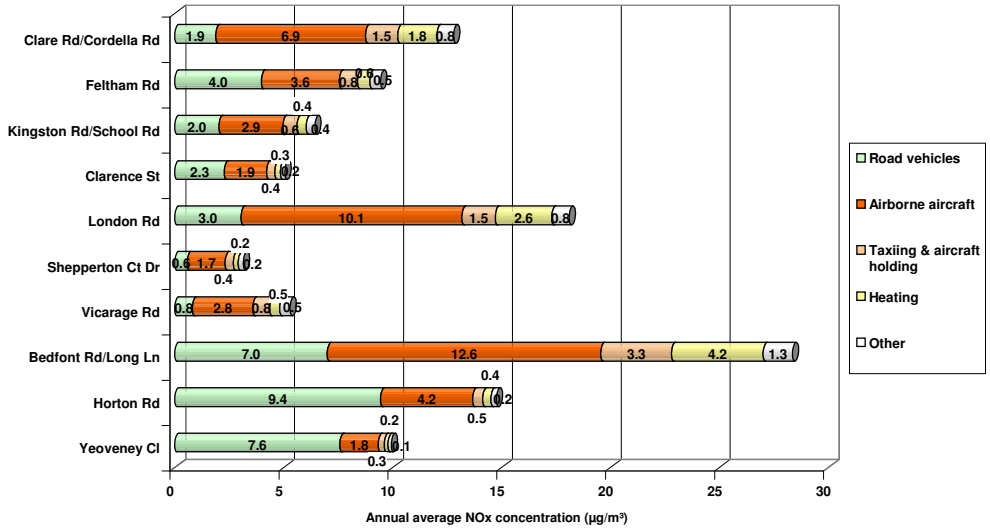
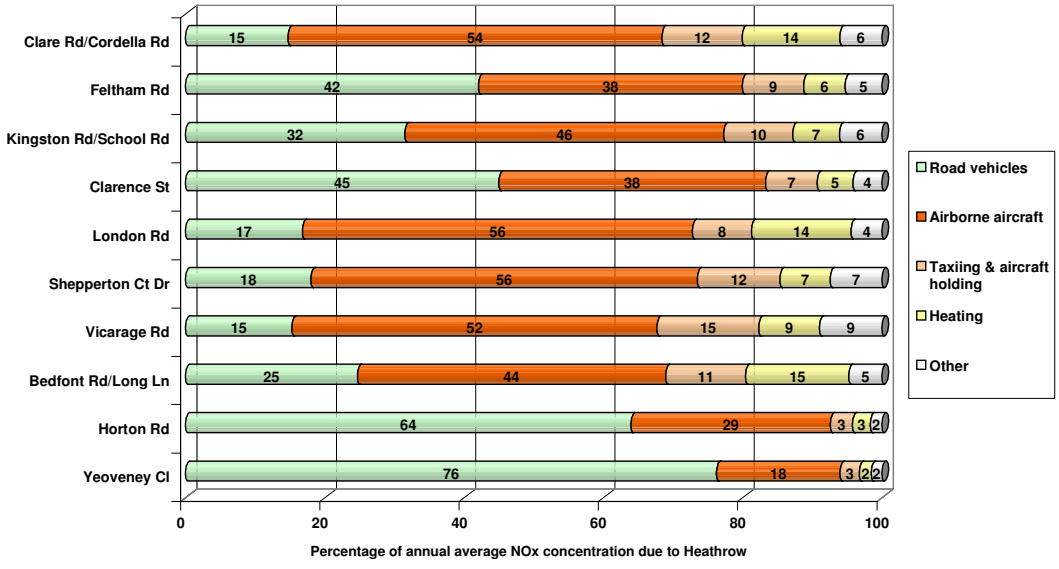


Figure 4.16 Percentage contributions from Heathrow sources groups to the annual average NO_x concentrations at each of the receptor locations.



4.3.6 Apportionment of Heathrow Airborne Aircraft Sources by Height

Activities carried on at Heathrow Airport make the 2nd largest single contribution to NO_2 levels within Spelthorne, accounting for an average 29% of the total NO_x emissions within the Borough of Spelthorne. These emissions arise almost wholly as a result of road vehicles and airborne aircraft. The locations of these emissions relative to the receptor locations are dependent upon the receptor's location with respect to the airport. At receptor locations close to the airport, the airport emissions will contribute significantly to ground level concentrations (up to about 32%). However, in the south of the borough the airport emissions will be much less significant, and contribute less than 10% of the ground level concentrations.

Based upon information provided by the Heathrow Airport Emissions Inventory, 11% of the total NO_x emissions from road vehicles are due to traffic flows throughout the borough of Spelthorne known to be associated with activities associated with Heathrow Airport, accounting for 22% of the total NO_x emissions emitted by activities associated with Heathrow Airport. The remaining 78% of the total NO_x emissions emitted by activities associated with Heathrow Airport are airport related emissions from within Spelthorne only; that is, airborne aircraft and road traffic only. It does not take into account airport related sources outside the borough, such as the 'on-airport' sources such as taxiing, airside vehicles etc. The contribution to the annual average concentrations of NO_x from each road group varies depending on the receptor location considered.

Aircraft Emissions

Detailed information on the emission rates of aircraft in different stages of the Landing and Take-Off (LTO) cycle were given in the Heathrow Emissions Inventory. For the purposes of the modelling this information was used to define a set of volume sources, of different dimensions and with different emission rates, to represent the aircraft emissions. Table 4.7 shows the dimensions and emission rates of each of the volume sources. Figures 4.17 and 4.18 show the dimensions of the volume sources in plan and elevation.

Table 4.7 shows that more NO_x and PM_{10} are emitted from aircraft above 450m high than from those close to ground level. However, the impact of the emissions from different heights on ground level concentrations will vary because of the distance from the ground and because of the area over which the pollutants are emitted.

Table 4.7: Explicitly modelled Heathrow Airport volume sources

Source	Base height (m)	Top height (m)	Length (m)	Width (m)	NO_x emission rate (T/yr)	NO_x emission rate ($g/m^3/s$)	PM_{10} emission rate (T/yr)	PM_{10} emission rate ($g/m^3/s$)
G1	0	50	4701	100	713	9.62E-07	3.1	4.23E-09
G2	0	50	4456	100	981	1.40E-06	3.6	5.16E-09
M1	50	450	7633	400	117	3.04E-09	2.1	5.40E-11
M2	50	450	9995	400	566	1.12E-08	3.4	6.80E-11
M3	50	450	10261	400	808	1.56E-08	2.4	4.65E-11
M4	50	450	10021	400	800	1.58E-08	3.2	6.33E-11
T1	450	1000	16695	3000	1112	1.28E-09	7.7	8.85E-12
T2	450	1000	15759	3000	2848	3.47E-09	8.7	1.07E-11
Total					7945		34.3	

Figure 4.17: Diagram showing the aircraft volume sources in plan

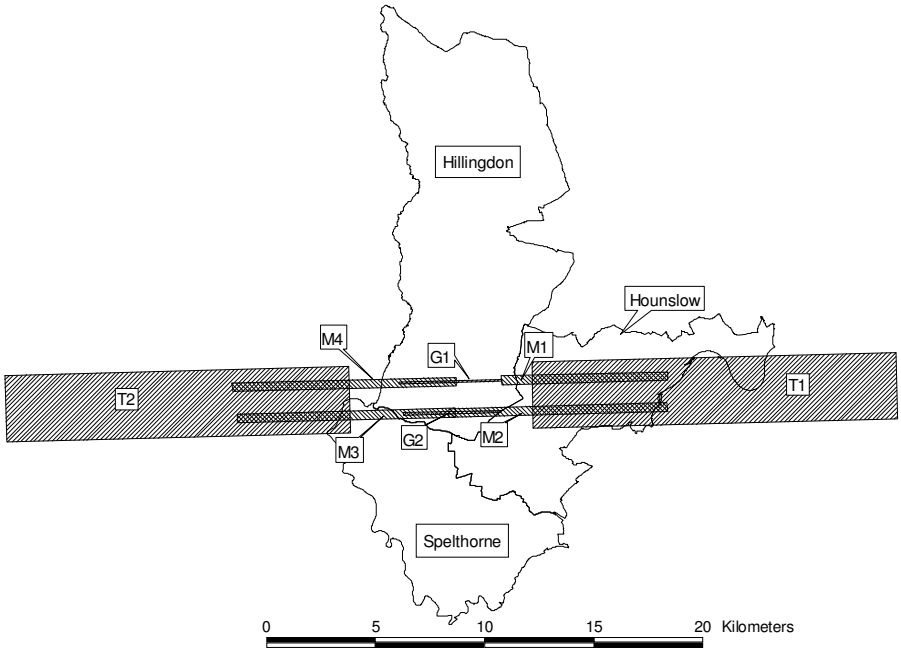
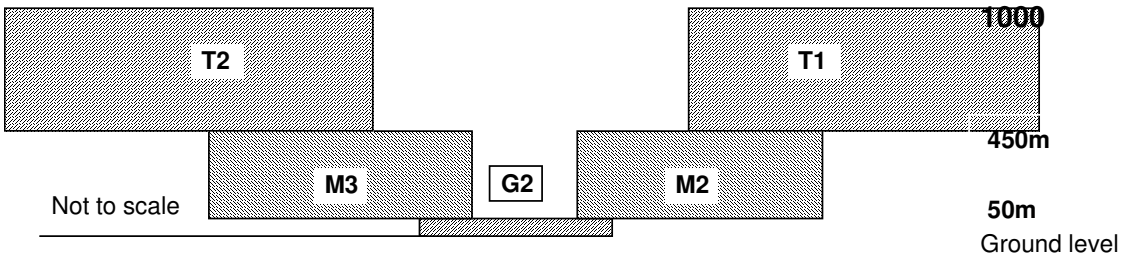


Figure 4.18: Diagram showing the aircraft volume sources in elevation (view from South)



The contribution of all the airborne aircraft to the annual average concentrations of NO_x varies depending on the receptor location. Although in all cases the greatest contribution is from the airborne aircraft closest to the ground (between 0 and 50 metres above ground level), contributing between 78% and 96% (that is, between 0.9 and 8.3 µg/m^3) of NO_x towards the annual average NO_x concentrations. The impact of the aircraft above 450m high is very small, contributing at most 2% of the total NO_x concentration resulting from airborne aircraft emissions, and this occurs at sites where the overall contributions are smallest.

To determine the relative impacts of the aircraft at different heights, the volume sources used in the modelling have been divided into three sets according to the heights they represent (0 to 50m; 50m to 450m; and 450m to 1000m) and have been modelled separately. The annual average concentrations of NO_x resulting from emissions from each set of sources have been predicted at each of the receptor points in the borough.

Figure 4.19 shows the contribution of each set to the total and Figure 4.20 shows these contributions as percentages of the total concentrations resulting from airborne aircraft emissions.

Figure 4.19: Contribution of aircraft at different heights to annual average NO_x concentrations

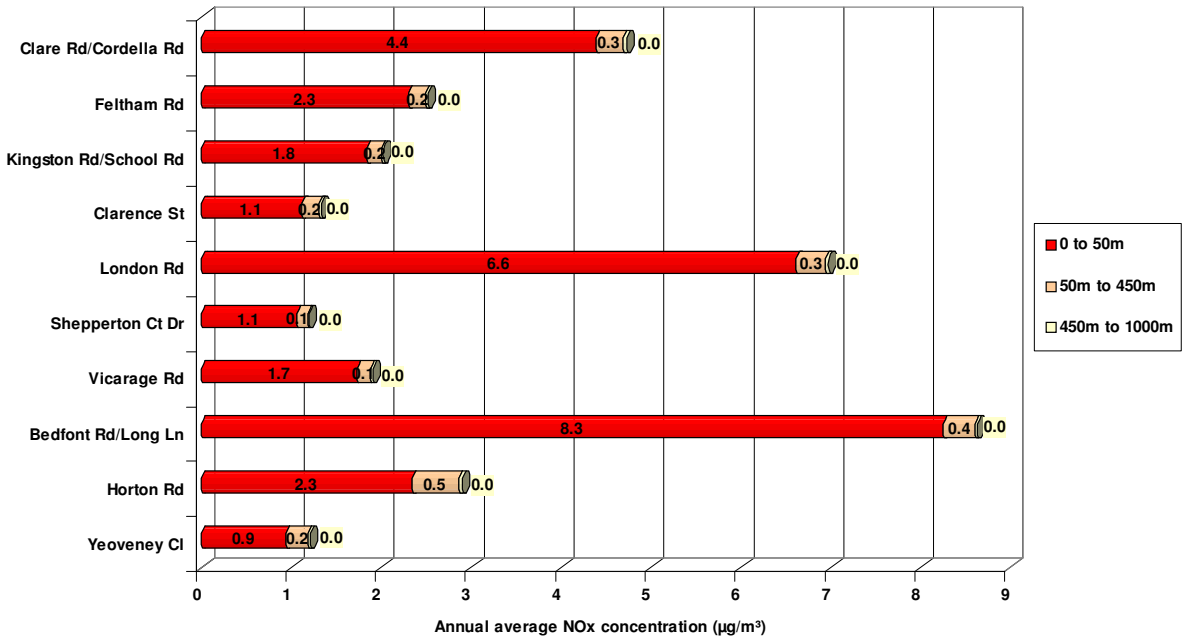
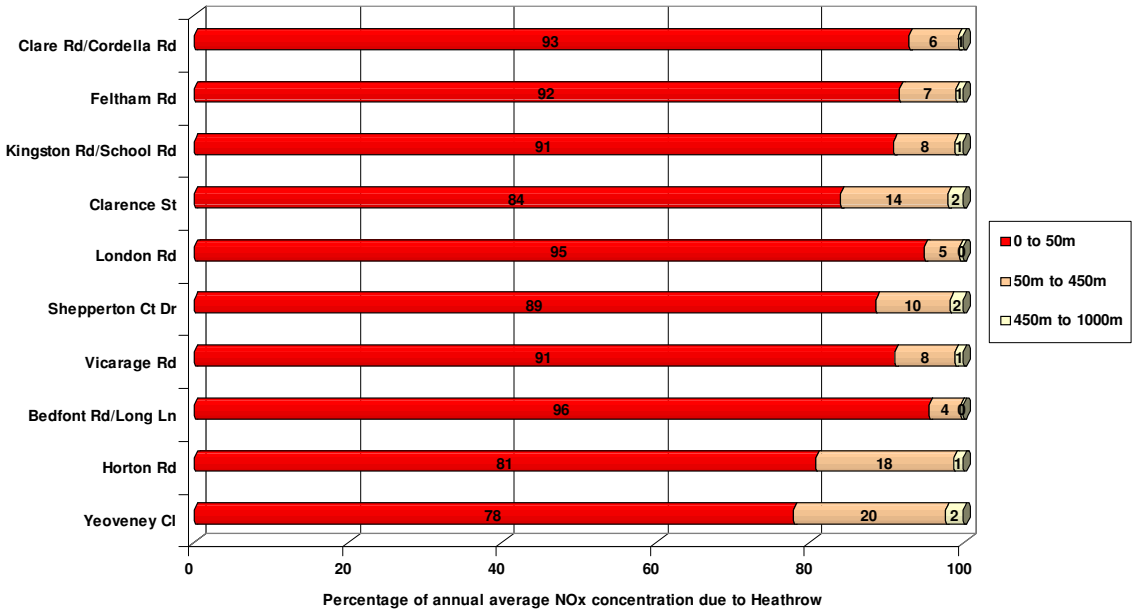


Figure 4.20: Percentage contribution to the annual average NOx concentrations from Heathrow's airborne aircraft flying at different heights



The maximum contribution to the emissions of NO_x emanating from Heathrow Airport sources within Spelthorne is from airborne aircraft, which contribute 78%. Consequently, at various locations within Spelthorne close to the airport, a major contribution to NO_x concentrations resulting from the airport emissions is from airborne aircraft.

5.0 EMISSION REDUCTION SCENARIO MODELLING

As part of the action plan formulation work, Cambridge Environmental Research Consultants Ltd (CERC) was jointly commissioned by Spelthorne Borough Council and the London Boroughs of Hillingdon and Hounslow to carry out a scenario testing study for the area covered by the three boroughs.

There are two main source groups of NO_2 emissions which impact upon air quality within the borough of Spelthorne (section 4 refers). Consequently, 3 nitrogen dioxide emission reduction scenarios have been investigated. These scenarios involved modelling the reduction in NO_2 emissions from major roads and from aircraft. In order to observe the effects of the scenarios modelling has therefore been carried out for a "do-nothing" scenario and for the following three scenarios:

- Scenario 1: Reduction of 30% in traffic flows;
- Scenario 2: Low Emission Zone (EURO II); and
- Scenario 3: Reduction of 50% in airborne aircraft emissions;

The Emissions Inventory Toolkit (EMIT) was used to set up the emissions scenarios. All emissions data and other parameters used within the model were the same as those used for Spelthorne's "Stage 4 - review and assessment" and "Source Apportionment" studies (which is available at http://www.spelthorne.gov.uk). All scenarios have been modelled for the year 2005, which is the year by which the Air Quality Strategy annual objective values for NO_2 must be achieved.

For each scenario, annual average concentrations of both NO_x and NO_2 have been predicted at each of ten receptor points. The ten receptor point locations are the same as those used for the 'stage 4' source apportionment exercise. In each case the predicted reduction in concentrations is given in µg/m³ and as a percentage. It should be noted that the reductions in NO_2 concentrations are smaller than those for NO_x, which is due to the nature of chemical reactions that take place in NO_x chemistry.

From table 5.1, it can be seen that for the "do nothing" scenario, the annual average NO_2 concentrations are predicted (2005) to exceed the NAQS annual objective value of 40µg/m³ at five of the ten-receptor points considered. The results of the three scenarios can be found over the next few pages.

Table 5.1: Source apportionment receptor point locations within Spelthorne

ID	Description	Location	Predicted (2005) Annual average NO_2 concentration (µg/m³)
1	Yeoveney Close, Staines	502554, 172803	45.0
2	Horton Road, Stanwell	503931, 175307	42.4
3	Bedfont Road/Long Lane, Stanwell	506860, 174198	38.3
4	Vicarage Road, Sunbury	510039, 170191	43.1
5	Shepperton Court Drive, Sunbury	507646, 167550	37.0
6	London Road, Ashford	506937, 173924	33.1
7	Clarence Street, Staines	503241, 171544	40.3
8	Kingston Road/ School Road	507910, 170506	38.6
9	Feltham Road, Ashford	507336, 171488	40.0
10	Clare Road/ Cordella Road	506150, 173600	34.1

6.0 SPELTHORNE'S PLAN FOR THE REDUCTION OF NO_2

6.1 Reduction of Emissions from Road Vehicles

6.1.1 Scenario Modelling: Reduction in traffic flows by 30%

The source apportionment study determined that the greatest contributor to NO_x levels within Spelthorne is from road transport, especially those using the major roads (M25, M3, A30, A308, and A316), which contributes 58% to the total NO_x emissions.

The predicted annual average concentrations of NO_x and NO_2 for the modelled scenario to reduce road traffic flows by 30% are presented in tables 6.1 and 6.2, respectively.

Table 6.1: Predicted annual average NO_x concentrations for "do nothing" and the modelled scenario to reduce road traffic flows by 30%

	Annual average NO_x concentration (µg/m³)			
	Do Nothing	Reduction in traffic of 30%	Difference	% Reduction
Yeoveney Close	77.4	64.4	13.0	17
Horton Road	69.8	59.2	10.6	15
Bedfont Road	59.9	55.7	4.2	7
Vicarage Road	67.2	58.0	9.2	14
Shepperton Court Drive	60.6	52.0	8.6	14
London Road	48.6	46.0	2.5	5
Clarence Street	71.5	61.0	10.5	15
Kingston Road	56.0	49.0	7.0	12
Feltham Road	59.7	52.2	7.5	13
Clare Road	49.4	45.7	3.7	7

Table 6.2: Predicted annual average NO_2 concentrations for "do nothing" and modelled scenario to reduce road traffic flows by 30%

	Annual average NO_2 concentration (µg/m³)			
	Do Nothing	Reduction in traffic of 30%	Difference	% Reduction
Yeoveney Close	**45.0**	**41.2**	3.8	8
Horton Road	**42.4**	38.8	3.6	8
Bedfont Road	38.3	36.5	1.7	5
Vicarage Road	**43.1**	39.7	3.4	8
Shepperton Court Drive	37.0	34.5	2.6	7
London Road	33.1	31.9	1.2	4
Clarence Street	**40.3**	37.8	2.4	6
Kingston Road	38.6	35.4	3.2	8
Feltham Road	**40.0**	36.9	3.1	8
Clare Road	34.1	32.3	1.8	5

The predicted reduction in the annual average NO_2 concentrations if road traffic flows could be reduced by 30% would range from 4% at London Road to 8% at Yeoveney Close, Horton Road, Vicarage Road, Kingston Road and Feltham Road.

Of the original 5-receptor locations predicted to exceed the NAQS annual objective for NO_2, a 30% reduction in road traffic flows is predicted to improve NO_2 concentrations at 3 of these locations such that the NAQS annual objective for NO_2 would no longer be exceeded. The remaining 2 receptor locations predicted to exceed the NAQS annual objective for NO_2 are those located close to junction 13 on the M25 and the M3.

From the findings of the assessment of source apportionment and the testing of the above-mentioned scenario, actions to reduce NO_2 concentrations within Spelthorne to below the NAQS annual objective limit will require appreciable attention to reducing NO_2 emissions from road traffic; in some places a road traffic reduction in excess of 30% will be required if the NAQS annual object is to be achieved.

6.1.2 Scenario Modelling: Low Emission Zones

Low Emission Zones (LEZ) are designated areas designed to reduce air pollution in air quality management areas, particularly in the centres of towns and cities, although other benefits may include reductions in traffic and noise which may in turn help to promote increased cycling and walking. An LEZ is an area in which certain categories of vehicle are barred from entering unless they meet specified pollution emission standards. The categories of vehicle barred, and the standards to be achieved are not set in any national legislation but work is currently on going to determine an appropriate national standard for LEZ's.

A study has been carried out to investigate the feasibility of an LEZ in London, providing information to allow a determination as to whether low emission zones would work towards meeting London's air quality targets and whether they should be taken forward to implementation. The study has considered a large number of different options, and the conclusions from the study, should a low emission zone for London be taken forward, are as follows:

Area. The study recommends that the most appropriate option for a London LEZ would be a scheme including all of the Greater London area.

Vehicles. The study recommends that the low emission zone start with a scheme that targets lorries, London buses and coaches. These vehicles have disproportionately high emissions per vehicle and targeting them produces greatest emissions reductions for least cost. However, the study recommends that the zone be potentially extended in later years to include vans (subject to further investigation of the socio-economic effects of such a scheme on small companies/owner drivers) and taxis (though taxis should be addressed earlier through the licensing process). The study does not recommend that cars are included in the scheme, but does recommend that some action is needed, alongside any LEZ, to target the removal of very old cars in London (those built before 1993).

Implementation Date. The work necessary to set up the legal basis for a London LEZ would make it extremely difficult to implement a fully operational scheme before the middle of 2006, and more realistically before late 2006. Therefore, the first LEZ that could be introduced in London would not be early enough to help progress towards the initial air quality targets for 2005. However, there is one advantage from a slightly later LEZ introduction, because it would tie in with the availability of Euro 4 vehicles (manufactured from late 2006 onwards), which have much lower emissions. Should an LEZ be introduced, the study recommends that it is progressive, i.e. it would apply tighter emission criteria in future years. Any scheme needs to be clear about these future criteria so that operators can

plan their future vehicle purchases accordingly.

Emission Criteria. The emission criteria set for a London low emission zone will dictate the air quality benefits and the costs to operators. The study recommends that for lorries, buses and coaches the criteria be based on Euro standard (age) and other emission standards (the Reduced Pollution Certificate (RPC)). The study recommends that vehicles should meet an initial criterion of Euro 2 plus RPC (or equivalent) in 2006/7. It also recommends that this criterion be tightened to Euro 3 plus RPC (or equivalent) in 2010. However, there are two additional conclusions put forward alongside this latter recommendation. Firstly, a NO_x based RPC scheme would help the effectiveness of the scheme and could allow greater NO_2 improvements. Secondly that it might be beneficial to introduce the Euro 3 plus RPC criterion earlier than 2010 using a rolling approach (applying the RPC to Euro 3 vehicles based on age). The study recommends a different approach for vans, should these vehicles be included, using a rolling ten-year-old age limit. A similar age-based standard is also recommended for licensed taxis and private hire vehicles.

Stakeholder consultation. Survey work has indicated that operators would be broadly supportive of a London low emission zone. Most operators would comply with the zone, though this might be achieved by transferring the older vehicles in their fleets outside London and moving newer vehicles into London (or onto London routes). Any LEZ would be likely to have greatest impact on operators of specialist vehicles and smaller companies. More investigation of the potential impacts of any LEZ on van operators is needed.

Air Quality. A London low emission zone would have modest benefits in improving overall emission levels and absolute air quality concentrations in London, but it would make a larger contribution to reducing exceedances of the air quality targets. The recommended LEZ would have greatest impact in targeting PM_{10} emissions and air quality exceedances. It is estimated that the recommended scheme would achieve a 23% reduction in total London PM_{10} emissions in 2010. It would also achieve a 43% reduction in the area of London exceeding the relevant PM_{10} air quality target in 2010, and a 19% reduction in the area of London exceeding the relevant NO_2 air quality target in 2010.

Table 6.3: Air Quality Benefits of the Recommended LEZ. Reduction in Emissions

	Reduction in Emissions (relative to baseline)			Reduction in Area Exceedance Target (relative to baseline)		
Pollutant	2007	2010 A)	2010 B)	2007	2010 A)	2010 B)
NOx (NO2)	1.5%	2.7%	3.8%	4.7%	12%	18.9%
PM10	9.0%	19%	23%	0%*	32.6%**	42.9%**

* London should meet the relevant air quality for PM10 in this year without any additional action for an average year's weather.
** Exceedance of the annual meanPM10 objective.
The 2007 scheme only includes lorries, buses and coaches. In 2010: A) includes lorries, buses and coaches and B) includes lorries, buses and coaches, vans and taxis.

It is stressed that the results of the above study have to be seen in the context of a changing scenario with respect to the technical options, the reliability of the air quality predictions, and a number of other uncertainties. Changes in a number of key areas including the emission factors, the relative health impacts or importance of different pollutants, the estimates of air

quality background in future years, and the costs of different technical options, would have a significant impact on the recommendations above. A number of areas are highlighted as warranting further investigation. These include:

- The potential for considering older cars in a low emission zone, or targeting these vehicles through alternative action.
- The assessment of the socio-economic effects on van owners and operators from an LEZ, particularly on small companies and owner-drivers.
- Further consideration of extending the current PM_{10} based RPC schemes forward in time, to all heavy vehicles, and to include NO_x.
- The consideration of a 'rolling' scheme for heavy vehicles after 2007, based on a 5-6 year age limit for these vehicles (beyond which time the vehicles would need to meet the RPC criteria).

Finally, a number of key tasks have been identified, that would need agreement and collaboration before the introduction of any LEZ. These include:

- A joint decision on whether to implement the zone between the Mayor, London boroughs, and the
- Government;
- Public consultation over the scheme, and agreement over any proposed modifications;
- Agreement on the approach for bus regulation and taxi licensing (TfL);
- Agreement on the format of the TRO and any associated Bill, and if relevant, regulations to
- Decriminalise offences;
- Agreement on the national certification system; and
- Agreement over the funding and division of responsibilities.

6.1.3 Scenario Modelling: Low Emission Zone (EURO II)

At the time of writing this air quality action plan, the above-mentioned study was being undertaken, and as such the nature and extent of the London LEZ had not been decided upon. However, in order to examine the impacts upon Spelthorne's air quality that a London wide LEZ may cause, the model was set-up to predict the effects of a LEZ that extends from the centre of London to the M25. The type of LEZ modelled was one that would exclude from the LEZ area all vehicles with engines that do not meet the standard of EURO II with particulate traps, with the exception of private cars. The total number of vehicles has been assumed to remain the same.

The predicted annual average concentrations of NO_x and NO_2 for modelled scenario for the setting-up of a LEZ from the centre of London to the M25 are presented in tables 6.4 and 6.5, respectively.

Table 6.4: Predicted annual average NO_x concentrations for "do nothing" and a LEZ covering the centre of London to the M25 scenario.

	Annual average NO_x concentration (µg/m³)			
	Existing	LEZ Scenario	Difference	% Reduction
Yeoveney Close	77.4	77.4	0.1	0
Horton Road	69.8	68.5	1.4	2
Bedfont Road	59.9	59.6	0.3	1
Vicarage Road	67.2	67.1	0.1	0
Shepperton Court Drive	60.6	60.6	0.0	0
London Road	48.6	48.4	0.2	0
Clarence Street	71.5	71.4	0.0	0
Kingston Road	56.0	55.9	0.1	0
Feltham Road	59.7	59.6	0.1	0
Clare Road	49.4	49.3	0.1	0

Table 6.5: Predicted annual average NO_2 concentrations for "do nothing" and a LEZ covering the centre of London to the M25 scenario.

	Annual average NO_2 concentration (µg/m³)			
	Existing	LEZ Scenario	Difference	% Reduction
Yeoveney Close	**45.0**	**45.0**	0.0	0
Horton Road	**42.4**	**42.0**	0.4	1
Bedfont Road	38.3	38.2	0.1	0
Vicarage Road	**43.1**	**43.1**	0.0	0
Shepperton Court Drive	37.0	37.0	0.0	0
London Road	33.1	33.1	0.1	0
Clarence Street	**40.3**	**40.3**	0.0	0
Kingston Road	38.6	38.6	0.0	0
Feltham Road	**40.0**	**40.0**	0.0	0
Clare Road	34.1	34.1	0.0	0

The modelling has predicted that if the Greater London Authority was to establish a LEZ that extended from the centre of London to the M25 there would be almost no impact on the of background concentration of NO_2. That is, there would be almost no reduction in NO_2 levels at the receptor locations, with the exception of Horton Road where the predicted reduction would be less than half %.

If the implementation of LEZ's within neighbouring Boroughs is considered to cause a negative impact on Spelthorne's air quality mitigation measures will be examined and implemented as appropriate.

6.2 Control of Emissions Emanating from Highway Agency Controlled Roads

Analysis of NO_x emissions arising from the road network system within the Spelthorne area determined that roads falling under the responsibility of the Highways Agency are accountable for 61% of the total ground-level concentrations of NO_x. The relevant roads (M25, A30, M3, and A316) are gateway roads for movement into, out of, and around London and the southeast.

6.2.1 Continuing Exceedance of NAQS Objectives at locations adjacent to Highway Agency Controlled Roads

Even with a 30% reduction in the number of road vehicles using Highways Agency control roads (namely A315/M3 and M25) (see modelling scenario 1, section 6.1.1) nitrogen dioxide concentrations at locations adjacent to these roads will still exceed the NAQS objectives for 2005, however, the Highways Agency are confident that a number of these continuing exceedance locations will achieve the EU objective for 2010. The examination of continuing exceedance locations is currently being examined by Spelthorne Borough Council through the "Detailed Assessment" process. Either way, it will only be through the development and implementation of effective national policies, programmes and projects that NAQS objectives will be achieved in these locations.

The Highways Agency's stated objectives for working to reduce emissions from their roads are:

- To work in partnership with Local Authorities towards the delivery of the National Air Quality Strategy;
- To maintain and support guidance on air quality assessment, making available Highways Agency air quality monitoring data via the internet;
- To develop and evaluate traffic control systems that reduce vehicle emissions;
- To work towards improved performance in emissions control during construction and maintenance activities; and
- To reduce congestion on the network which will have air quality benefits

One method of delivery for achieving the above objectives are "Route Management Strategies" (RMS). These are a techniques developed by the Highways Agency to provide a framework for managing individual trunk routes as part of wider transport networks. RMS will interlock with local transport strategies (set out in Local Transport Plans) within the context established by Regional Planning Guidance'. (Paragraph 3.1.34 of 'A New Deal for Transport: Better for Everyone' refers). RMS's take a strategic approach to the maintenance, operation and improvement of a road network, leading to the adoption of a 10-year strategy and 3-year investment plan for each of the routes comprising that strategic network.

6.2.2 The M25 Orbital RMS Study

The London Orbit Multi-Modal Study (Orbit) was commissioned by the Government Office for the South East and made its final report in November 2002. The objective of the study was to identify causes of congestion along and approaching the M25, and recommend a preferred strategy of possible solutions to alleviate the impact of congestion on the M25.

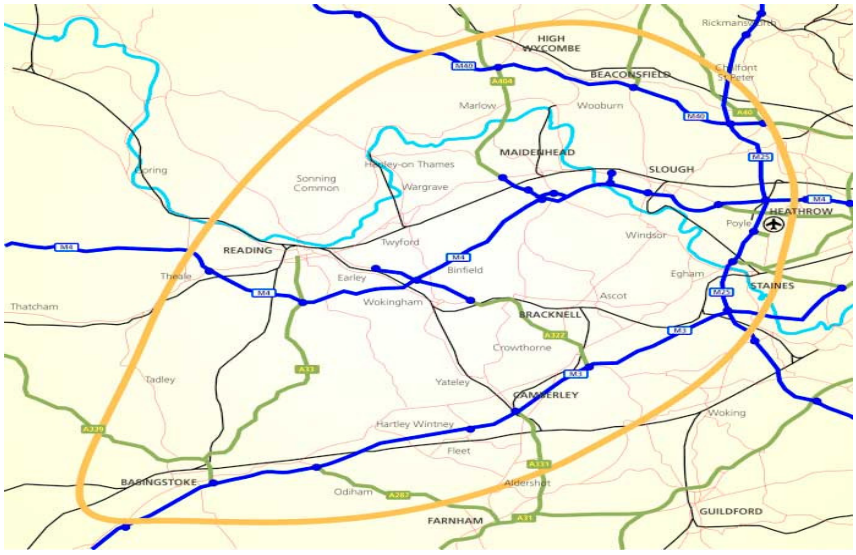
The Orbit report identified a number of sections and junctions that need widening or improvements to increase capacity for future growth, including the M25 approaches to the M3 Junction, which is operating at or near to capacity. Widening of the M25 between Junctions 12 and 14 has begun and is will be completed by 2006.

The Orbit report also recommended further implementation of demand management measures including Integral Demand Management (IDM). Through IDM, the report proposed increased use of CCTV, speed control and more variable speed limits. The study put forward the case for greater use of ramp metering and flow metering to increase vehicle movements and hence journey time reliability. The report also suggested that if ramp metering was successful, then introducing priority lanes for use by public transport should begin on the widened sections of the motorway.

The Orbit study made no specific key recommendations for the M3 pertinent for this RMS.

6.2.3 Thames Valley Multi-Modal Study (TVMMS)

The Thames Valley Multi-Modal Study (TVMMS) was commissioned by the Government Office for the South East and made its final report in January 2003. The purpose of the study was to formulate a coherent strategy, mutually supporting Orbit and SWARMMS. The study addressed



the importance of transport in the region and its influence regarding land use with special regard to protecting the environment, providing for social needs and maintaining economic growth.

The report did not make specific recommendations, however it did presented broad strategic measures that, if introduced, would achieve in part the aspirations of the social, business and environmental communities. In these broader measures, the TVMMS did not favour widening of the M3, preferring to increase the management of the existing infrastructure. TVMMS recommended greater use of CCTV, variable speed limits and incident detection. While the TVMMS report states that these methods of traffic flow management will not substantially increase capacity; but does recognise that they can increase journey time reliability, recognising that M3 as a corridor needing better management.

The TVMMS recommended giving priority access to public transport, high occupancy vehicles and freight traffic. The TVMMS report did not make any specific recommendation measures for the M3 approaches to the M25. The report suggested a park and ride facility near to the M25, to alleviate traffic congestion approaching London's Heathrow airport. The TVMMS made known that any measures on the strategic trunk road network need identifying, designing and appraising through the RMS framework mechanism.
Finally, despite giving priority to freight traffic on the trunk road network, the TVMMS supported the transfer of freight traffic from road to rail, and called for transfer sites in the Thames Valley region to be brought forward. The report highlighted three Strategic Rail Authority schemes; Southampton to West Midlands (2006), north east to south west (2010) and the Great Western Main Line gauge clearance to Bristol and Cardiff (2010). These schemes are likely to be delivered within the timescale of both the Multi-Modal Study and this RMS. The TVMMS report anticipated that these schemes would go some way in providing a feasible alternative to the carriage of freight on the road.

The Secretary of State considered these recommendations. He supported the conclusion that general motorway widening is not required in the study area before 2016 and he asked the Highways Agency (HA):

- To identify and develop smaller scale improvements on the trunk road network to address localised congestion problems in key corridors and to submit proposals in due course;
- To develop appropriate management measures for the trunk road and motorway network in the Blackwater Valley and north west Surrey, including better detection and management of incidents, and to submit proposals in due course which take account, inter alia, of the opening of Heathrow Terminal 5 in 2008;
- To continue to monitor the performance and journey time reliability of the motorway and trunk road network as these measures are taken forward.

The Secretary of State also asked the HA to consider the case for priority measures on appropriate parts of the motorway and trunk road network which would support the development of bus and coach services.

6.2.4 The M3 Route Management Strategy

In October 2004, the Highways Agency's released for consultation the draft RMS developed for the M3 Motorway from Junction 1 Sunbury, south west London to Junction 14 Southampton, and includes the first 500m of the A316(T) trunk road in south west London. The RMS has taken into consideration the recommendations from the recently completed Multi-Modal Studies, namely the London Orbit Multi-Modal Study, the Thames Valley Multi-Modal Study and the South Coast Corridor Multi-Modal Study. Comments from the South West and South Wales Multi-Modal Study were also taken into account.

The draft proposes a set of route outcomes that, if adopted, would promote studies and interventions to improve the operation and maintenance of the M3 Motorway. The principal strategy objectives are for (i) the reduction of congestion and improvements in journey time reliability; (ii) safety and efficiency of the route to be maintained and where possible improved; and (iii) appropriate development to be facilitated as far as is practical.

The Highways Agency anticipates publication and adoption of the final RMS for the M3 Motorway in early spring 2005.

6.2.5 The Highway Agency & Development Control

Planning Policy Guidance Note 13 (PPG13) sets out national planning policy in respect of transport. In accordance with Annex B of PPG13 the Highways Agency (HA) encourages Local Planning Authorities (LPAs) to consider alternatives to the use of the private car in devising access to local developments.

The HA is responsible to the Secretary of State for the implementation of his policies and the fulfilment of his duties in respect of the trunk road network. In this context the HA may exercise the Secretary of State's powers to direct LPA's in respect of planning applications.

In some cases proposed development will only be acceptable if measures are required on the trunk road network to mitigate the impact of the proposed development. Circular 4/2001 gives guidance on the operational life required of these measures, how developers should agree them with the HA, how they will be conditioned into planning permissions and how developers should pay the HA for them.

6.2.6 General Actions

Actions the Highways Agency is in the process of implementing within the borough of Spelthorne that will assist in the reduction of traffic emissions include:

- The installation of variable message signs on the M25 to provide information to drivers, for example the presence of area diversions in the event of motorway closure;
- Improved advance notification of roadwork's and provision of information to allow road users to seek alternative routes;
- Improvements to the A30 Crooked Billet junction and A30 Town Lane junction to improve the signalling and provide cycle facilities;
- HA Traffic Officers who will patrol the network and keep traffic moving. This will reduce emissions from queuing vehicles. They will deal with incidents and clear obstructions and can stop and direct traffic as needed;

More generally, the Highways Agency will be launching the "Influencing Driver Behaviour" initiative that will promote soft demand management measures to reduce demand for the network. They will be working with developers, employers, freight transport association, local authorities, coach operators and tourist boards on this. Also, they look to encourage the vehicle and construction industries to play their part in reducing emissions. The Highways Agency also supports the Government's proposals for long-term sustainable transport solutions for the southeast region.

Neither Spelthorne Borough Council nor Surrey County Council have any authority over Highway Agency controlled road, however, we both have an ongoing working relationship with the Highways Agency and meet regularly to discuss air quality issues. This work will continue.

Action - Roads Emissions 1

The Borough of Spelthorne together with Surrey County Council will continue to work with the Highways Agency to seek and implement long-term solutions for the reduction of emissions from road vehicles using Highways Agency controlled trunk roads within Spelthorne.

6.3 Control of Emissions Emanating from County Council Maintained Roads

At various hotspot locations within the borough of Spelthorne, emissions emanating from roads that fall under the direct responsibility of Surrey County Council are predicted to exceed the NAQS annual objective NO_2 limit; 39% of the total NO_x emissions within the borough of Spelthorne is caused by vehicles using roads maintained by Surrey County Council. Section 86 of the Environment Act 1995, places a duty on county councils to submit to the local authority for inclusion with the area's air quality action plan:

- Proposals for the control of emissions emanating from county maintained road that they themselves can implement to work towards meeting the air quality objectives in designated areas; and
- A statement detailing the timescales for the implementation of each of the proposals.

The Government is recommending that local authorities responsible for local air quality management integrate Air Quality Action Plans, where transport is the primary factor, into the Local Transport Plan covering their area. This approach, through the integration should enable air quality problems to be dealt with in a more corporate and multi-disciplinary way; further encouraging county council transport planners to work more closely with district council air quality officers in devising appropriate solutions. While the transport related component of this air quality action plan is currently separate from the Local Transport Plan, it will be integrated into the next Local Transport Plan, which will be published in 2006.

Spelthorne Borough Council and Surrey County Council are working in partnership to reduce emissions from road vehicles at locations throughout the borough that are predicted to exceed NAQS objectives.

6.3.1 Surrey County Council's Local Transport Plan (2001 to 2006)

In consultation with its district Councils, Surrey County Council is responsible for developing the Local Transport Plan (LTP), which is the statement of the County's transport strategy. The main objectives of the transport plan are:

- Objective A - Integration - to improve co-ordination between all forms of transport, and to integrate transport with other policies. The policies referred to include those for land use planning, health, education, wealth creation and social exclusion;
- Objective B - Environment - to protect and improve the environment of Surrey and health of its people by reducing the adverse effects of motorized transport;
- Objective C - Safety - to improve the safety and security of transport for all travellers. This is in response to the Crime and Disorder Audit, which highlighted transport security as one of the principal concerns of Surrey residents. However, it should be recognised that this is largely a perceived problem; police records indicate a relatively low incidence of transport related crime in Surrey;
- Objective D - Economy - to promote an efficient transport system that supports a sustainable economy;

- Objective E - Accessibility - to make it easier for everyone to travel to everyday facilities, especially people without a car, thus improve accessibility whilst reducing the overall need to travel.

The Government has certain national transport targets and the standards it has set for road casualty reduction, increasing cycling and improving air quality. These targets are reflected in the Surrey LTP; the following target areas for priority in the county:

- Improvements in accessibility to encourage more public transport use, walking and cycling, linked with complementary measures to achieve traffic reduction ~ Improvements in accessibility will be supported by complementary measures to restrain and manage traffic, however, until considerable improvements in accessibility are made to encourage public transport, walking and cycling, it is less likely that a shift toward these modes of transport will occur, or that traffic reduction can be achieved;
- Road safety measures to address the severe problem of road accident casualties in Surrey;
- Maintenance of the highway network, aimed at reducing the serious backlog of maintenance work;

Table 6.6 presents the subject areas of the eight LTP targets, showing which of the five objectives each is most closely associated with. In most cases, the targets are related to several objectives. *(The LTP is currently being reviewed; it is likely that some of the targets identified in table 6.6 may change.)*

Table 6.6: Targets related to objectives

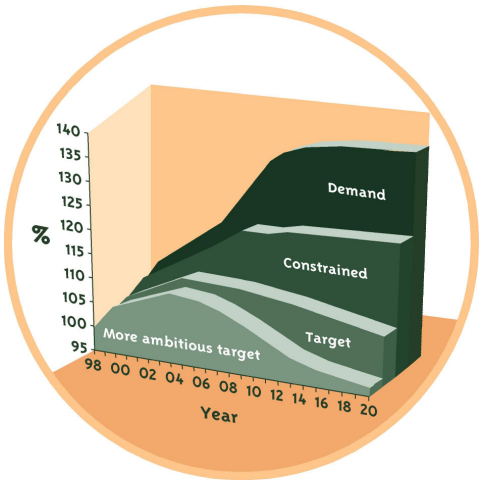
Targets (To gauge progress towards the objectives)	Objectives				
	Integration	Environment	Safety	Economy	Accessibility
1. Traffic reduction					
2. Improved accessibility by non-car modes					
3. More walking, cycling and use of public transport					
4. Road casualty reduction					
5. Reduced vehicle emissions					
6. Increased proportion of major developments located in accessible urban centres					
7. Improved condition of the highway network					
8. Improved provision for freight transport					

Local Transport Plan Targets

The protection and improvement the Spelthorne's environment and the health of its people by reducing the adverse effects of motorised transport is relevant to all 8 of the LTP targets (objective B and table 6.6 refer).

Target 1 - Traffic reduction Measures

To limit road traffic levels on county roads to zero growth above the 1998 level by 2016 with a reduction thereafter. The milestone targets for 2006 and 2011 are 8% and 10% above the 1998 level respectively. Survey data together with the Surrey County Transportation Model is used to monitor this target.



Target 2 - Improved Accessibility by Public Transport, Cycling and Walking

To increase the proportion of the population who have good access (within 20 minutes) to town centres, schools and secondary education colleges, by the following amounts:

	1999	2006	2011	2016
Public Transport	30%	40%	45%	50%
Cycling	55%	60%	65%	70%
Walking	22%	N/A	N/A	N/A

There has been strong public support for improving accessibility by the non-car transport modes but good accessibility is seen as being less than the 30 minutes used in the provisional LTP. Therefore, 20 minutes door to door in the morning peak hour is now taken to represent a good level of accessibility to aim for. The target requires that by 2006, 2011 and 2016 the proportion of the population within 20 minutes of a town centre should be 40%, 45% and 50% respectively.

Target 3 - More Walking, Cycling and Public Transport Use

To increase the percentage of all journeys and school journeys by non-car modes to the following levels:

	1999	2006	2011	2016
All Journeys				
Public Transport	9%	12%	15%	18%
Cycling	2%	4%	6%	8%
Walking	21%	22%	23%	24%
School Journeys				
Public Transport	18%	20%	25%	30%
Cycling	7%	9%	15%	20%
Walking	19%	21%	25%	30%

Given the steady decline in the use of bus and train, walking and cycling as modes of transport to work over the past decades, revealed by the Census journey to work data, the target is challenging. It should be achievable, however, provided sufficient resources are employed to make these modes sufficiently attractive. The achievement of the longer-term targets will be dependent on the introduction of restraints on car use, and road space reallocation. The target to double the mode share for cycling by 2006 and double it again by 2016 is more ambitious than the national target.

The decline in the use of non-car modes for the journey to school has been greater in Surrey than nationally. In the light of past trends, the reversal of this decline is challenging. However the Safe Routes to School initiatives including new conventional bus services and Green Travel Plans at some schools and colleges have produced dramatic reductions in car use.

The mode share figures for 1999 are taken from a Travel Diary Survey undertaken in 1999. It is intended to repeat this, or a similar survey, each year to monitor the all-journeys target. The repeats of the Travel Diary Survey will be the principal means of monitoring the school journey mode split target. Studies at individual schools will supplement the Travel Diary Survey.

Target 4 - Road Casualty Reduction
To reduce road casualties by the following amounts:

	2002	2006	(National Target) 2010	2011	2016
Killed and Seriously Injured	25%	29%	40%	43%	57%
Children Killed and Seriously Injured	28%	36%	50%	53%	71%
Slight Casualties (per 100 million Vehicle Km)	15%	7%	10%	11%	14%

The Surrey targets are based on the new national targets but have been re-calculated to reflect the LTP milestone years of 2006 and 2011 and extended to 2016 to bring these target dates into line with all the others in this LTP. It is, however, recognised that the National Target is likely to be changed before 2010, which will necessitate a change in the 2011 and 2016 milestones. This target will be monitored by reference to police accident records and estimated vehicle kilometres from the Surrey County Transportation Model.

Target 5 - Reduced Vehicle Emissions
To ensure that road traffic emissions do not cause national air quality standards to be exceeded.

While implementation of the LTP will bring about an improvement in the air quality of the Borough, target 5 promises "Where AQMA's have been declared, and where road traffic on County roads contributes significantly to the problem, the LTP implementation programme will be adjusted to take account of proposals for the reduction of emissions from road traffic".

Where AQMA's have been declared, the transport programmes in these areas are to be prioritised accordingly and measures introduced to help reduce vehicle emissions. The level of transport emissions will be monitored using the EVAL programme on the County Transportation Model.

Target 6 - Increased Proportion of Major Developments Located in Accessible Urban Centres

To ensure that at least 50% of major developments are located within existing urban areas at sites that have good access by public transport, cycling and walking. The location of major development within urban areas, at locations that are highly accessible by means other than the private car, should reduce the need to travel, especially by car. There has been strong public support for improving accessibility by the non-car transport modes but good accessibility is seen as being less than the 30 minutes used in the provisional LTP. Therefore, 20 minutes door to door in the morning peak hour is now taken to represent a good level of accessibility to aim for.

Target 7: Improved Condition of the Highway Network

To increase the proportion of the Surrey Priority Network in good structural condition to 72% by 2006, 80% by 2011 and 85% by 2016.

Smooth and unimpeded flow traffic is essential for ensuring that emissions of NO_x from road traffic are kept to a minimum, consequently effective road maintenance is essential. In addition to maintaining the condition of roads for use by motorised vehicles, cycleways and footpaths need to be maintained to make them attractive to the user. Therefore it is necessary to ensure a higher level of repair and maintenance of footways, cycle tracks, cycle lanes, and the near-side edges of roads without specific provision for cyclists, to achieve safe, even surfaces.

Action – Road Emissions 2

Spelthorne Borough Council and Surrey County Council will continue to work together to identify, prioritise and implement actions to reduce vehicle emissions emanating from county maintained roads within NAQS exceedance locations throughout the borough of Spelthorne.

6.3.2 Implementation of Surrey County Council's Transport Plan within Spelthorne

One of the principal elements of Surrey County Councils transport programme for Spelthorne that has a direct impact on improving air quality within the borough is to "widen travel choice and encourage more journeys by public transport, cycle or walking as a result of enhancing the public transport, cycle and pedestrian network and facilities".

The County Councils objectives to "improve road safety by carrying out local safety schemes, junction improvements and traffic calming" will facilitate the above-mentioned objective.

In 2006, Surrey County Council will publish a revised Local Transport Plan (LTP) that will take forward their transport strategy for the years 2006 to 2011. The revised LTP will integrate the actions detailed within this "Air Quality Strategy Action Plan" that will reduce emissions emanating from Surrey County Council maintained roads.

6.3.2.1 Reduction of Road Traffic Emissions Caused by Travelling to School

A number of incentives have been developed that will result in the reduction of emissions from vehicles transporting children to school. Such incentives include the introduction of 'safe routes to school', 'school travel plans' and 'walking buses'.

Safe Routes to School

"Safe routes to school" projects are designed to encourage more people to walk, cycle or use public transport to travel to school, by making these options safer and easier. Safe routes to schools projects aim to:

1) Help people who already walk, cycle, and use the bus or the train;
2) Have fewer cars making the school trip, by making the other modes of travel more attractive than the car.
3) Avoid accidents and improve skills and confidence in dealing with traffic.

There are four types of activity that when combined can make a successful project in a school:

- Engineering works - to create a safer and more convenient travelling environment;
- Education and training – to improve people's skills and confidence;
- Marketing and Communications – to encourage people to use more sustainable forms of transport and to create a dialogue between service providers and users,
- Data Collection – to quantify impact and provide attitudinal information. At any one school, there is a mix of these measures that will realise maximum potential. Doing this is usually an ongoing process as opportunities emerge through dialogue. In this way, detailed participation is proving to be the lifeblood of SRS projects both in Surrey and in the whole country generally.

Safe Routes to School within Spelthorne

Surrey County Council established the nation's first countywide "Safe Routes to Schools" project. Safe Routes to School (SRS) projects have been undertaken in Spelthorne for the past 3 years. Due to the large number of schools in the Sunbury area, this work commenced in Sunbury in 2001. The work will progress through the borough area by area with the engineered aspects due for completion in 2006.

These works form part of a larger strategy for ensuring safe routes to schools throughout Spelthorne. An overview of this strategy is given in table 6.7 below.

Table 6.7: Safe Route to School Programme 2000/2006

	2000	2001	2002	2003	2004	2005	2006
Data Collection							
'Before' surveys	Sunbury			Ashford	Staines	Stanwell	
'After' surveys					Sunbury	Ashford	
Engineering							
Highways phase 1		Sunbury phase 1		Ashford phase 1			
					Staines phase 1		
						Stanwell phase 1	
Highways phase 2				Sunbury phase 2		Ashford phase 2	Staines phase 2
Highways phase 3 - cycle parking						Sunbury phase 3	Ashford phase 3
Marketing & Communications							
Survey feedback				Ashford autumn		Staines, Sunbury	Ashford, Stanwell
Borough newsletter					Spring		
County newsletter				October			
School travel plans:							
Recruit interested schools				Sunbury, Ashford			
Schools sign up to site specific advise scheme				Sunbury, Ashford			
Individual school programmes produced through working groups				Sunbury, Ashford			
Promotions and events							
Golden Boot Challenge				Five schools			
Initiatives emerging from STP's				Ongoing			
Education and Training							
Ongoing programme			Ongoing				
Programme tailored to fit engineering and promotion timetable				Chertsey Rd, Nursery Rd, Squires Bridge Rd	Woodthorpe Road		

Funding for SRS schemes is provided for as part of the Local Transport Plan on an annual basis (the 2003/04 allocation was £171,246). This funding has been allocated to two main schemes (Nursery Road and Squires Bridge Road) and a number of other smaller projects have been identified for work in 2003 and 2004 SRS schemes programme. Works incorporated within the 2003/2004 programme include:

- Nursery Road traffic-calming construction (£58,000);
- Squires Bridge Road - puffin construction (£35,000);

- Chertsey Road, Sunbury - puffin construction;
- Green Lane, Shepperton – pelican adaptations;
- Woodthorpe Road - puffin construction;

> Action – Road Emissions 3
>
> Surrey County Council will continue to work with Spelthorne's schools for the development and implementation of safer routes to schools program.

School Travel Plans

A "School Travel Plan" is a document containing a series of practical steps for improving children's safety on the school journey. The plan has benefits for both the individual school and the wider community. It aims to reduce dangers, ease congestion, improve health and promote the use of alternative transport.

Schools within Spelthorne will be actively encouraged to develop School Travel Plans. Work on school travel plans will commence with the Sunbury schools, where works have been recently completed or are to be completed shortly and selected Ashford schools. Government assistance may be available for this in the short-term, but in the longer term, Surrey County Council's Local Transportation Services in Surrey have allocated dedicated resources to provide for 1 full-time equivalent post for an officer to cover the School Travel, Travel Plan, and Mobility Management projects.

> Action – Road Emissions 4
>
> Surrey County Council will continue to work with Spelthorne's schools for the development, implementation and the annual review of School Travel Plans.

Walking Buses

Walking buses are a simple but effective idea for families who live up to 1 mile from school. Walking buses not only improve air quality and traffic congestion, it also improve children's health through regular exercise, making them more alert in class, and provides a valuable social opportunity.

> Action – Road Emissions 5
>
> Surrey County Council will continue their work to help schools in Spelthorne organise "Walking Buses".

Parents organise themselves on a rota basis to walk their children to school, collecting other children on the way. Adults and children wear fluorescent and reflective tabards so that the walking bus can be easily identified and seen by drivers.

Cycling Proficiency and Cycle Skills training

Surrey County Council's Road Safety Officers regularly arranges cycling proficiency and cycle skills within schools for school children. This work will continue as part of Surrey County Council's work.

> Action – Road Emissions 6
>
> Surrey County Council will continue their work to help schools teach pupils cycling proficiency training and cycle skills.

6.3.2.2 General Actions for the reduction of Emissions from Road Vehicles on County Council Controlled Roads in Spelthorne

Vehicle Activated Signs

Vehicle Activated Signs (VAS) has been developed to address the problem of inappropriate speed where conventional signing has not been effective.

VAS are to be introduced on roads within the borough of Spelthorne where traffic calming may not be appropriate, such as classified roads or roads within conservation areas and have been erected to encourage drivers to comply with the speed limit. Drivers exceeding a set threshold speed trigger the VAS, which warns the driver they are travelling at an inappropriate speed, or of a hazard, or that they may be in the vicinity of a school.

While new road signs and changes to the road layout have an initial effect on traffic speeds. However, after a period of time regular users of a road become familiar with the new layout and tend to increase their speeds. For this reason Spelthorne local Transportation Service has devised a programme whereby the roads on the rolling program undergo the following changes:

- The road is without any speed indicators
- Posters are erected along the length of the road
- The road is without any speed indicators
- VAS are erected
- The roads on the programme have been selected for the following reasons:
- Classified roads with high accident rates but on which traffic calming would be inappropriate.
- Near schools
- Requests from the public

> Action – Road Emissions 7
>
> Surrey County Council will install Vehicle Activated Signs to control road traffic speeds at appropriate locations within Spelthorne.

Variable Message Signs

To allow choice of travel modes people need information on the alternatives available. There are now a variety of transport schemes available, information systems should stimulate interest and demand, and increase awareness of the opportunities. Travel information needs to be up-to-date and reliable.

Surrey County Council's Network Management and Information Centre (NMIC) in Leatherhead are currently exploring the use of variable message signs to:

- To advise travellers on issues such as journey time, availability of parking spaces and actual air quality, all of which could be coordinated from the NMIC.
- Make bus timetable information and "real time passenger information" available at bus stops, on the Internet, and also accessible by text messaging. This is part of the "real-time passenger information" project in which bus stops are being provided with the ability to tell those waiting at them when the next bus will arrive. It does this using satellite technology connected to the bus. The signals counting down its arrival are coming from the bus, and not from a theoretical timetable. This information would also be available on NMIC website and also to people telephoning the NMIC contact centre, and eventually (hopeful) through "short messaging service" (SMS) technology used by mobile phones. All of this supports our aim to enable more people to get out of their cars and on to reliable buses, easing Surrey's significant traffic congestion problems.
- SCC are exploring the possibility of connecting real time air quality monitoring equipment through the common database at the NMIC and then distributing this information to roadside VMS in Spelthorne. This would give the public up to date information on current air quality and hence promote the modal shift that is aimed at.

Action – Road Emissions 8

Surrey County Council will investigate the feasibility of installing Variable Message Signs to provide travel advice information at appropriate locations in and around the borough of Spelthorne.

Traffic Management

The new Traffic Manager for SCC has a brief to 'keep traffic moving' with respect to reducing delays from roadworks and other both planned and unplanned events. This is particularly important with regards to reducing the amount of standing traffic, especially in the Sunbury Cross area.

Decriminalised Parking Enforcement

Decriminalised Parking Enforcement (DPE) is the means by which enforcement of all waiting and loading restrictions becomes a civil offence, thereby enforceable by the Local Authority, or its contractor.
Spelthorne Borough Council is a member of Surrey's DPE working party, the aim of which is to achieve "Effective enforcement of parking restrictions, leading to better traffic management, reduced congestion, improved road safety, fairer distribution of available parking spaces, elimination of obstruction on narrow roads, better management and appropriate distribution of commuter / shopper parking."

It is intended that parking enforcement becomes self-financing across the county as a whole. Surrey County Council will pay for all DPE start up costs, with the exception of existing plans, such as those planned by Spelthorne Borough Council for its car park services, these will be identified as a contribution towards the costs. Where there are no such plans, Surrey County Council will cover all costs. Surrey County Council has agreed to underwrite any losses over the first 5 years. Any surplus will be held by Surrey County Council, which will consider its use. To enable DPE to be self-financing by year 5, Spelthorne Borough Council shall identify gap-closing measures by the end of the first year of operation, as a decision has to be made by the end of the second year whether to continue the Agency agreement or not (by either party).

Action – Road Emissions 9

Spelthorne Borough Council will work in partnership with Surrey County Council for the implementation of decriminalised parking enforcement within the borough of Spelthorne.

As part of its work in establishing DPE within Spelthorne, information explaining the DPE scheme will be given to borough residents through the Council's Borough Bulletin.

Action – Road Emissions 10

Spelthorne Borough Council will publicise the establishment of DPE within the borough of Spelthorne.

Controlled parking zones

Controlled parking zones (CPZs) (also known as a "Permitted Parking Areas") are areas where all on-street parking is controlled. This helps keep roads free from dangerous parking and give priority to residents and local businesses, who must display parking permit or voucher.

Designated parking bays are shown by white road markings and the remainder of the kerbside is subject to parking restrictions. There are signs at the entry roads to all CPZs stating the hours during which the

Action – Road Emissions 11

Spelthorne Borough Council will investigate the feasibility of establishing CPZ at various locations in the borough.

controls and yellow line restrictions are operational. Visitors parking in the bays during these hours must use the pay and display machines as traffic wardens monitor the controlled parking zones.

Once the DPE has been established. Spelthorne Borough Council will look at the feasibility of establishing CPZ's and additional restrictions at various locations in the borough.

Freight Quality Partnership

Surrey County Council are to conduct a feasibility study into the development of a lorry routing strategy. The principal objectives are:

- To investigate the movement of HGVs inside the M25 orbital motorway in the area between the M3/ A308/ A309 and the A3. The area under consideration is mainly contained within the Surrey boroughs of Spelthorne and Elmbridge, either side of the Thames at Walton. The study boundary does extend further to include the M25 to the west and south and the A308 north and eastwards into Richmond and Kingston;
- Medium term practical action plan as to the development of an HGV routeing strategy and other measures for the area and advise on a likely programme of measures for implementing the strategy; and
- Other recommendations as to how the work could be developed further taking into account the eventual implementation of the new bridge at Walton.

The feasibility study shall include;

- Liaison with Local Authority stakeholders to identify optimum locations for investigations;
- 3 specialised goods vehicle counts;
- Analysis of information including traffic count details from current bi-annual counts; and
- Development of recommendations.

The purpose of the specialised vehicle counts is to observe traffic on a length of road or at a junction and assess the age, vehicle size and type, direction of travel and industry category of the commercial vehicles that are using the transport infrastructure. This in depth knowledge of traffic type can help planners make informed decisions, develop ideas or provide information for further study or analysis. The analysis can provide a good indication of the main industries generating commercial traffic in the area and the destinations attracting large volumes of lorries. A proportion of company names and contact details are also recorded and this can help with discussions with relevant stakeholders in local industry.

When summarised, this information can later be related to the Euro engine emission standards and the contribution of light commercial traffic and buses can be more accurately modelled. The output of this quantitative process offers the potential not only for more accurate modelling of the impact of goods vehicles but also offers an insight into the ways in which goods vehicle emissions can be reduced. The information will also be compared to

our national database of vehicle types and nature of freight. The information will also be combined with the bi-annual traffic surveys.

Other issues that will be considered include:

- M25 and possible rat-running through the area;
- Industrial development around Heathrow airport;
- The redevelopment of Walton Town Centre;
- Replacement bridge over the Thames at Walton on Thames;
- Understanding of freight issues in preparation for the Walton bridge Public Inquiry; and
- Tesco at Brooklands have distribution centres in the area in Weybridge.
- Effect of a weight limit on Walton Bridge for over 17tonnes vehicles in light of new information

The logistics planning process for the area will also be considered including the supply chain descriptions and trends where evidence is uncovered.

Action – Road Emissions 12

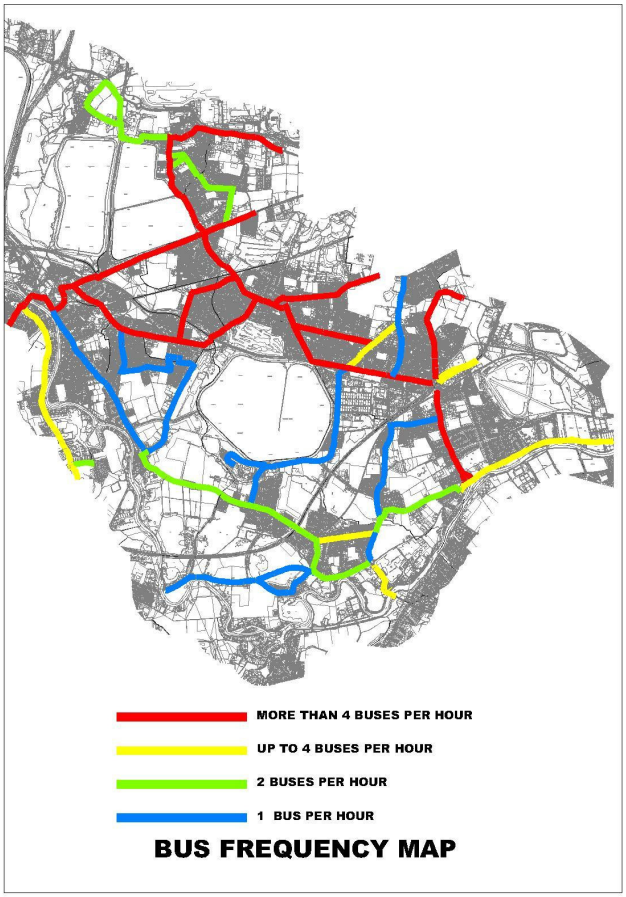
Carry out a feasibility study into the development of a lorry routing strategy.

Public Transport Integration

Improvement and integration of passenger transport systems are central to the success of Surrey's (and thus Spelthorne's) local transport plan target for reducing car dependency, which in turn will reduce emissions of air pollutants from road transport.

Spelthorne is well placed in terms of being able to exploit public transport systems as a means of reducing car dependency. Spelthorne has 5 railway stations offering direct and regular services between London Waterloo and Reading, Weybridge and Windsor.

Spelthorne's bus routing is widely distributed across the borough providing good network coverage to



most areas of the borough, in addition to neighbouring boroughs and London. About 1/3rd of the network is served by routes having more than 4 buses per hour during core hours (7am - 7pm). In most instances bus routes are integrated with train stations throughout the borough: -

- Staines train station is serviced by 4 regular and 4 restricted bus services. In addition to the buses calling directly to the train station, Staines bus garage is within a 5-minute walk. The bus garage supports 706 bus movements each working day, accessing various parts of the borough via 17 regular and 8 restricted bus routes.
- Sunbury train station is supported by 436 bus movements each working day during core hours (7am - 7pm). These buses access various parts of the borough via 7 regular and 6 restricted bus routes. Five of these bus services (all regular) call directly at the train station, the other bus routes are all accessible within a 5 to 10 minute walk of the station.
- Ashford train station is accessed by 5 regular services and 1 restricted bus service. In addition to those buses calling directly to the train station, there are 4 other regular service and 1 restricted service bus routes within 5 to 10 minute walk of the station.
- Shepperton train station is accessed by 6 regular and 2 restricted bus services.

Action – Road Emissions 13

To promote integrated public transport as a good alternative form of transport to the car and improve facilities at bus stops within Spelthorne.

Action – Road Emissions 14

To promote bus travel as a good alternative form of transport to the car and improve facilities at bus stops within Spelthorne.

Emissions from buses

Emissions from buses account for 17% of all ground-level NOx emitted by road vehicles in Spelthorne. In terms of actual emission levels, this is a relatively small amount, although it is anticipated that this will increase as the number of buses on Spelthorne's road rise. However, ensuring that buses having the lowest emissions operate bus-routes within the Spelthorne area can offset this. For that reason, whilst working to enhance and improve public transport, bus companies will be encouraged to use the lowest emission buses on bus-routes along critical corridors within the Spelthorne area.

Action – Road Emissions 15

Buses operating along critical corridors within the borough of Spelthorne will be encouraged to have Euro III compliant engines.

Weekend Nightbus Service

Spelthorne Borough Council in partnership with Surrey Police and other stakeholders have established a nightbus service that operates on Friday and Saturday nights. Two routes have been set up, both of which originating from Staines town centre:

- **Service N100:** Departs from Staines (Blue Anchor) at 2230, 0050 & 0210, stopping at Egham, Royal Holloway College, Virginia Water, Addlestone, Chertsey & Pooley Green as required by those boarding at Staines.
- **Service N200:** Departs from Staines (Blue Anchor & Post Office) at 0010, 0130 & 0250 stopping at Stanwell, Ashford, Sunbury Cross, Upper Halliford, Shepperton & Laleham as required by those boarding at Staines. The departure at 0250 also serves Feltham on request.

The cost to travel is £2.00 per person. Further information is available from Centra (telephone number 0208 569 6901 or 01932 859250.

Bus infrastructure and Quality Partnerships

The 555/6/7 bus route carries a million passengers annually through the borough on the Heathrow route. A bus priority study has identified a number of improvements that will aid bus services through congestion trouble spots, reducing bus journey times and improving the reliability of the service. The improvements identified include:

Action – Road Emissions 16

Bus prioritised infrastructures will be installed at strategic locations within Spelthorne.

- Bus priority at traffic signals ~ seven key traffic signals along the route have recently been fitted with equipment that gives buses priority.
- The provision of a bus lane along Staines Road West (A308) and one on Walton Bridge Road
- The provision of raised kerbs to complement the low-floor buses and improve lighting and surfacing around bus stops to make them safer.
- Parking restrictions.

Cycle Routes

Increasing the number of journeys undertaken by cycle will play a direct part in achieving Surrey's Local Transport Plan (LTP) modal share targets and will contribute to the overall vision on sustainable transport, especially the environment (air quality) and accessibility objectives. Census and travel diary information shows around 2% of all journeys are made by cycle in Surrey.

Analysis has been made of the main current deterrents to cycling in Surrey and considers what opportunities there are to overcome these and so increase the proportion of people who cycle. Most journeys are less than five miles, which makes it physically possible for the

target for increased cycling to be reached, provided improvements could be made in the quality of the journey and the facilities at the cyclist's destination. Equally crucial is improved safety; Surrey's cycling strategy dovetails with that on road safety in seeking a dramatic fall in the risk per kilometre cycled, so that cycling levels can rise while casualties fall. The strategy also involves close liaison with the school travel, passenger transport and travel awareness topic strategies. The main actions identified for they cycling strategy throughout Surrey include:

- To implement at least 1,000 kilometres of new cycle facilities within five years, roughly tripling the current 470 kilometres of on or off-road cycle network.
- To give more priority to facilities that improve journey times for cyclists.
- To continue developing local co-operative working through district cycle forums.
- To increase the levels of cycling skills and confidence in Surrey's population.
- To complete sections of the SUSTRANS National Cycle Network in Surrey, and create links to other parts of the county and to adjoining authorities.
- Take action on cycle parking at rail and bus stations, and carriage of cycles on trains in ways that complement the Council's aim of greater passenger transport patronage.
- Establish cycle monitoring cordons for all districts in the county to collect detailed local information that will supplement countywide travel diary data.
- Include cycling in Company Travel Plans and School Travel Plans.
- Integrate the needs of cyclists into the town centre pedestrian access project, so that shared opportunities for vulnerable road users can be maximised and the points of conflict minimised.

Action – Road Emissions 17

Increase the number of journeys made by cycle from 2% to 4% above 2001 base level.

Walton Lane in Shepperton is mostly one way and used by cyclists travelling in both directions, bringing them into possible conflict with vehicles. A new segregated cycle lane is to be introduced at the section of the road where cyclists are most at risk, on a widened footway, with the cycle lane continuing on the carriageway to Walton Bridge Road.

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Introduce a linked, segregated cycle land between Chertsey Bridge and Walton Bridge Road.

Surrey Cycle Guides

Surrey County Council will produce a series of Cycle Guides that will detail all

Action – Road Emissions 19

Surrey County Council will produce a series of Cycle Guides that will detail all the cycle routes throughout Surrey.

the cycle routes throughout Surrey. The guides will be made available, free of charge, from local libraries, cycle shops, district councils and from Surrey County Council direct.

River Thames Passenger Ferry

A regular ferry service is provided across the River Thames from at Ferry Lane on Shepperton bank of the Thames, to Thames Street on the Weybridge bank of the Thames. The ferry will operate on request of passengers arriving on either side of the riverbank at the times shown below.

Mondays to Fridays
0800 to 1730 (running every 15 minutes)
Saturdays
0900 to 1730 (running every 15 minutes)
Sundays
1000 to 1730 (running every 15 minutes)

Nauticalia Ferry operates the ferry in partnership with the Environment Agency, the Countryside Commission and Spelthorne and Elmbridge Borough Councils. Further information can be obtained by telephoning Nauticalia Ferry on 01932-254844.

6.4 Actions to reduce NO_x Emissions Caused by Road Vehicles in General

Motor vehicle engines emit many types of pollutants including nitrogen oxides (NO_x), volatile organic compounds (VOC's), carbon monoxide (CO), carbon dioxide (CO_2), particulates (PM's), and sulphur dioxide (SO_2).

A number of factors affect the volume of pollutants emitted. Such factors include the engine energy efficiency, the type of fuel, speed (engines are inefficient at low speeds and during idling), volume of traffic using route, route congestion, and the traffic components using the route, for example the number of heavy goods vehicles.

6.4.1 Cleaner Technology

In general, diesel cars are cleaner than petrol cars without catalysts for all pollutants except particulates. Diesel cars have very different emission characteristics, by comparison with catalyst cars, diesels engines emit less carbon monoxide, hydrocarbon and carbon dioxide, but emit higher levels of nitrogen oxides and particulates. Diesel cars have greater fuel economy and reduced maintenance requirements. However, an increase in diesel cars at the expense of petrol cars could have important implications on urban air quality, smog formation, global warming and other environmental issues.

Petrol cars with catalysts produce higher levels of carbon monoxide and hydrocarbon than diesel cars, although exhaust emissions of NO_x and particulates are much lower than diesel cars. This is due to the carbon monoxide and oxides of nitrogen being converted to less harmful substances (water, nitrogen and carbon dioxide) when exhaust gasses pass through the catalyst. Catalysts are also effective for hydrocarbons, aldehydes and carbon monoxide.

When petrol cars without catalysts are compared to petrol cars with catalysts, catalyst cars have much lower carbon monoxide, hydrocarbon and oxides of nitrogen emissions, but higher carbon dioxide emissions due to the oxidation of carbon monoxide.

Alternatively fuelled vehicles that produce fewer emissions can make an important contribution to reducing air pollution in urban areas. Many new vehicles are being produced which are dual fuelled so they can run on petrol and gas. Electric vehicles, which are becoming more widely available, produce no emissions at point of use, and while they have a limited range they are ideal for short trips around towns and cities.

Funding Programmes for Cleaner Vehicles

Government provides funding to the Energy Savings Trust's Transport Action programmes "Powershift" and "CleanUp", which are complementary programmes. Powershift aims to create a sustainable market in the UK for new, mainly small vehicles (cars and vans) that run on clean fuels. CleanUp focuses on reducing the emissions of larger diesel vehicles over 3.5 tonnes (such as lorries, buses, emergency vehicles and refuse trucks) and black cabs, either by converting their engines to run on natural gas or by fitting emissions reduction equipment such as particulate traps to the exhausts of diesel vehicles.

- The Powershift programme was originally launched in 1996, and will continue until self-sustaining clean fuel vehicle markets have been established. For the 3-year period 2001 to 2004, Powershift's budget is £33m. Powershift has helped to increase the number of cleaner vehicles on the road. There are now over 750 Compressed Natural Gas vehicles and around 20,000 Liquid Petroleum Gas vehicles registered in Britain. The program makes provision for grant funding for vehicles having engines that have been produced to Euro II, Euro III or Euro IV emissions standards. For passenger cars and car-derived vans, this means that most vehicles manufactured since January 1997 might be eligible. For larger vans most vehicles manufactured since January 1998 might be eligible. One condition of grant funding is that vehicle must be included on the 'PowerShift Register'.
- The CleanUp programme aims to improve air quality in the UK by encouraging the fitting of emissions reduction equipment to the most polluting diesel vehicles. The programme commenced in 2000, and money has been guaranteed until, at least April 2004. Over 1,700 vehicles have been fitted with emissions reduction technology to date through direct funding by the CleanUp programme. Grant assistance is available for reducing the emissions of larger diesel vehicles over 3.5 tonnes (such as lorries, buses, emergency vehicles and refuse trucks) and black cabs, either by converting their engines to run on road fuel gas or by fitting emissions reduction equipment such as particulate traps or oxidation catalysts to the vehicle exhausts. CleanUp also supports the replacement of older diesel engines with newer, cleaner engines (called 'repowering').

6.4.2 Cleaner Fuels

To replace pollutant fuels (petrol and diesel), cleaner alternative fuels are continually being developed and produced to a higher specification with the specific aim of reducing emissions from vehicles using them.

- City diesel is a petroleum-based lower emission diesel. Exhaust emissions from vehicles fuelled with city diesel compare favourably with exhaust emissions from equivalent vehicles fuelled with conventional diesel. The main benefit of city diesel is that its combustion reduces particulate emissions by 34 - 84% depending on engine type and type of particulate measured. An additional benefit of city diesel is that it is a low sulphur fuel, which is necessary for the optimum running of oxidation catalytic converters.
- Low benzene petrol (trade name) has less benzene than conventional petrol.
- Liquid petroleum gas (LPG) is cleaner than petrol or diesel. It is suitable for vans and light goods vehicles. While LPG is 25% less efficient than conventional fuels, it's about 30% cheaper and much cleaner in terms of producing far less emissions when compared to petrol or diesel. For light goods vehicles emissions are reduced by in excess of 20% for carbon monoxide, 30% for oxides of nitrogen, and by over 40% for hydrocarbons. Where used in heavy goods vehicles, the reductions are much greater; carbon monoxide emissions are reduced by over 90%, hydrocarbons by over 80% and oxides of nitrogen by over 60%. There are virtually no particle emissions from LPG engines.
- Compressed natural gas (CNG) is also cleaner than petrol or diesel, and is suitable for heavy goods vehicles due to the size of tank required to hold the fuel. By comparison with diesel, heavy goods vehicles running on CNG produce 50% less carbon monoxide, 85% less oxides of nitrogen, and nearly 70% less particle emissions. CNG reduces emissions

of other pollutants such as hydrocarbons and sulphur dioxide.

- Hydrogen can be used to power fuel cells using catalytic energy release. It is the cleanest of all the alternative fuels since it produces only water as a by-product. Fuel cells are still at the prototype stage and are extremely expensive to produce, although there is a great deal of research currently focused on fuel cell technology, in particular, how this technology can be mass produced at a cost which is reasonable to the consumer.

Financial Relief for Cleaner Fuel Use

Vehicle Excise Duty (VED) is graduated for all new cars from March 2001 and a company car tax relief system, with discounted rates are given for cars that run on cleaner, alternative fuels. In 1999, VED for buses and lorries meeting stringent particle emission standards was cut by up to £500 to encourage bus and lorry operators to use cleaner vehicles. Older vehicles are able to meet the tighter standards by retrofitting the vehicle with a particulate trap, or a new engine of a higher standard, or converting to gas. So far, over 40,000 vehicles have qualified for this concession. In 2001 a VED cut introduced for HGV's, bringing UK rates down to among the lowest in Europe for the cleanest lorries. Plans have been announced for the introduction of new lower VED rates for lorries meeting latest Euro-IV standards from around 2004 ($_{LAQM.G3(00)}$).

6.4.3 Spelthorne's Plan to Encouraging use of cleaner vehicles

One of the principle means of encouraging vehicle owners and drivers to use cleaner fuels is to increase their availability. At this present time there are currently no commercial filling stations for LPG in the borough, accordingly the Spelthorne Borough Council will encourage all petrol companies that have stations in the Borough to supply LPG, and any new developments to consider the installation of LPG filling facilities where appropriate.

As previously stated, electric vehicles produce no emissions at their point of use and are ideally suited to people and businesses that mainly drive locally. As electric vehicles only have a range of about 60 miles before the need for recharging, it is important to ensure that there are sufficient charging points available throughout the borough to allow charging. Spelthorne Borough Council will encourage local companies to use electric vehicles and make provision for the installation of recharging points within their premises. In addition, the Spelthorne Borough Council will encourage new developments, were appropriate, to make provision for recharging points.

> Action – Road Emissions 20
>
> Spelthorne Borough Council will promote the use of "cleaner technology and fuels" within Spelthorne.

6.4.4 Business Travel Plans - Local businesses

Spelthorne Borough Council in association with Surrey County Council will actively encourage and promote the implementation of Business Travel Plans by local businesses. This will be through direct contact with local businesses, and through representatives of local businesses, such as Spelthorne's Chamber of Commerce and Staines Town Centre Management.

Communication with local businesses will be through meetings, mail shots, and newsletters. Such opportunities will be used to inform businesses of the environmental impact of vehicle fleets, the need for improvements in emissions, and availability of funding through the Energy Savings Trust's Transport Action programs and the reduced Vehicle Excise Duty for cleaner vehicles.

Action – Road Emissions 21

Spelthorne Borough Council in association with Surrey County Council will promote the development and implementation of "business travel plans" by companies located within the borough of Spelthorne.

6.5 Reducing emissions from the Council's Activities

6.5.1 Spelthorne's Business Transport Plan (SBTP)

The Council agreed Spelthorne's Transport Plan in February 1999. The Plan sets the framework by which we can all manage our travel needs - getting to work and at work - in a more efficient and environmentally friendly way. It seeks to reduce car dependency and facilitate transport choice by encouraging alternatives to car use along with changes in working arrangements. The vision of the SBTP is to:

- Reduce congestion, pollution, the number of accidents, and staff stress;
- Work more efficiently;
- Improve the motivation of people at work; and
- Build a healthier environment and a more successful economy for all.

The Spelthorne Borough Council is committed to a Company Transport Plan for the Council and its employees. The general principles of Spelthorne's Company Transport Plan have been endorsed by UNISON on behalf of staff and agreed by the Council in February 1999. It is acknowledged that such a Plan can only be successful if supported by everyone at all levels throughout the organisation. The aims of the Plan are "*to manage the travel needs of our staff in a more effective and environmentally friendly way*", by:

- Promoting the use of alternatives to car travel either by different modes of travel or by different ways of working.
- Reducing car journeys to work and work related car usage by staff by 20% in 2 years and 30% in 5 years.
- Setting an example to other employers in the area and encourage them to adopt similar plans.
- To make staff aware of the challenges and encourage them to consider their means of transport getting to their workplace and carrying out their duties.

There are 3 main strands to the approach adopted: (i) Working arrangements; (ii) Promoting alternatives to car travel; and (iii) Promoting less car use.

Working Arrangements

There is scope to influence the number of journeys to work and the time of day at which they are made. For example:

(i) Make changes to the flexitime system - by extending the flexible working hours with an earlier start and later finish time (7.30am to 7.30pm) and removal of core hours. This would encourage travel to work at less congested times of day. Allowing staff to take two flexi days per four-week period and an increased maximum carry over of hours per period could lead to less travel days per year.

(ii) Consider Home Working Arrangements - current technology enables people to work from home, where previously this was not possible. Not all posts lend themselves to home working; nevertheless there are a number of posts where a certain amount of work can be done from home without detriment to either the standard of work or service to the customer. A separate policy on eligibility for home working will be produced to complement this plan.

(iii) Make better use of all of our accommodation - although the Borough Council has accommodation around Spelthorne, staff based at Knowle Green need to return here for administrative purposes. Greater use will be made of all Borough Council accommodation and new technology so as to reduce the need to travel to and from Knowle Green through improved communication.

Pilots for (i) and (ii) above were introduced in 1999 as a way of assessing the strengths.

Promoting Alternatives to Car Travel to Work

Most staff travel to their work place by car (even though about half of staff live in the Borough or have journeys less than 4 miles from their workplace). As a means of promoting alternatives to car travel the Council will

- Provide interest-free season ticket loans - it is already Council policy to provide these, but the scheme will be more widely promoted;
- Provide bus and train information - to ensure accurate travel information is available;
- Encourage cycling - In the past, little encouragement has been given to people to cycle to work by the Borough Council. The provision of good quality cycle storage, showers / changing rooms and interest-free loans for purchase of cycles (coupled with negotiated discounts for purchase from local suppliers) will be evaluated in the light of cost and likely usage. Depending on the outcome, a campaign to promote cycling will be launched;
- Promote walking - many work journeys are less than a mile and can easily be made on foot.

Promoting less Car Use

The Council accepts that some members of staff do need to travel to work by car or use a car for their work. However, there is still scope to reduce the amount of car usage. Measures include:

- Reviewing the car leasing scheme to make it more environmentally friendly, including a financial incentive to staff to reduce the size of car, offering a travelling allowance to staff as an alternative to car leasing;
- Reviewing the car allowance scheme to discourage high mileage;
- Reviewing working arrangements to consider work practices such as reporting in to the Knowle Green office first thing in the morning, after lunch and in the evening; use of modern equipment. Some journeys would be unnecessary as well as leading to a more efficient and quicker service for the customer;

- Introducing a car sharing system through a register for those interested plus a guarantee of a lift home to anyone let down by a car share arrangement or who needs to make an emergency trip home, amending the current home relocation scheme to reduce length of journeys into work (reduce present 30 mile radius to 20 miles);
- Phasing out the lunchtime car-parking pass in Staines;
- Other initiatives that could be looked at in the light of any Central Government measures could include (a) car-park charging at the place of work, and
  (b) departmental targets for reduction of car mileage

The Future

It is hoped that other initiatives will be forthcoming, subject to further consultation with staff and negotiation with Unison as appropriate. A taskforce has been set up to look at further initiatives as well as promoting the current Plan. This plan will be reviewed in the light of experience gained through the implementation of the various pilots, increased awareness and any further Central Government measures, and no later than 12 months after the implementation of this policy.

Action – Reducing emissions from the Council's Activities 1

Spelthorne Borough Council will continue to seek to reduce car dependency and facilitate transport choice by encouraging alternatives to car use along with changes in working arrangements.

Action – Reducing emissions from the Council's Activities 2

Spelthorne Borough Council will review its Business Travel Plan within 12 months.

6.5.2 Reducing Emissions from Spelthorne Fleet Vehicles

The Spelthorne Borough Council operates a diverse range of vehicles in the performance of its activities; these range from small vans, trucks through to refuse collection vehicles and road sweepers. The current Council fleet contains a large number of vehicles that are pre-Euro I, and Euro I emission standards. The Council has provided for the reduction of emissions by ensuring that vehicles using cleaner fuels will progressively replace the fleet, and where appropriate and cost effective, the use of alternatively fuelled vehicles will be considered.

Table 6.8: Spelthorne Borough Council's Fleet Vehicles

Total No	Vehicle Type	Breakdown		
		No	Fuel Type*	Standard
7	Refuse Collection (LGV's)	3	Diesel	Pre-Euro
		4	Diesel	Euro II
15	Street Cleansing	4	Diesel	Pre-Euro
		9	Diesel	Euro II
		2	Diesel	N/A
3	Citroen Berlingo Van	3	Diesel	Euro II
1	Vauxhall Movano Van	1	Diesel	Euro II
1	Volvo Whale Tanker	1	Diesel	Euro II
5	Citroen Dispatch Chefmobil	5	Diesel	Euro II
2	Vauxhall Novas	2	Petrol	Pre-Euro
1	Ford Fiesta	1	Petrol	Euro I
7	Ford Transit 190D	1	Diesel	Pre-Euro
	(16 seat bus)	2	Diesel	Euro I
		4	Petrol	Pre-Euro
2	Renault Master T35D	1	Diesel	Euro I
	(16 seat bus)	1	Diesel	Euro II
1	LDV 400 Convoy D	1	Diesel	Euro I
	(16 seat bus)			
2	Volkswagen 31	2	Petrol	Pre-Euro
	(16 seat bus)			
1	Leyland DAF 400 D	1	Diesel	Pre-Euro
	(16 seat bus)			
1	Ford Transit 190 2.5 D	1	Diesel	Pre-Euro
1	Vauxhall Combo Van 1.7	1	Petrol/LPG	
	(duel Fuel)			
	* All diesel vehicles are run on ultra low sulphur diesel			

The environmental performance of the fleet will be one of the criteria used to evaluate future tenders. All new contracts which will end before 2005 will therefore specify that 50% of the vehicle fleet should meet as a minimum Euro II emission standards with particulate traps fitted. The remaining 50% should meet Euro III emissions or higher. These standards will be reviewed each year. By the end of 2005 all contracts will specify Euro III emissions or higher, since December 2005 is the deadline for meeting the NO_2 objective.

In addition to those vehicles provided by contract, other vehicles operated by the Spelthorne Borough Council will be brought up to the minimum Euro II standard by 2005 by the

retrofitting of emission control devices (both for particulates and gasses). Help with the funding for the retrofits will be sought from the Energy Savings Trust who is able to provide up to 75% of the funding. Once the traps are fitted, the vehicle will also qualify for a reduced pollution certificate and a reduction in the Vehicle Excise Duty.

The Spelthorne Borough Council is considering the replacement of vehicles that are 7 years or older. All new vehicles purchased will be required to meet Euro III emissions as a minimum, additionally, where appropriate, the use of alternatively fuelled vehicles will be considered.

Action – Reducing emissions from the Council's Activities 3

All new fleet vehicles purchased by Spelthorne Borough Council will be meet Euro III emissions as a minimum, additionally, where appropriate, the use of alternatively fuelled vehicles will be considered.

6.6 Actions to reduce NO_2 emissions resulting from activities at Heathrow Airport

Based upon information provided by the Heathrow Airport Emissions Inventory, 11% of the total NO_x emissions from road vehicles are due to traffic flows throughout the borough of Spelthorne known to be associated with activities associated with Heathrow Airport, accounting for 22% of the total NO_x emissions emitted by activities associated with Heathrow Airport.

The remaining 78% of the total NO_x emissions emitted by activities associated with Heathrow Airport are airport related emissions from within Spelthorne only; that is, airborne aircraft and road traffic only. It does not take into account airport related sources outside the borough, such as the 'on-airport' sources such as taxiing, airside vehicles etc. The contribution to the annual average concentrations of NO_x from each road group varies depending on the receptor location considered.

6.6.1 Scenario Modelling: Reduction of 50% in airborne aircraft emissions

The predicted annual average concentrations of NO_x and NO_2 for the scenario of reducing emissions from airborne aircraft by 50% are presented in Tables 6.9 and 6.10, respectively.

Table 6.9: Predicted annual average NO_x concentrations for 50% reduction in airborne aircraft emissions and "do nothing"

	Annual average NO_x concentration (µg/m³)			
	Existing	**Scenario**	**Difference**	**% Reduction**
Yeoveney Close	77.4	76.7	0.7	1
Horton Road	69.8	68.2	1.6	2
Bedfont Road	59.9	55.4	4.5	8
Vicarage Road	67.2	66.2	1.0	1
Shepperton Court Drive	60.6	60.0	0.6	1
London Road	48.6	44.8	3.7	8
Clarence Street	71.5	70.8	0.7	1
Kingston Road	56.0	54.9	1.1	2
Feltham Road	59.7	58.4	1.3	2
Clare Road	49.4	46.9	2.5	5

Table 6.10: Predicted annual average NO_2 concentrations for 50% reduction in airborne aircraft emissions and "do nothing"

	Annual average NO_2 concentration (µg/m³)			
	Existing	**Scenario**	**Difference**	**% Reduction**
Yeoveney Close	**45.0**	**44.7**	0.3	1
Horton Road	**42.4**	**41.7**	0.7	2
Bedfont Road	38.3	37.0	1.3	3
Vicarage Road	**43.1**	**42.8**	0.3	1
Shepperton Court Drive	37.0	36.9	0.2	0
London Road	33.1	31.9	1.2	4
Clarence Street	**40.3**	**40.0**	0.3	1
Kingston Road	38.6	38.3	0.3	1
Feltham Road	**40.0**	39.6	0.5	1
Clare Road	34.1	33.3	0.8	2

The predicted reduction in annual average NO_2 concentrations due to a 50% reduction in airborne aircraft emissions ranges from zero at Shepperton Court Drive to 4% at London Road.

6.6.2 Working in Partnership

While local authorities have no legal powers over aircraft movements, they can enter into agreements with airport operators for the reduction of emissions resulting from airport operations. For this reason a number of groups have become established to facilitate this.

- The "Heathrow Airport Transport Forum" has been established specifically to develop strategies to make surface access to Heathrow Airport more sustainable by improving its integrated public transport systems. A key aim of the forum is to have 40% of passengers arriving and departing by public transport. Members of the airport transport forum include BAA, surrounding local authorities (including Spelthorne), bus, train and airline operators.
- The "Dispersion Modelling of Emissions Arising from Aircraft Operations at Heathrow Airport" steering group has also been established. The main aim of this group is to establish protocols for the modelling and monitoring of emissions emanating from aircraft operations at Heathrow Airport. Members of the group include BAA, surrounding local authorities (including Spelthorne), aircraft operators, aircraft engine manufacturers, academic institutions, DEFRA, and DfT.
- The Heathrow Air Quality Working Team, consisting of BAA's Environment team and the Air Quality Officers of the 4 surrounding local authorities, meet on a regular basis to discuss issues such as the development, review, and implementation of Heathrow Airport's "Air Quality Action Plan"; which is required under a Condition of planning permission granted for Terminal 5 under the Town and Country Planning Act 1990. (Can be viewed on BAA's website at http://www.baa.co.uk).
- In addition to the above-mentioned action plan, BAA must also produce an inventory of all the emissions caused by activities associated with Heathrow Airport. This emissions inventory is reviewed on a regular basis. The 4 surrounding local authorities, as well as BAA, use the emissions inventory in their air quality review and assessment work. Consequently, the content of the Heathrow's emissions inventory is an area of ongoing discussion and work for BAA and the 4 local authorities.

> Action – Heathrow Emissions 1
>
> Spelthorne Borough Council will continue to work to in partnership to minimise the impacts on air quality caused by the activities of Heathrow Airport air.

6.7 Reducing Air Pollution through Land Use Planning

The Government documents 'Planning Policy Statement 23: Planning & Pollution Control', and the 'Local air quality management Guidance (LAQM.G4(00))' states that "the land use planning system is central to improving air quality and minimising the adverse effects of potential pollution on present and future land". When preparing local plans or assessing how a proposed development may affect air quality, Local Planning Authorities, Local Transport Authorities and Pollution Control Authorities are advised to work together to ensure development has a beneficial impact on the environment, taking account of the NAQS objectives, the results of air quality 'review and assessments', and the content of air quality action plans. Where a development is likely to significantly affect air quality such that the NAQS objectives are likely to be exceeded, it does not necessarily follow that the Local Planning Authority should refuse all development proposals within that area. In such instants where practicable, the above-mentioned authorities must work together to secure mitigation measures that would allow the proposal to proceed.

6.7.1 The Local Plan

Each Local Planning Authority must produce a Local Development Framework for its area. This sets out the council's policies and proposals for how land within its area is used and developed over a period of up to 10 years in the future. These plans provide developers and local people with a clear idea of the types of development that would and would not be acceptable in particular parts of their area. Decisions on planning applications and appeals must be made in line with the development plan, unless there are very good reasons to do otherwise.

Government guidance (PPG3) requires local planning authorities to build in ways that "exploit and deliver accessibility by public transport to jobs, education and health facilities, shopping, leisure and local services". PPG3 also requires local authorities to "place the needs of people before ease of traffic movement in designing the layout of residential developments" and to "seek to reduce car dependence by facilitating more walking and cycling, by improving linkages by public transport between housing, jobs, local services and local amenity, and by planning for mixed use". To facilitate this planning policy guidance advises local authorities to make maximum use of the most accessible sites, such as those in town centres and others that are, or will be, close to major transport interchanges. These opportunities may be scarce. They should be pro-active in promoting intensive development in these areas and on such sites.

Spelthorne Borough Council's main planning policy is set out in the Local Plan (www.spelthorne.gov.uk). Policy M1 commits Spelthorne Borough Council to work with Surrey County Council to "use all appropriate measures to manage and control the demand for travel by car in order to secure environmental improvements, improve safety, and reduce congestion and pollution". Policy M1 identifies the mechanism by which this will be achieved as being:-

(a) Encouraging the use of public transport, cycling or walking

(b) Implementing appropriate calming and traffic management measures to contain the use and impact of cars and give positive advantage to other forms of transport

(c) Bringing forward specific schemes to assist public transport

(d) Refusing developments with significant extra movement implications where there is not an overriding need or where a more appropriate location e.g. town centre may reduce the movement implications to an acceptable level. Proposals for development will be encouraged to locate close to public transport facilities.

Action – Land Use Planning 1

Spelthorne Borough Council will ensure that the new Development Framework incorporates planning policy that will not adversely impact air quality, but furthermore, enhance air quality where possible.

While currently there are no policies that deal specifically with air quality, the Local Plan is due to be revised in 2006 and replaced by a new Development Framework, at this time policies in respect of air quality will be enhanced to ensure the continued improvement and protection of air quality.

6.7.3 Supplementary Planning Guidance: A Parking Strategy For Surrey

Surrey has some of the most congested roads in the country. It is difficult to travel around the County not only during peak hours but increasingly off peak as well. Pollution levels are high, and the environment in many town centres is unacceptable due to traffic. Consultations and surveys conducted on behalf of Surrey County Council show this to be a key concern of Surrey residents. The cost of congestion is also a major concern to the business sector.

It is impossible to provide enough road space in Surrey for all the cars that want to use our roads, particularly in town centres. Ways have to be found to discourage the use of the car where possible. Nationally, the Transport White Paper and Planning Policy Guidance (PPG13) on Transport set out a number of initiatives to control the demand for travel. Locally, the County Council has produced a Local Transport Plan, which sets out our own initiatives. These initiatives in particular focus on providing alternatives to the use of the car (see section 6.3.1). Alongside that, one of the main ways of gaining some control over car use is the regulation of parking provision. Surrey County Council has therefore responded to public concerns by developing a parking strategy in conjunction with the Surrey District Councils.

The strategy aims to complement policies to reduce traffic growth by limiting the availability of parking spaces and managing the overall supply to better meet priority uses. In this way, parking management supports policies to promote economic development and support town centres by reducing the levels of congestion. The objectives of the strategy are to:

- Manage travel demand through integrated planning ~ integrate transport and land use at all

levels, so that transport and planning work together to support more sustainable travel choices and forms of development;

- Reduce the need to travel ~ make an effective contribution to reducing unnecessary travel by locating major traffic generators in existing centres where they can be reached without needing a car;
- Introduce restraint-based parking standards ~ avoid the over-provision of parking spaces by the replacement of minimum with maximum parking standards consistent with the restraint of car use and the intensification of development;
- Sustain and enhance the vitality of town centres ~ transport policies should support the prosperity of town centres by providing a balance of good public transport and short stay parking and by reducing congestion;
- Effectively manage the total parking supply ~ parking management plans should include all types of parking and consider short stay priorities, regulation, charging and enforcement.
- Encourages a reduction in workplace parking, particularly by promoting alternatives to the car, for example, through Travel Plans;
- Enables consistent local parking management plans to be developed by Districts through an approach that reflects the diversity of conditions and required solutions;

The parking strategy also meets a number of objectives of the County Council's Common Agenda for Sustainable Development since it addresses longer-term concerns about the growth in congestion and pollution.

The Strategy covers all aspects of parking across Surrey. It provides a framework within which the District Councils are producing their own parking management plans, covering the more detailed issues. Parking management plans form an important element of the implementation of the Local Transport Plan. To do this, the County strategy reviews the current parking standards, and proposes the application of new standards based on four parking area packages. Each area package has different levels of parking provision depending on the type of centre. It is for District Councils to decide where the boundaries of the parking area packages areas should be, based on the criteria set out in the strategy. In some areas, Districts may also decide to amalgamate the third and fourth package into one parking package area where local circumstances suggest this would provide clearer, more defensible boundaries.

The County Council is responsible for matters of overall policy and strategy, which includes the definition of maximum parking standards for new developments. District Councils are responsible for off street parking management within their areas and it is intended that they implement the strategy through the preparation of local parking management plans. It is intended that the strategy will be included as appropriate within Districts' adopted Local Plans.

The implementation and monitoring of the strategy at all levels will be co-ordinated through the County Council's Local Transport Plan and District Council's Local Plans. In preparing local parking management plans, the District Councils will consider where the boundaries of

the parking package areas should lie based on the criteria provided and their local knowledge. They will also consider whether the implementation of the strategy needs to be phased to safeguard the vitality and viability of town centres, and to enable development patterns to reflect potential improvements to public transport services, for example through green travel plans. This phasing could mean that areas are placed in a more generous parking band until public transport or economic improvements allow it to be moved into the next band where less parking is allowed. If local authorities are intending to phase the introduction of the parking standards in this way, a clear review process and associated timetable will be specified.

Further information on the Surrey parking strategy can be found by using the search facility on Surrey County Council's website (http://www.surreycc.gov.uk).

6.7.3.1 Parking Standards in Spelthorne

In 2001, Spelthorne Borough Council produced supplementary planning guidance in support of Policy M8 of the Spelthorne Borough Local Plan 2001. The standards were prepared in consideration of Government guidance in PPG13 (Transport) and RPG9 (Regional Planning Guidance for the South East) and Surrey County Council's parking strategy. They also take account of surveys of parking demand in residential and commercial developments in the Borough. All development proposals with borough of Spelthorne that affect parking provision within existing developments will be considered against these parking standards.

The standards define the maximum acceptable provision for most common forms of development. Provision above this level is not normally permitted, except only in special circumstances and at the discretion of the planning authority. A minimum requirement is not normally imposed unless under-provision would result in road safety implications that cannot be resolved through the introduction or enforcement of on-street parking controls. However, car-parking provision below the maximum standard is required in areas well served by public transport, particularly town centres.

In determining the appropriate scale of reduction on the maximum standard regard is had to:-

- The existing accessibility of the site by non car-based modes of travel;
- Any committed proposals to improve the accessibility of the site by non-car-based modes of travel, including relevant provisions of Business Travel Plans accompanying development proposals;
- The existence of measures to control on-street parking in the vicinity of the site, including measures secured as part of development proposals;
- In the case of business development, the extent of any essential car user requirements necessary for the operation of the business;
- The business standards include specific consideration of development in the commercial area of Staines town centre.

Where improvements in accessibility by non car-based modes, or controls over on-street

parking are necessary to enable a development to go ahead, then development proposals are expected to either contribute to the cost of such improvements, or to incorporate specific improvements into the development.

Further information on the Spelthorne's parking standards can be found by using the search facility on Spelthorne Borough Council's website (http://www.spelthorne.gov.uk).

6.7.2 Local Development Control

In consideration of the above Guidance and that provided within Planning Policy Statement (No. 23) on Pollution Control, the Spelthorne Borough Council, through its function as the Local Planning Authority, will take air quality into account as a material consideration where development may have an adverse impact upon air quality. Therefore, where appropriate, the following measures will used to guard against further deterioration of air quality within the borough that may arise from the impacts of development.

- Where development may have a significant impact on air quality, either due to processes carried out or potential traffic generation, the applicant will be expected to carry out an assessment of the likely impacts.
- Where the assessment shows that there is likely to be a harmful impact on air quality OR that the development could harm attempts to bring about necessary improvements to air quality to meet national standards, developers will be expected to incorporate mitigation measures into the development and demonstrate that the proposed measures will reduce impacts to an acceptable level. Such measures could include controls or modifications to production processes, or measures to reduce traffic generation including support for non-car based modes of travel, business travel plans, and parking restrictions.
- Where it appears to the Council that harmful impacts on air quality cannot be overcome by mitigation measures then the Council may refuse planning permission on air quality grounds.

All applications for development inside AQMA's must be supported by sufficient information to allow a full consideration of their likely impact on local air quality. It is therefore important that developers are aware of the existence of any AQMA's.

In certain circumstances it may be appropriate for the developer to fund mitigation measures elsewhere inside the AQMA to offset any increase in local pollutant emissions as a consequence of the proposed development, or to pay for the purchase of monitoring equipment. Where appropriate, these measures will be introduced through section 106 agreements.

Action – Land Use Planning 2

Spelthorne Borough Council will ensure that the future development of land will not adversely impact on air quality.

6.8 Regulation of Industrial sources

Industrial sources account for 1% of the total NO_x emissions within the borough of Spelthorne.

Since 1990, in order to control the emission of specific pollutants to the environment, certain industrial processes (known as prescribed processes) require an operator's licence before they can be operated. These prescribed processes are regulated under Part I of the Environmental Protection Act, Part I, with the Environment Agency being responsible for the regulation of larger industries (known as Part A processes) and local authorities being responsible for regulating smaller industrial processes (known as Part B processes). At this present time there are 21 'Part B' processes (15 of which are petrol filling stations) and no 'A1 or A2' processes within the Borough.

The regulation of 'prescribed processes' by local authorities and the Environment Agency is progressively being transferred to the provision of the Pollution Prevention and Control Act 1999, bringing the UK in line with European legislation. The introduction of this new legislation within the borough of Spelthorne is unlikely to have any significant impact on the number of industrial processes, or the manner in which they are regulated.

With the advent of the Solvents Emissions Regulations, the release of solvents to the atmosphere is also now controlled. Within the UK the requirements of these new Regulations are largely being implemented through Part 1 of the Environmental Protection Act 1990 and the Pollution Prevention and Control Act 1999.

Action – Industrial Sources 1

The Borough of Spelthorne will continue to ensure that emissions from all 'prescribed processes' remain tightly controlled and regulated in line with National Policy.

6.9 Smoke & Bonfire Control

6.9.1 Smoke Control Areas

Nearly the whole of the borough of Spelthorne is designated as a Smoke Control area. This means that smoke is prohibited from being emitted from chimneys from the burning of coal, wood or other non-authorised fuels on open fires or in unauthorised stoves or boilers.

The Council does from time to time receive complaints about smoke nuisance where coal or wood is burnt on open fireplaces. The Council normally deals with these complaints by informing the perpetrators that their actions are prohibited, and this is normally sufficient to stop the practice. However the Council retains the power to prosecute offenders, and will do so if offences are repeated.

Action – Smoke Emissions 1

The Borough of Spelthorne will continue to ensure that the Smoke Control Areas within the Borough of Spelthorne continue to be enforced.

6.9.2 Bonfires

Spelthorne Borough Council discourages the disposal of green garden waste on bonfires and instead promotes composting and offers free collection of garden waste. Garden waste can also be taken for composting at any of Spelthorne's waste transfer centres. Information about these subjects is made freely available to the public via the Spelthorne's web site and in leaflets available from the Council offices at Knowle Green, or libraries throughout the borough.

Action – Smoke Emissions 2

The Borough of Spelthorne will encourage the recycling of the green waste generated in the borough and discourage the burning of domestic waste as a means of waste disposal.

Enforcement of Statutory Provisions for the Control of Smoke from bonfires

Statutory Nuisance

The Environmental Protection Act 1990 provides that smoke, smell or ash emitted from premises can be a statutory nuisance and action can be taken in this matter. The Council has legal powers to stop bonfires if a statutory nuisance occurs and may even prosecute offenders. However, to be considered a nuisance a bonfire would have to be a regular problem and interfere substantially with a neighbour's well being, or the comfort and enjoyment of their property.

Action – Smoke Emissions 3

Spelthorne Borough Council will enforce against bonfires that are causing a statutory nuisance.

There is no legislation to prohibit domestic bonfires and therefore there is no prescribed time considered appropriate for their use. Spelthorne Borough Council provides the NSCA leaflet 'Good Bonfire Guidelines' with recommendations for appropriate and safe use of bonfires.

Dark Smoke

The Clean Air Act 1993 makes it an offence to emit dark smoke from any trade or industrial premises (including demolition sites and agricultural land). This offence also applies to any material burnt in connection with any industrial or trade process and to the burning of material likely to give rise to dark smoke.

Dark smoke is a shade of grey defined in law and in order for the Council to take action in this matter an authorised council officer would have to witness the offence. However, there are certain limited circumstances where burning material that gives rise to dark smoke would not be regarded as an offence.

Action – Smoke Emissions 4

Where appropriate the Borough of Spelthorne will use its enforcement powers to control dark smoke from bonfires.

Burning of Trade Waste

The Environment Agency use a number of different enforcement powers to control the burning of waste on trade premises.

If a business wishes to dispose or treat any waste material on its premises it must have a Waste Management License issued by the Environment Agency. Exemptions from this licensing system relate to the burning of wood, bark and plant material at the site of production provided fires do not cause persistent problems to neighbours. However, these fires still have to be registered with the Environment Agency and it is an offence not to do so.

If a bonfire at a commercial property located within Spelthorne is reported to the Council, the Council will pass the details of the bonfire to the Environment Agency for their enforcement as appropriate.

Action – Smoke Emissions 5

Bonfires at commercial premises will be passed to the Environment Agency for enforcement purposes.

6.10 Awareness raising, education and public information to promote air pollution issues

Without the engagement of the residents and business communities of Spelthorne this air quality action plan will not succeed, consequently it would not be possible to achieve the NAQS annual objective for NO_2 with the borough of Spelthorne. It is therefore vital that the public are provided with information that will allow them to make informed choices.

Information is currently provided on air pollution matters through the Spelthorne Borough Council's web site (www.spelthorne.gov.uk) and through the provision of leaflets on air quality, health and transport. Spelthorne Borough Council will improve and enhance the provision of air quality and related information through:

- The borough magazine "The Bulletin" is distributed to every household in the Borough. Articles and information about local air quality issues will regularly feature in this magazine. Information reported will include publicising: cleaner fuels and cleaner vehicle technology; air quality campaigns; and the implementation of initiatives designed to improve air quality within the borough of Spelthorne;
- Reporting on Spelthorne's website and in the "Borough Bulletin" analysis of Spelthorne's local air quality trends and a comparison with air quality objectives.
- To promote Surrey County Council's transport carried out within the borough Spelthorne, for example, school and business travel plans.

Action – Raising Awareness and the Provision of Information 1

To raise the public's awareness of initiatives that will improve the quality of air within the borough of Spelthorne.

6.11 Working in Partnership

Spelthorne Borough Council recognises the transboundary nature of air pollution, therefore the Council understands the need to work with its neighbours in order to robust assessments of air quality within the area, and likewise the successfully development, implementation and management of an effective air quality action plan.

6.11.1 Local Authority Partners

The Council is committed to working with its neighbouring boroughs and Surrey County Council for the improvement of local air quality:

- Spelthorne Borough Council participates in the "Surrey Air Quality Group" and the "Surrey Air Quality Sub-Group";
- Spelthorne Borough Council also works with the neighbouring local authorities, Slough Borough Council, the London Borough of Hillingdon, and the London Borough of Hounslow. This work includes working together for the development of consistent and robust air quality review and assessments for the area covered by the 4 local authorities;

> Action – Working in Partnership 1
>
> Spelthorne Borough Council will continue to work, in partnership with its neighbouring boroughs and others for the control of air pollution and continued improvement of air quality.

6.11.2 Non Local Authority Partners

Spelthorne Borough Council also works with a number of other partners to improve local air quality. Two of these, the Highways Agency and Surrey County Council have already been mentioned in the sections above. Others would include the "Heathrow Airport Transport Forum", the steering group for the "Dispersion Modelling of Emissions Arising from Aircraft Operations at Heathrow Airport", and the "Heathrow Air Quality Working Team". Spelthorne Borough Council will continue to work in partnership with these partners,

Spelthorne Borough Council will actively seek opportunities to work with organisations and form new partnerships that will lead to the improvement of air quality within Spelthorne.

> Action – Working in Partnership 2
>
> Spelthorne Borough Council will seek opportunities for effective partnerships for the continued improvement of air quality.

6.12 Proposed Extension of the Air Quality NO_2 Monitoring Strategy

Following on from the Stage 4 Review and Assessment, it is essential that NO_2 be accurately and reliably monitored, as required by statutory guidance LAQM.TG(03). The existing NO_2 monitoring network will be extended so that:

- A better understanding of the air quality within the borough of Spelthorne can be developed. As mentioned above due to the lack of monitored air quality data within the borough of Spelthorne, computer-based models have generated all information relating to the exceedance areas within the Borough. While these are commonly used and necessary for predictive work, they do not produce results as accurate as real data.
- So that the Council can provide detailed information to the public and DEFRA in respect of the air quality within the borough of Spelthorne.
- So that the Council can find cost-effective actions to reduce the impact of emissions from road vehicles. Action for the improvement of air quality within an exceedance area should be cost-effective, dealing with the least expensive but with the best rate of return (high NO2 reduction) first.

Nitrogen dioxide is currently monitored within Spelthorne Borough Council through a network of 26 passive NO_2 tubes sited at various locations through out the borough, 3 of which are collocated with BAA's automatic air quality monitoring station. The existing NO_2 monitoring network will be enhanced by the addition of:

- The siting of at least a further 16 passive samplers at locations where members of the public might reasonable be exposed to levels of NO_2 predicted to exceed the NAQS objective limits;
- The introduction of a continuous automatic monitor to be located where members of the public might reasonable be exposed to levels of NO_2 predicted to exceed the NAQS objective limits;
- The introduction of two electrochemical NO_2 sensors, each to be accompanied by a traffic count logger system.

Action – Air Quality Monitoring 1

Spelthorne Borough Council will enhance the NO_2 monitoring network within Spelthorne in order to develop a better understanding of the air quality within Spelthorne.

Action – Air Quality Monitoring 2

Spelthorne Borough Council will make available regularly updated detailed information about the quality of air within Spelthorne on the Council's website (http://www.spelthorne.gov.uk).

Action – Air Quality Monitoring 3

Spelthorne Borough Council will use the data obtained, in partnership with Surrey County Council to find further cost-effective measures to reduce emissions emanating from County maintained roads within Spelthorne.

6.13 Energy Efficiency within Buildings

Spelthorne Borough Council is committed to issues that are directly related to climate change and reducing green house gases. Thus, energy efficiency flags out as one our main priorities.

The recent (February 2002) House Condition and Energy Survey carried out indicates that the total number of properties at risk of fuel poverty is 4648 or 12.1% of the total number of households in the Borough. These figures will be further investigated and updated during the forthcoming stock survey 2005-06.

Given the findings at both the National and Local levels, Spelthorne Borough Council has adopted the following mission statement.

"To provide access to warmth, comfort and well-being of its residents and reduce the percentage of households in fuel poverty. This will be achieved by raising awareness of its effects, providing appropriate advice on access to grants and support to enable people to reduce their fuel bills and achieve adequate warmth in their homes. We will also develop a strategy to tackle ill health and eliminate early deaths caused by cold homes. We will achieve this by developing partnerships with other organization both in the private sector and the public sectors."

In May 2001, the Council appointed a part time Energy Coordinator who reported directly to the Energy Manager of the Council. The main duties of the officer were to raise awareness of Energy Efficiency both internally and to the residents of the Borough. Since November 2002, the council has adopted a policy to investigate the potentials of introducing renewable energy measures and raising the energy efficiency profile to both our building stock and that belonging to the various housing associations in the borough. A number of initiatives have already been implemented and others are being actively investigated. Those already in place are:

- Energy Efficiency training for existing staff and coordinating with other stakeholders from other agencies dealing with the elderly, particularly those attending the day centres;
- Launching a major exercise to record the whole borough current thermal status and integrate the obtained database within our GIS system, using thermal imaging techniques. The survey was executed in March 2003; the database will be finalised in 2004-2005.
- Successful bidding for several major governmental grants (e.g. major development grant, EU LCIP, and community heating schemes), to introduce renewable energy measures into the borough, (e.g. Photo voltaic and biomass).
- Adoption of a target of purchasing 25% of the Council's electrical energy from renewable sources by 2010, this target has already been surpassed and we are now buying 100% of our electricity with a green tariff.
- Continue to improve environmental sustainability in areas over, which the Council has no direct control or is in partnership with others.
- Workshop sessions at each of the day centres since October 2001 in conjunction with

British Gas to the staff and the day centres users;

- Active participation in the all the regional and national bodies that are involved in energy efficiency and renewables, in order to learn and tap into the available resourcing.
- Advertisements have been placed in year planners and diaries circulating locally publishing the availability of grants and the Local Energy Efficiency Advice centre services; which is currently working in partnership with the council.
- Publicity for new Warm Front scheme in the Council's free publication the "Borough Bulletin" distributed to all householders;
- Access to Warmer Homes initiative started with the Mayors Fund and British Gas funding in partnership with Age Concern Spelthorne, Help with Aged, British Gas and the Borough;
- Promotional activities such as the Shepperton Fair and articles in the local papers and Borough Bulletin;
- Targeted mail shot to customers on benefits from various grants and funds available through relevant bodies (i.e. Energy Saving Trust, DTI, etc.).

Action – Energy Efficiency within Buildings 1

Spelthorne Borough Council will establish the innovations programme; "Future Green", which seeks to fund and promote energy efficient services and measures. Delivery timetable (2004-2007)

Action – Energy Efficiency within Buildings 2

Utilize the results of the Borough thermal imaging survey to promote the benefits and potential for energy efficiency in all sectors. Delivery timetable 2004-07

Action – Energy Efficiency within Buildings 3

Link the Fuel Poverty Strategy to the weekly heating costs of properties occupied by vulnerable residents to a percentage of the state pension by 2010 start of the project 2008.

Action – Energy Efficiency within Buildings 4

Achieve the Home Energy Conservation Act (HECA) target of eradicating fuel poverty by 2010.

6.14 Summary of Actions To Reduce Nitrogen Dioxide Emissions within Spelthorne

A summary of the actions that will be implemented to reduce nitrogen dioxide emission that impact upon the air within the borough of Spelthorne is provided in table 6.14 below.

Table 6.14: Summary of Actions

Action Code	Description of Action	Impacts on Nitrogen Dioxide Concentrations (at location of action implementation, unless otherwise stated)	Other impacts	Lead Role	Timescales	Costs
Roads Emissions 1 (Section 6.2)	Identify and implement long-term solutions for the reduction of emissions from road vehicles using Highway Agency controlled trunk roads within Spelthorne.	Negligible to minor adjacent to Highway Agency controlled roads	Dependent upon action determined	The Highways Agency & Spelthorne Borough Council	Ongoing	Low to major
Road Emissions 2 (Section 6.3.1)	Identify, prioritise and implement actions to reduce vehicle emissions emanating from county maintained roads within NAQS exceedance locations throughout the borough of Spelthorne.	A reduction of 120 tonnes of NOx per annum by 2006	Reduction of 87 tonnes CO, 15 tonnes HC, and 12 tonnes particulates per annum; reduced congestion; increased road safety; increase access; reduced noise from road traffic;	Surrey County Council & Spelthorne Borough Council	Ongoing	Low to intermediate
Road Emissions 3 (Section 6.3.2)	Surrey County Council will continue to work with Spelthorne's schools for the development, implementation of the "Safe Routes to School" program.	Negligible	Improved road safety; Reduction in congestion during peak flow periods; Increased social interaction; Increased social inclusion;	Surrey County Council	Ongoing	Intermediate
Road Emissions 4 (Section 6.3.2)	Continue to work with Spelthorne's schools for the development, implementation and the annual review of School Travel Plans.	Negligible to minor	Improved road safety; Reduction in congestion during peak flow periods; Increased social interaction; Increased social inclusion;	Surrey County Council	25 schools to have travel plans by 2007	Low
Road Emissions 5 (Section 6.3.2)	Continue to work with schools in Spelthorne help organise "Walking Buses".	Negligible	Improved physical fitness; Improved road safety; Reduction in congestion during peak flow periods; Increased social interaction; Increased social inclusion;	Surrey County Council	Long-term	Low
Road Emissions 6 (Section 6.3.2)	Continue to work to help schools teach pupils cycling proficiency training and cycle skills.	Negligible	Improved physical fitness; Improved road safety; Reduction in congestion during peak flow periods; Increased social interaction; Increased social inclusion;	Surrey County Council	Ongoing	Low

Action Code	Description of Action	Impacts on Nitrogen Dioxide Concentrations (at location of action implementation, unless otherwise stated)	Other impacts	Lead Role	Timescales	Costs
Road Emissions 7 (Section 6.3.2)	Install vehicle activated signs to control road traffic speeds at appropriate locations within Spelthorne.	Negligible	Improved road safety; Reduction in congestion due to smoother traffic flow;	Surrey County Council	Long-term	Low to medium
Road Emissions 8 (Section 6.3.2)	Investigate the feasibility of installing variable message signs to provide travel advice information at appropriate locations in and around the borough of Spelthorne.	Negligible	Improved public information & awareness; Improved road safety; reduction in road traffic noise;	Surrey County Council	Long-term	Low
Road Emissions 9 (Section 6.3.2)	Implement decriminalised parking enforcement within the borough of Spelthorne	Negligible	Improved road safety; Reduced congestion caused by blocked roads; improved journey times;	Spelthorne Borough Council & Surrey County Council	From 2005	Medium but self-funding after 5 years
Road Emissions 10 (Section 6.3.2)	Publicise the establishment of decriminalised parking enforcement within the borough of Spelthorne	Negligible	Raising public awareness	Spelthorne Borough Council	From 2005	Low
Road Emissions 11 (Section 6.3.2)	Investigate the feasibility of establishing controlled parking zones at various locations within the borough of Spelthorne	Negligible	Improved road safety; Reduction in congestion; Increased social interaction; Increased social inclusion;	Surrey County Council	Long-term	Low
Road Emissions 12 (Section 6.3.2)	Carry out a feasibility study into the development of a lorry routing strategy.	Negligible to minor	Improved road safety;	Surrey County Council	Autumn 2004	Low
Road Emissions 13 (Section 6.3.2	To promote integrated public transport as a good alternative form of transport to the car and improve facilities at bus stops within Spelthorne	Negligible to minor	Improved road safety; Reduction in congestion; Increased social interaction; Increased social inclusion & accessibility	Surrey County Council & Spelthorne Borough Council	Long-term	Low
Road Emissions 14 (Section 6.3.2)	Promote bus travel as a good alternative form of transport to the car and improve facilities at bus stops within Spelthorne.	Negligible	Improved road safety; Reduction in congestion; Increased social interaction; Increased social inclusion & accessibility;	Surrey County Council & Spelthorne Borough Council	From 2004	Low
Road Emissions 15 (Section 6.3.2)	Buses operating along critical corridors within the borough of Spelthorne will be encouraged to have Euro III compliant engines.	Negligible to minor	Reduced particulates and some climate change gases	Surrey County Council	Ongoing	Low
Road Emissions 16 (Section 6.3.2)	Bus prioritised infrastructure will be installed at strategic locations throughout Spelthorne.	Moderate	More reliable bus journey times; Increased social inclusion & accessibility; Reduction in climate change gases	Surrey County Council	From 2004	High
Road Emissions 17 (Section 6.3.2)	Increase the number of journeys made by cycle from 2% to 4% above 2001 base level.	Negligible	Improved physical fitness; Improved road safety; Reduction in congestion during peak flow periods; Increased social interaction; Increased social inclusion & accessibility; Improved choice;	Surrey County Council	2001 - 2006	Low to medium

Action Code	Description of Action	Impacts on Nitrogen Dioxide Concentrations (at location of action implementation, unless otherwise stated)	Other impacts	Lead Role	Timescales	Costs
Road Emissions 18 (Section 6.3.2)	Introduce a linked, segregated cycle land between Chertsey Bridge and Walton Bridge Road.	Negligible	Improved physical fitness; Improved road safety; Reduction in congestion; Increased social interaction; Increased social inclusion & accessibility;	Surrey County Council		
Road Emissions 19 (Section 6.3.2)	The production of a series of Cycle Guides that will detail all the cycle routes throughout Surrey.	Negligible	Improved physical fitness; Improved road safety; Reduction in congestion during peak flow periods; Increased social interaction; Increased social inclusion & accessibility;	Surrey County Council	Short-term	Low
Road Emissions 20 (Section 6.4.1)	Promote the use of "cleaner technology and fuels" within Spelthorne.	Negligible to minor	Reduction in emissions of other air quality pollutants; Increased travel choice	Spelthorne Borough Council	Long-term	Low
Road Emissions 21 (Section 6.4.4)	Promote the development and implementation of "business travel plans" by companies located within the borough of Spelthorne.	Negligible to minor	Reduction in emissions of other air quality pollutants; Improved choice; Improved relationships between employer & employees; Improved travel choice;	Surrey County Council & Spelthorne Borough Council	Long-term	Low
Reducing emissions from the Council's Activities 1 (Section 6.5.1)	Reduce car dependency and facilitate transport choice by encouraging alternatives to car use along with changes in working arrangements.	Negligible to minor	Reduction in emissions of other air quality pollutants; Improved choice; Improved relationships between employer & employees; Improved travel choice;	Spelthorne Borough Council (Chief Executive Team)	Long-term	Low
Reducing emissions from the Council's Activities 2 (Section 6.5.1)	Spelthorne Borough Council will review its Business Travel Plan.	Negligible	Reduction in emissions of other air quality pollutants; Improved choice; Improved relationships between employer & employees; Improved travel choice;	Spelthorne Borough Council (Chief Executive Team)	2005	Low
Reducing emissions from the Council's Activities 3 (Section 6.5.2)	All new fleet vehicles purchased by Spelthorne Borough Council will be meet Euro III emissions as a minimum, additionally, where appropriate, the use of alternatively fuelled vehicles will be considered.	Negligible	Reduction in emissions of other air quality pollutants;	Spelthorne Borough Council (Direct Services)	Ongoing	Medium
Heathrow Emissions 1 (Section 6.6.2)	Spelthorne Borough Council will continue to work to in partnership to minimise the impacts on air quality caused by the activities of Heathrow Airport air.	-	Dependent upon actions taken	Spelthorne Borough Council (Environmental Health) & BAA, and the airline industries	Ongoing	Low

Action Code	Description of Action	Impacts on Nitrogen Dioxide Concentrations (at location of action implementation, unless otherwise stated)	Other impacts	Lead Role	Timescales	Costs
Land Use Planning 1 (Section 6.7.1)	Ensure that the new Development Framework incorporates planning policy that will not adversely impact air quality, but furthermore, enhance air quality where possible.	Negligible to major	-	Spelthorne Borough Council (Planning Policy)	2005	Low
Land Use Planning 2 (Section 6.7.2)	Ensure that the future development of land will not adversely impact on air quality.	Negligible to minor (this is based on the consideration of individual cases)	Dependent upon development proposals and decisions taken	Spelthorne Borough Council (Development Control & Environmental Health); Surrey County Council (Transportation Development Control)	Ongoing	Low
Sunbury Cross Area (Section 7.3)	As part of the planning process, Spelthorne Borough Council will ensure that the impacts on air quality caused by the future development of land within the Sunbury Cross area will be taken into consideration, and where necessary mitigated again in line with the polluter pays principal.	Negligible to minor (this is based on the consideration of individual cases)	Dependent upon development proposals and decisions taken	Spelthorne Borough Council (Development Control & Environmental Health); Surrey County Council (Transportation Development Control)	Ongoing	Low
Industrial Sources 1 (Section 6.8)	Continue to ensure that emissions from all 'prescribed processes' remain controlled and regulated in line with national policy.	Negligible	-	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Smoke Emissions 1 (Section 6.9.1)	Continue to enforce the Smoke Control Areas within the borough.	Negligible	Reduction in climate change gases, particulates and dioxins; improved air quality indoors;	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Smoke Emissions 2 (Section 6.9.2)	The Borough of Spelthorne will encourage the recycling of the green waste generated in the borough and discourage the burning of domestic waste as a means of waste disposal.	Negligible	Improved soil quality; Reduction in climate change gases; dioxins and particulates; improved air quality indoors;	Spelthorne Borough Council (Environment Services & Environmental Health)	Ongoing	Low
Smoke Emissions 3 (Section 6.9.2)	Enforce against bonfires that are causing a statutory nuisance.	Negligible	Reduction in climate change gases; dioxins and particulates; improved neighbour relations;	Spelthorne Borough Council (Environmental Health)	Ongoing	Low

Action Code	Description of Action	Impacts on Nitrogen Dioxide Concentrations (at location of action implementation, unless otherwise stated)	Other impacts	Lead Role	Timescales	Costs
Smoke Emissions 4 (Section 6.9.2)	Where appropriate, use enforcement powers to control dark smoke from bonfires	Negligible	May reduce climate change gases; dioxins and particulates; improved air quality indoors;	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Smoke Emissions 5 (Section 6.9.2)	Bonfires at commercial premises will be passed to the Environment Agency for enforcement purposes.	Negligible	May reduce climate change gases; dioxins and particulates; improved air quality indoors;	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Raising Awareness and the Provision of Information 1 (Section 6.10)	Raise the public's awareness of initiatives that will improve the quality of air within the borough of Spelthorne.	Negligible	Increased social responsibility; more informed decision-making.	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Working in Partnership 1 (Section 6.11)	Spelthorne Borough Council will continue to work, in partnership with its neighbouring boroughs and others for the control of air pollution and continued improvement of air quality.	Negligible to moderate	Dependent upon actions taken	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Working in Partnership 2 (Section 6.11)	Spelthorne Borough Council will seek opportunities for effective partnerships for the continued improvement of air quality	Negligible	Dependent upon actions taken	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Air Quality Monitoring 1 (Section 6.12)	Spelthorne Borough Council will enhance the NO_2 monitoring network within Spelthorne in order to develop a better understanding of the air quality within Spelthorne.	-	Raising public awareness; Informed decision making;	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Air Quality Monitoring 2 (Section 6.12)	Spelthorne Borough Council will make available regularly updated detailed information about the quality of air within Spelthorne on the Council's website (http://www.spelthorne.gov.uk).	Negligible	Raising public awareness; Raised social responsibility	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Air Quality Monitoring 3 (Section 6.14)	Spelthorne Borough Council will use the data obtained, in partnership with Surrey County Council to find further cost-effective measures to reduce emissions emanating from County maintained roads within Spelthorne.	Negligible	Informed decision making;	Spelthorne Borough Council (Environmental Health)	Ongoing	Low
Energy Efficiency in Buildings 1 (Section 6.15)	Establish the innovations programme; "Future Green", which seeks to fund and promote energy efficient services and measures.	Negligible	Reduced CO2 emissions, improved societal equity, health, and quality of life	Spelthorne Borough Council (Environment Services)	2004 -2007	Low

Action Code	Description of Action	Impacts on Nitrogen Dioxide Concentrations (at location of action implementation, unless otherwise stated)	Other impacts	Lead Role	Timescales	Costs
Energy Efficiency in Buildings 2 (Section 6.15)	Utilize the results of the Borough thermal imaging survey to promote the benefits and potential for energy efficiency in all sectors.	Negligible	Reduced CO2 emissions, improved societal equity, health, and quality of life	Spelthorne Borough Council (Environment Services)	2004 - 2007	Low
Energy Efficiency in Buildings 3 (Section 6.15)	Link the Fuel Poverty Strategy to the weekly heating costs of properties occupied by vulnerable residents to a percentage of the state pension.	Negligible	Reduced CO2 emissions, improved societal equity, health, and quality of life	Spelthorne Borough Council (Environment Services)	2008 - 2010	Low
Energy Efficiency in Buildings 4 (Section 6.15)	Achieve the Home Energy Conservation Act (HECA) target of eradicating fuel poverty within the borough of Spelthorne.	Negligible	Reduced CO2 emissions, improved societal equity, health, and quality of life	Spelthorne Borough Council (Environment Services)	2010	Low

7.0 THE IMPACT OF IMPLEMENTING SPELTHORNE'S AIR QUALITY ACTION PLAN

7.1 Highway Agency Maintained Roads

While the Highways Agency has initiated a number of actions (section 6.2 refers) that will help reduce emissions from road vehicles, even with the implementation of these actions, after 31 December 2005 it is likely that the NAQS annual objective for nitrogen dioxide will be exceeded at various locations adjacent to the M25 and the M3 where members of the pubic are likely be exposed to elevated levels of nitrogen dioxide. These roads are maintained by the Highways Agency.

In order to achieve the NAQS objectives along these Highways Agency maintained roads there would need to be a very significant reduction in traffic flows. However this is unlikely to happen; this is because there are no alternative forms of transport that could cope with the enormous extra demand and provide equivalent journey times that are required.

It will only be through the development and implementation of effective national policies, programmes and projects that emissions from vehicles along these Highways Agency maintained roads that the NAQS objectives will be achieved.

7.2 Surrey County Maintained Road

Largely, implementation of this air quality management action plan should counter the predicted exceedances of the NAQS annual objective for nitrogen dioxide caused by road traffic using Surrey County Council maintained roads within the borough of Spelthorne. However, even though the background level of nitrogen dioxide across the borough will be reduced due to the actions laid out within this action plan, there is still the likelihood that the NAQS annual objective for nitrogen dioxide will be exceeded at the Sunbury Cross Roundabout beyond 2005. Whether this exceedance continues beyond 2010 will be subject to examination during Spelthorne's "Detailed Assessment" under the Review and Assessment system.

7.3 Actions for the Reduction of Nitrogen Dioxide Emissions in the Sunbury Cross

Road Transport

The Sunbury Cross junction serves as a crossroads for 7 roads, the busiest four of which are the slip roads serving the M3/A316 flyover, and the A308/A308. Actions that maybe employed to reduce emissions through this junction are limited:

- Traffic management options that will improve traffic flows through the junction are the most readily available tool to control/improve emissions from road traffic at Sunbury Cross. However the options available are considerably limited by the need to give priority to vehicles accessing and exiting the M3/A316, thus ensuring the road safety of vehicles using the M3/A316.
- Re-routing of traffic has also been considered, however, this is not a viable option as the re-routing of traffic would be either is through already congested roads, or through

residential roads.

- The Sunbury Cross roundabout is land-locked. That is, one half of the Sunbury Cross junction is constrained by railway infrastructure (which includes railway lines, 2 railway bridges, and a train station), plus various office and warehouse premises. While the other side of the junction is constrained by several high-rise buildings (comprising retail, office and residential premises) and terraced retail premises with residential accommodation above. Alterations in the infrastructure at Sunbury Cross junction may also be an option. Such alterations may include the installation of an underpass, or the compulsory purchase and subsequent demolition of various existing premises to make way for adaptation of existing road infrastructure, however these are not cost-beneficial options.

While the implementation of traffic management schemes and infrastructure alterations may offer a solution to increase road traffic flow rates, and thereby reduce pollution levels within the immediate vicinity, this is only a short-term resolution. It has been recognised that merely providing additional road space can no longer solve transport problems. The environmental and economic costs of this approach are too high, and have been found to generate even greater traffic growth that exacerbated the problems. In consideration of this, it therefore follows that the only real sustainable options available for the reduction of emissions from road vehicles within the Sunbury Cross area are those which are being implemented across the borough, and as discussed within this action plan.

Planning Guidance for the Sunbury Cross Area

In recognising air quality as a material planning consideration within individual planning applications made for the Sunbury Cross area, Spelthorne Borough Council will pay particular attention to developments that may generate increased traffic, and that may adversely impact upon air quality. While it is not the Council's intention to refuse all such development proposals within the Sunbury Cross area, it is necessary for individual proposals and applications to be examined more extensively. For that reason, all applications should be supported by such information as is necessary to allow a full consideration of the impact of the proposal on the air quality within the area.

Where appropriate, the use of planning conditions or section 106 agreements will be explored in terms of their potential for securing air quality improvements prior to developments going ahead or to offset subsequent air quality impacts from the development. Further, in some instances it may be appropriate for the developer to fund mitigation measures elsewhere within the borough to offset any increase in local pollutant emissions.

Action – Sunbury Cross Area ~ Land Use Planning 1

As part of the planning process, Spelthorne Borough Council will ensure that the impacts on air quality caused by the future development of land within the Sunbury Cross area will be taken into consideration, and where necessary mitigated again in line with the polluter pays principal.

8.0 APPROPRIATENESS, PROPORTIONALITY AND FUNDING OF AIR QUALITY MANAGEMENT ACTION PLAN

8.1 Analysis of Cost-Benefits & Wider Impacts

Achieving a balance between cost and effectiveness is an essential consideration when deciding upon the actions to be employed to reduce emission levels of NAQS pollutants. While a full quantification of cost-effectiveness/benefit is not requires, an estimation that will allow a balanced and realistic approach to be taken by local authorities in their pursuit of achieving the NAQS air quality objectives is required. Statutory guidance LAQM.PG(03) states that the key aspects that should be considered are:

- How much of an improvement in ambient air quality is likely to result from a particular action or policy measure;
- How much the implementation of a particular action or policy measure is likely to cost, both directly and indirectly, and on whom the costs are likely to fall;
- Whether there might have been other policy options for delivering the same result, and if so, why they were considered to be less cost-effective (if they were no real alternatives that could have been considered, this should be explained within the action plan);
- Doing nothing is not always a cost-free option, as there might be indirect costs involved, such as health impacts on the local community;

8.1.1 Road and Transport Related Projects

Highway investments have for many years been appraised using procedures that take account both of impacts measured in monetary units, such as construction costs, time savings and reductions in accident costs, and of social and environmental impacts that may be quantified but not valued (such as the number of houses suffering specified increases in noise) or assessed only in qualitative terms (such as impacts on landscape). In 1998 DETR developed a multi-criteria analysis approach in the form of the “New Approach to Appraisal for transport projects” (NATA). NATA enables decision makers to consider the economic, environmental and social impacts of transport projects or policies in light of the Government's five main objectives for transport, which are show below and in table 8.1:

- To protect and enhance the natural and built environment. Environment is divided into noise, local air quality, landscape, biodiversity, heritage, and water, while the impact on carbon dioxide emissions is also distinguished separately:
- To improve safety for all travellers;
- To contribute to an efficient economy, and to support sustainable economic growth in appropriate locations. Economy is divided into journey times plus vehicle operating costs (VOC), highway construction and maintenance cost, reliability, and regeneration; and
- To promote accessibility to everyday facilities for all, especially those without a car; Accessibility is divided into public transport, severance, and pedestrians and others; and
- To promote the integration of all forms of transport and land use planning, leading to a

better, more efficient transport system.

Table 8.1: New Approach to Appraisal of Transport Investment (NATA)

Objective	Description	Point Score
Integration	New road building with no additional facilities for cycling, walking and public transport	-4 points
	New road building with no additional facilities for either cycling, walking or public transport	-3 points
	Promote car use on existing network	-2 points
	Deters change in mode	-1 point
	Does not promote change in mode	0 points
	Supports existing measures	1 point
	Promotes 1 initiative	2 points
	Promotes 2 initiatives	3 points
	Scheme close to school or school route	3 points
	Scheme gives priority to vulnerable modes	4 points
Environment	Significant negative effect in combination of factors	-4 points
	Quantifiable negative effect in combination of factors	-3 points
	Quantifiable reduction in air quality	-2 points
	Quantifiable increase light pollution	-1 point
	Noise from calming features	-1 point
	No benefit or + and - cancel	0 points
	Deters rat running or reduce traffic or enhances conservation area	1 points
	Improve air quality	2 points
	Quantifiable improvement in combination of factors	3 points
	Significant improvement in combination of factors	4 points
Safety	May increase accident rate by more than 5 accidents per year	-4 points
	May increase accident rate by approx. 3 to 5 PIA per year	-3 points
	May increase accident rate by approx. 1 to 3 PIA per year	-2 points
	May increase accident rate by approx. 1 PIA per year	-1 point
	Save 0 accidents	0 points
	Increase perception of personal safety or save 1 accident	1 point
	Save between 1 and 3 accidents	2 points
	Save 3 to 5 accidents	3 points
	Save 5 or more accidents	4 points
Economy	Average legal journey time increased by over 1 minute	-4 points
	Average legal journey time increased by up to 1 minute	-3 points
	Reduces access to local shops for all modes	-2 points
	Reduces access to shops for one mode	-1 point
	No outside funding available	0 points
	Part funding from outside source	1 point
	Improve facilities near shops	1 point
	Developer funding to improve shopping area or complete funding from outside source	2 points
	Average legal journey times improved by up to 1 minute	3 points
	Average legal journey times improved by over 1 minute	4 points
Accessibility	Prohibit cycling and walking, sever community	-4 points
	Increase journey times for walking and cycling	-3 points
	Increases severance	-2 points
	Minimal effect on negative accessibility	-1 point
	Has no effect on accessibility	0 points
	Minimal positive effect on accessibility	1 point
	Improves access for walk or cycle	2 points
	Reduces severance	2 points
	Improve access to school, or shop or leisure facility	2 points
	Improve access for walk and cycle	3 points
	Improve access to school and/or shop and/or leisure	3 points

Surrey County Council's transport planners used the NATA assessment approach in the selection process of road and transport related projects by application of table 8.1 above.

8.2 Funding Implications of the Air Quality Management Action Plan

The principal sources of funding for works for improving air quality include;

- Surrey County Council is responsible for funding the maintenance and repair of non-motorway and non-truck roads, footpaths and cycleways, including lighting schemes within the borough of Spelthorne. Consequently, financial provision for the implementing "air quality management actions" relevant to the control of emissions from Surry County Council maintained roads will come from Surrey County Council's Local Transport Plan provision.
- The cost of implementing "air quality management actions" relevant to the control of emissions from roads maintained by the Highways Agency (motorways and trunk roads) will fall to the Highways Agency.
- The cost of implementing "air quality management actions" that fall within the Councils responsibility will be met from within Spelthorne Borough Council's annual budget;
- Where works are required to mitigate against air pollution caused by new development, funding for action plan initiatives or air quality monitoring will be sought from developers though section 106 agreements or by planning condition.

8.3 Costing Criteria

The cost of implementing "air quality management" actions are presented within this document at table 6.14 using the following criteria:

Low	=	less than £50,000
Medium	=	£50,000 to £100,000
Intermediate	=	£100,000 to £400,000
High	=	£400,000 to £5,000,000
Major	=	more than £5,000,000

8.4 Impacts on Air Quality

The following criteria have been used to describe the impact of actions in terms of the reduction of nitrogen dioxide.

Negligible	=	less than 0.4 μgm^{-3}
Minor	=	0.4 μgm^{-3} to 1.0 μgm^{-3}
Moderate	=	1.0 μgm^{-3} to 2.0 μgm^{-3}
Major	=	more than 2.0 μgm^{-3}

While individual actions may offer only a small reduction in nitrogen dioxide level, the cumulative impact of many actions across the borough will have a significant impact upon the reduction of nitrogen dioxide levels, both at hotspot locations and of the background.

APPENDICES

Appendix 1 – Action Planning Process Checklist

	Reference Location	Comments
1. Local Authority Information	Page 2	
2. Process Adherence to Guidelines and Consideration of Policies		
Have Statutory Consultees been consulted:	Section 3	
Secretary of State		
Environment Agency		
Highways Agency		
Surrey County Council		
Contiguous Authorities		
Have other local authority departments been consulted	Section 3	
Planning Policy		
Development Control		
Environment Services		
Have other relevant consultees been consulted:	Section 3	
Public Authorities		
Business Interests		
Others		
Has a statement of the problem causing the AQMA, as identified in the Stage 4, been clearly stated?	Section 1	
Have the principal sources of the pollutants causing the exceedance been identified?	Section 4	
Have other local authority plans/policies been considered?	Section 2.5	
Has an options timescale been included?	Section 6.14	
Have costs of options/plan been set out?	Section 8	
Have impacts been assessed?	Section 8	

Evidence to support the local authorities' selection or rejection of each considered measure would be sought by identifying the following issues:

	Reference Location	Comments
Road Transport Measures		
Low emission zones	Section 6.1.2	
Parking management & charging	Section 6.3.2	
Public transport initiatives - Bus	Section 6.3.2	
Development of cycling and walking	Section 6.3.2	
Partnerships & travel plans (workplace & school)	Section 6.11	
Promotion, education & awareness raising	Section 6.10	
Fleet management & clean fuels	Section 6.5.1	
Land use planning	Section 6.7.1 & 6.7.2	
Freight measures	Section 6.3.2	
Industrial Measures		
Local abatement	Section 6.8	
Domestic Measures		
Energy conservation	Section 6.15	
Appliance improvement	Section 6.15	
Smoke control	Section 6.9.1	
Nuisance policy (bonfires etc.)	Section 6.9.2	

Airport Measures - Airside Activity	Section 6.6.2	

4. Appropriateness and Proportionality		
Do measures seem appropriate to the problem? Has the right balance been struck?	NATA	Also LDP
How have measures been assessed?	NATA	Also LDP
Are the measures likely to achieve the stated goal?.	Yes	
Have the wider impacts been appraised appropriately?	NATA	
Was the method of assessing costs appropriate?	NATA	
Is it likely for LAQM objectives to be met? How will success be measured? What impact will wider initiatives/policies have on the measures?	In most places	AQ Monitoring
Is it likely for Directive values to be met? How will success be measured? What impact will wider initiatives/policies have on the measures?	Yes	AQ Monitoring
Do the chosen measures comply with wider Government Policies?	Yes	

5. Implementation		
Are measures realistic in light of the objective deadline(s)?	Overall yes	
Have responsibilities been assigned to the relevant party? Does the assigned party have the necessary powers?	Section 6.14	
Has financing been secured and who will pay. Is this realistic?	Section 6.14	

Appendix 2 - Action to reduce NOx Emissions Caused by Road Transport

Motor vehicle engines emit many types of pollutants including nitrogen oxides, volatile organic compounds, carbon monoxide, carbon dioxide, particulates, and sulphur dioxide. A number of factors affect the volume of pollutants emitted, such as the engine energy efficiency, the type of fuel, speed (engines are inefficient at low speeds and during idling), volume of traffic using route, route congestion, and the traffic components using the route, for example the number of heavy goods vehicles.

New specifications for vehicle engines and fuel quality are ensuring continued improvements in the reduction of emissions from road transport. Since 1992, there have been ongoing improvements in the reduction of emissions from road vehicles. Further improvements are expected with the introduction of more stringent emissions standards for new vehicles in 2005 (Euro IV). Table A1.1 summarises the various mandatory emissions standards and when they are being introduced.

Table A1.1: Mandatory Vehicle Emissions Euro Standards

Standard	Directive	Type of vehicle	Date of introduction (for type approval)
Euro I	91/444/EEC 93/59/EEC 91/542/EEC	passenger cars light commercial vehicles heavy diesels	31 December 1992 1 October 1994 1 October 1993
Euro II	94/12/EC 96/69/EC 91/542/	passenger cars light commercial vehicles heavy diesels	1 January 1997 1 October 1997 1 October 1996
Euro III	98/69/EC Common position	passenger cars and light commercial vehicles heavy diesels	1 January 2001
Euro IV	98/69/EC Common position	passenger cars and light commercial vehicles heavy diesels	1 January 2006

Source: LAQM.G3(00)

The emissions from pre-Euro I vehicles are significantly higher than for vehicles in production now (Euro III) and those that will be produced under Euro IV (table A1.2 below refers).

Table A1.2: Relative Emission Performance of Different Vehicle Types by Fuel and Emission Standards on Urban Test Cycle*

Type of vehicle	Emission standard	Carbon monoxide	Hydrocarbons	Oxides of Nitrogen	Particulates
Petrol car	pre-Euro I	100	100	100	5
	Euro I	15	9	19	2
	Euro II	10	4	9	2
	Euro III	7	3	6	2
	Euro IV	4	2	3	2
Diesel car	pre-Euro I	7	10	43	100
	Euro I	4	4	29	55
	Euro II	3	3	21	31
	Euro III	2	2	13	20
	Euro IV	2	1	7	10
Petrol LGV	pre-Euro I	151	120	114	10
	Euro I	30	6	21	5
	Euro II	21	3	9	5
	Euro III	17	2	6	5
	Euro IV	7	1	3	5
Diesel LGV	pre-Euro I	10	20	82	209
	Euro I	8	15	40	115
	Euro II	6	9	30	63
	Euro III	4	4	26	41
	Euro IV	3	3	13	20
Rigid HGV	pre-Euro I	38	192	640	484
	Euro I	21	113	440	318
	Euro II	17	105	316	168
	Euro III	9	47	224	113
	Euro IV	6	33	158	22
Articulated HGV	pre-Euro I	44	183	1704	700
	Euro I	22	87	893	482
	Euro II	18	78	650	185
	Euro III	9	47	641	124
	Euro IV	7	33	325	24
Bus	pre-Euro I	63	83	795	458
	Euro I	28	90	859	304
	Euro II	22	84	614	187
	Euro III	11	50	436	125
	Euro IV	8	35	307	24
Motorcycle	Less than 50cc: two stroke	34	135	2	-
	greater than 50cc: two stroke	74	338	4	-
	greater than 50cc: four stroke	67	68	13	-

*Emissions performance indexed to petrol car without three-way catalyst (Pre-Euro I = 100), except for particulates where it is indexed to pre-Euro I diesel car. Legislative standards for particulates only exist for diesel vehicles (petrol figures for particulates are included for comparison). Euro standards do not apply to motorcycles at the moment.

Source: LAQM.G3(00)