Greater Manchester LTP2 Air Quality Strategy & Action Plan (2006)

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Appendices

1. Introduction – Executive Summary

The Local Government Association (LGA) and Department for Transport (DfT) have identified “Better Air Quality” as a key shared priority in the second round of local transport plans (LTP2). Evidence indicates exposure to certain air pollutants can have serious implications for human health and negatively impact on quality of life. In addition, the growth of greenhouse gas emission is now recognised as a serious social, economic and environmental issue at both local and global levels.

Like many urban centres in the UK, local road transport emissions in Greater Manchester (GM) adversely affects local air quality and contributes towards greenhouse gas emissions. Nitrogen dioxide and to a lesser extent particulate matter are of particular concern to the health of the local population. In 2005 all GM Districts declared that in some areas ground level concentrations of nitrogen dioxide would exceed national health based targets in 2010 if corrective action to reduce emissions is not taken.

The “Greater Manchester LTP2 Air Quality Strategy and Action Plan” has been developed in a bid to reduce emissions associated with local transportation in Greater Manchester (GM) over the next five years. The main drivers for the development of the document are:

- The release of DfT & DEFRA guidance outlining the requirement for local authorities to integrate the Air Quality Action Plans (AQAPs) with LTP2s.
- The need to update the GM strategy dealing with air quality and transportation.
- The need to improve integration and partnership working between strategic GM air quality stakeholders in order to effectively address air quality issues through local transport measures.

The main purpose of this strategy is to provide an expanded air quality & local transport strategy that supports and compliments the GM LTP2. Specifically the document provides:

- A summary and baseline of the current air quality situation in GM highlighting any significant problems and issues.
- A review of relevant key air quality guidance, strategy and research documents.
- An outline of key strategic air quality actions to be delivered across GM
- Provide guidance for GM Districts to aid integration of air quality elements into future transportation works programmes.
- Outlines specific air quality actions to be delivered by the GM LTP2 Steering group, the Greater Manchester Public Transport Executive (GMPTE), the Freight Quality Partnership (FQP) and LTP2 Air Quality Working Group.
- A summary of LTP2 air quality monitoring and reporting obligations.

- A brief summary of potential non-LTP2 funding sources.

The key objective for delivering lower local transport related emissions in GM outlined in this document is

To sustainably reduce the negative impact of local transport related emissions to a minimum; in doing so contribute towards meeting national health based air quality objectives and national greenhouse gas reduction commitments

The supporting aims are to:

- Reduce the negative impact on human health of transport linked emissions.
- Reduce the need to make trips by polluting modes.
- Reduce the number of trips made by polluting modes by applying the sustainable transport hierarchy principle in the decision making process. In particular, focus on increasing the number of zero emission walking and cycling trips in instances when travel is necessary.
- Promote and use emission abatement technologies and alternative fuels to reduce emissions associated with polluting vehicles. Focus on addressing issues relating to the most polluting vehicles and in areas where emissions have proportionally greater impact on human health per emission unit released.
- Facilitate, promote and encourage the use of clean public transport as an alternative to the car.
- Improve fuel efficiency and therefore reduce emissions by providing appropriate information, route planning and driver training.
- Influence travel behaviour to reduce emissions by implementing intelligent traffic management measures and road design aspects to increase fuel efficiency and support low emission modes.
- Deter and prohibit activity responsible for contributing towards transport related pollution problems and issues through regulation and enforcement.
- Support and promote developments in sustainable, accessible locations
- Consider population weighted exposure to negative emission impacts in addition to total emission output when planning, assessing and prioritising schemes intended to improve air quality.
- Where appropriate, target specific emission “hotspots”, but in doing so, do not displace pollution and associated problems and issues to different locations.
- Support national air quality measures and contribute towards regional and national air quality and climate change targets and objectives.

It is intended that these aims and objectives will be achieved by adopting strategy themes and practices that will result in lower local transport emissions when implemented effectively. The key strategy themes include:

Transport Management and Infrastructure - Intelligent transport management and improvements in sustainable transport infrastructure have potential to impact positively on both air quality and congestion.

Regulation and Enforcement - Regulation and enforcement are key tools in both removing emissions at source and controlling emission levels. Measures can function as deterrents, restrict polluting activity and also help to raise awareness.

Smarter Choices - Professional and co-ordinated marketing, promotion and communication are essential for the success of modal shift change to lower polluting modes of transport. Measures including personalised travel planning, increased access to information, effective training and the provision of guidance materials are important. The key aim of Smarter Choice schemes is to encourage the use of existing sustainable transport infrastructure by improving the delivery and quality of transportation information provided.

Planning Policy & Development Control - Planning policy and development control can be used effectively to reduce emissions associated with transport at source and delivering change in the medium and long-term. Methods of approach include encouraging development in sustainable locations, investigation of the air quality impact of new developments and securing air quality mitigation measures through planning gain and Section 106 agreements.

Clean/ Technology, Fuels & Practices - Clean technologies and fuels offer an opportunity to negate and reduce emissions at point of source. Increased uptake will result in reduced emissions and therefore contribute towards improving local air quality. Although many clean technology and fuel measures are delivered at a national level i.e. low fuel duty on biodiesel, EURO engine standards it is possible to promote and help facilitate measures locally to increase uptake.

Internal and External Partnerships - Effective partnerships with internal and external air quality stakeholders are essential in efforts to lower transport related emissions, in particular the Highways Agency and Manchester Airport.

Chapter 8 contains an action plan table that outlines strategic air quality actions to be delivered across GM and specific air quality actions to be delivered by key air quality stakeholders (e.g. LTP2 Steering Group, Freight Quality Partnership) over the next five years. All actions are linked to the strategy themes and aims and objectives outlined above.

Chapter 9 expands on details included in the monitoring technical appendix submitted as part of the main GM LTP2 document relevant to air quality and

quality of life indicators and targets. The key mandatory headline indicator on which each GM District air quality performance will be assessed is "Concentration of nitrogen dioxide at chosen worst case or near worst case receptor points in each GM District Air Quality Management Area". Each GM District has selected a location at which a 2005 nitrogen dioxide baseline and 2010 target concentration level has been set.

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2. Background – Setting the Scene

2.1 Statutory Obligations

Local authorities have statutory duties for local air quality management (LAQM) under the Environment Act (1995) and the subsequent National Air Quality Strategy (2000) and Air Quality Regulations.

Since 1997 local authorities have been conducting reviews and assessments of local air pollutant levels against national health based air quality objectives (Appendix 1.0). Concentrations of the listed pollutants are measured at or near ground level. Where exceedances are predicted and where there is likelihood that the public will be exposed to elevated levels, local authorities have a duty to declare Air Quality Management Areas (AQMA) and produce an Air Quality Action Plan (AQAP).

Air Quality Objectives – Health based targets relating to harmful air pollution concentrations at ground level. Objectives are linked to target dates when certain safe concentration levels should be achieved. Concentrations and target years differ for different pollutants (See Appendix 1.0)

Air Quality Management Areas (AQMA) - Areas where air pollutant emissions levels exceed those deemed harmful to human health on exposure. The air quality objectives are based on pollution concentrations in the air at ground level. Environmental factors, such as topography, weather and building height/density significantly influence pollution dispersion and therefore pollution concentrations. AQMAs are usually displayed as coloured areas on a map (See Figure 2.0).

An Air Quality Action Plan (AQAP) - A series of measures aimed at reducing emissions levels and subsequently the areas of exceedances in an AQMA. Following the designation of Air Quality Management Areas, local authorities are required to develop Air Quality Action Plans to identify and implement actions to improve air quality locally. Such plans must involve collaboration between local authority departments (for example the Engineering Services Department and the Planning and Regeneration Department) and external stakeholders i.e. the Highways Agency and the Environment Agency.

2.2 Greater Manchester Air Quality Management

Greater Manchester (GM), with a population of almost 2.5 million people, is one of the largest conurbations in the country. The ten member authorities recognise that a joint approach to air quality management offers the most effective delivery strategy. In particular, close co-operation is necessary given the transboundary nature of air emissions and sources (i.e. vehicle movement, the effect of weather). Accordingly, in 2001 the GM Local Authorities co-operated in the production of their individual air quality review and assessment reports. The results indicated that without action, exceedances of the annual mean **nitrogen dioxide concentration objective** and, to a lesser extent, the daily **particulate objective** were likely (Appendix 1.0).

NITROGEN OXIDES (NO_X)

NOX, a combination of various nitrogen oxides, is produced by the reaction of nitrogen and oxygen atoms in the air under the high temperature and pressure present in engines. Once produced NOX is emitted as a primary pollutant. The deposition of NOX from the atmosphere may lead to acidification and eutrophication of the environment and is also believed to aggravate asthmatic conditions. In the atmosphere NOX is subject to a complex series of chemical reactions, producing secondary pollutants (see below), which can be even more harmful.

Nitrogen Dioxide

NO_X in the atmosphere reacts with sunlight to produce nitrogen dioxide (NO_2). NO_2 is also produced directly by combustion engines. Raised levels of NO_2 increase the likelihood of respiratory problems. Research indicates that NO_2 is probably a threshold pollutant i.e. below a certain concentration level exposure is not harmful.

Nitric Acid

NOX undergoes chemical transformations in the atmosphere to form nitric acid, which in the presence of moisture may lead to acid rain, which can damage entire ecosystems. Nitric acid in the atmosphere is oxidised by O_3 to form NO_2.

Ozone

NO_2 reacts, in the presence of sunlight, with volatile organic compounds (VOCs) to produce low-level ozone (O_3). Once formed O_3 reacts with NO to produce NO_2, and in the absence of other competing reactions, concentrations of NO, NO_2 and O_3 are all inter-related.

Although O_3 is required at high altitudes to filter out ultraviolet (UV) radiation, near ground level it can impair lung function and cause irritation to the respiratory tract. If low level O_3 is present in high enough quantities irreversible damage to the respiratory tract and lung tissue can occur.

Photochemical Smog

Photochemical smog forms when particulates and nitric oxides react in the atmosphere, in the presence of sunlight. High levels of smog can cause respiratory problems, including emphysema, bronchitis, and asthma.

PARTICULATE EMISSIONS

Particle pollution, otherwise known as particulate matter, is a mixture of solids and liquid droplets, of varying size, suspended in the air. Particulates with a diameter less than 10 micrometers (known as PM_{10}) are small enough to get deep into the lungs when breathed in and can lead to serious health problems. Those with a diameter of 2.5 micrometers ($PM_{2.5}$) are even more dangerous as they are small enough to pass into the blood. These fine particles can lead to serious health effects in both the lung and heart. Larger particles are not as much of a problem as they tend to be caught by the hairs in the nose and throat. They can however lead to irritation of the eyes, nose, and throat. Research indicates that particulates are not a threshold pollutant i.e. there is no safe threshold level for exposure.

In response to the expected air quality objective exceedances, each of the Greater Manchester Authorities declared an AQMA in 2002 (Appendix 2.0). The AQMAs revealed a correlation between air quality objective exceedances with urban centres and the highways network. An analysis of emissions revealed that for the nitrogen dioxide (NO2) annual mean concentration objective to be met by December 2005, total tonnes of nitrogen oxide (NOX) emissions would need to be reduced by approximately 30% across the conurbation (NOX significantly contributes to NO2 concentrations – see above).

2.3 Greater Manchester Air Quality Action Plan (2004)

In order to effectively address predicted NO2 concentration exceedances, the GM authorities produced and adopted a joint AQAP in 2004. The plan contains a number of strategic GM wide actions linked to more detailed district air quality action plan annexes. It is the responsibility of each GM Authority to develop local action plans in line with the central GM AQAP and to provide annual progress reports.

The plan addresses both transport and non-transport elements, however, the majority of the actions contained with the plan are linked directly to measures within the GM Local Transport Plan 1 (2000/1-2005/6). The actions include –

- Promoting the use of public transport
- Cleaning up bus emissions
- Encouraging walking and cycling
- Implementing travel plans
- Addressing freight emission and fuel efficiency through Freight Quality Partnerships (FQP)
- Traffic management and traffic calming
- Improved energy efficiency
- Enforcement of pollution control legislation
- Roadside Emissions Testing
- Feasibility study into Low Emission Zones (LEZ)
- Review the regulation of taxi exhaust emissions
- Air quality guidance for developers
- Actions by other organisations

The main function of the action plan is to deliver improved air quality across Greater Manchester and in particular those locations that have been designated as Air Quality Management Areas. This will be achieved by delivering the following aims and objectives:

- To ensure that air quality is integrated into other local authority plans, strategies and activities
- To develop closer relationships with organisations that can help deliver improved air quality
- To identify new partners that can work with the Greater Manchester authorities to improve air quality
- To raise awareness of air quality issues amongst the population of Greater Manchester
- To encourage individuals to recognise that they can make choices that can lead to improved air quality.

It is highlighted that the success of the Greater Manchester AQAP is dependent on:

- Development of a fully integrated public transport system, including a major expansion of Metrolink, which provides people with alternatives to the private car
- Demonstrating the value and tangible benefits of cleaner air in order to gain the active support of people who live and work in, or visit the Manchester area, recognising that everyone needs to participate in a successful Air Quality Action Plan
- Implementation of the Action Plan through targeted actions whose costs and benefits have been evaluated and are appropriate to the wider needs of Greater Manchester
- Integration of the air quality improvements into the wider context of safe, healthy and sustainable urban communities within the Greater Manchester area
- Co-operative working with relevant third parties, such as the Highways Agency in relation to the motorway network, to deliver air quality improvement related to national policy issues, which are largely outside the control of the Greater Manchester Authorities

A wide range of people and opinions were sought throughout the preparation of the Greater Manchester Air Quality Action Plan. Consultation began with an information leaflet and questionnaire entitled ‘Clearing the Air’ circulated in November 2000; followed by a Focus Group with interested organisations in December 2001 and ‘Transport Matters’ Newsletters in May 2002 and in November 2003 as the Plan progressed. Comment on the final draft was sought from DEFRA and incorporated appropriately.

2.4 Greater Manchester Air Quality Review and Assessment (2004)

During 2003/4 all GM authorities conducted a second mandatory review and assessment of local air quality against national health based objectives (Appendix 1.0). Detailed reviews and assessments are scheduled to take place every three years.

Figure 2.0 highlights the extent of the revised AQMAs for the NO2 annual mean concentration objective across Greater Manchester based on the new modelled assessment results. All the individual revised GM District AQMAs were declared on the basis of projected NO2 concentration exceedances; however, particulates are still an issue, particularly in the city centre, at busy motorway junctions and in areas with a high numbers of bus trips.

A number of differences become apparent when comparing the extent of 2002 (Appendix 2.0) and 2005 GM AQMA. Generally, there appears to be a reduction in the areas of exceedance across the conurbation as a whole. Three key reasons are attributed to the reduction:

1. Improved real time monitoring producing more accurate raw date.
2. Modelling and analysis refinements and improvements
3. A reduction in the amount of transport and non-transport emissions across GM.

A new NO2 annual mean concentration objective date was been set following the release of the Air Quality Limit Values Regulations in 2003 (Appendix 3.0). For GM to meet National and European air quality obligations all areas of NO2 exceedance (shaded green areas on the GM AQMA Map Fig 2.0) must be brought below the target objective concentration level by 1st January 2010.

PRODUCING THE GM AQMA MAP

Producing the GM AQMA Map (Fig 2.0) involves a four stage process -

1. Data collection – Real -time monitoring of emission concentrations using monitoring stations and pollution diffusion tubes. A combination of road side and background sites are used to provide a balanced assessment.
2. Transport Emissions – Traffic type, flows, volumes and speeds are measured. Emission factors are applied to produce tonnes of emissions associated with transport.
3. Non-Transport Emissions – Point source (e.g. large industrial) and area source (e.g. residential areas) emissions are calculated using the EMIGMA inventory.
4. Environmental Modelling – Factors such as weather, topography and cross-boundary contributions are applied to emissions data using air quality modelling.
5. AQMA Emissions Concentrations Map – Modelled concentrations of emissions are plotted on a map (Fig 2.0). Areas of exceedance i.e. concentrations harmful to human health are highlighted.

Fig 2.0 - AQMA

Links to GM AQMA MAP

http://www.gmltp.co.uk/pdfs/Fig3_2_Air_Quality_Management_Areas.pdf

2.6 Emissions Sources and Source Apportionment in GM

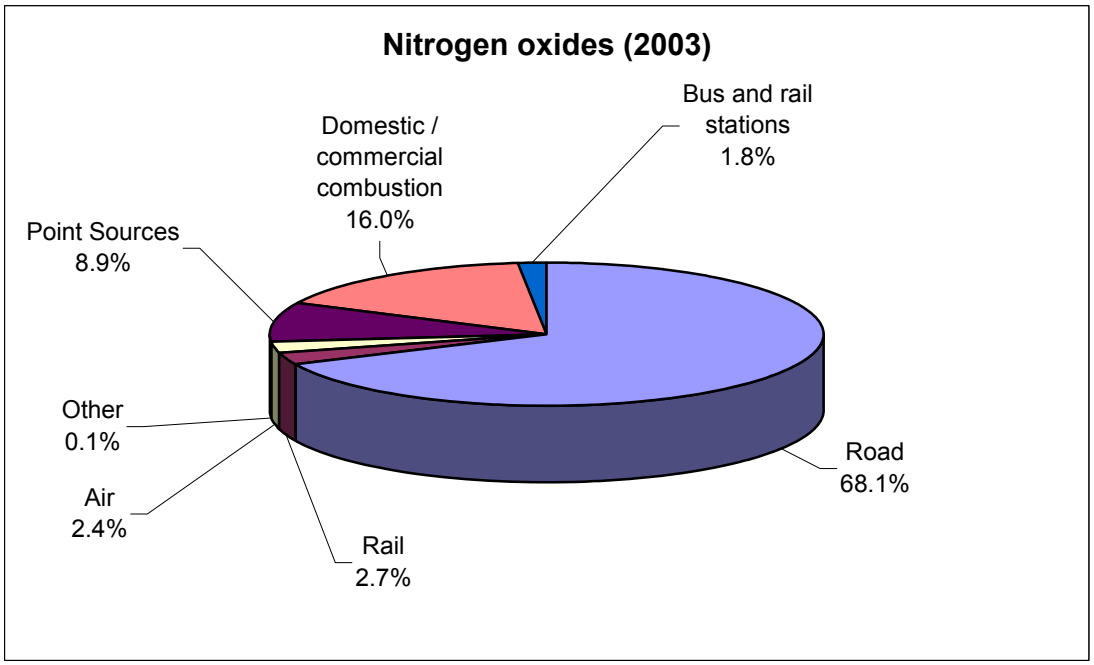
Local air quality pollutant concentrations are largely determined by the amount of emissions released in the area, local weather and terrain features. The major sources of emissions within Greater Manchester and Warrington are detailed in the **EM**issions **I**nventory for the **G**reater **M**anchester **A**uthorities and Warrington (EMIGMA). The EMIGMA database is updated each year, the latest report was produced in March 2005 and estimates the emissions produced in the area during 2003.

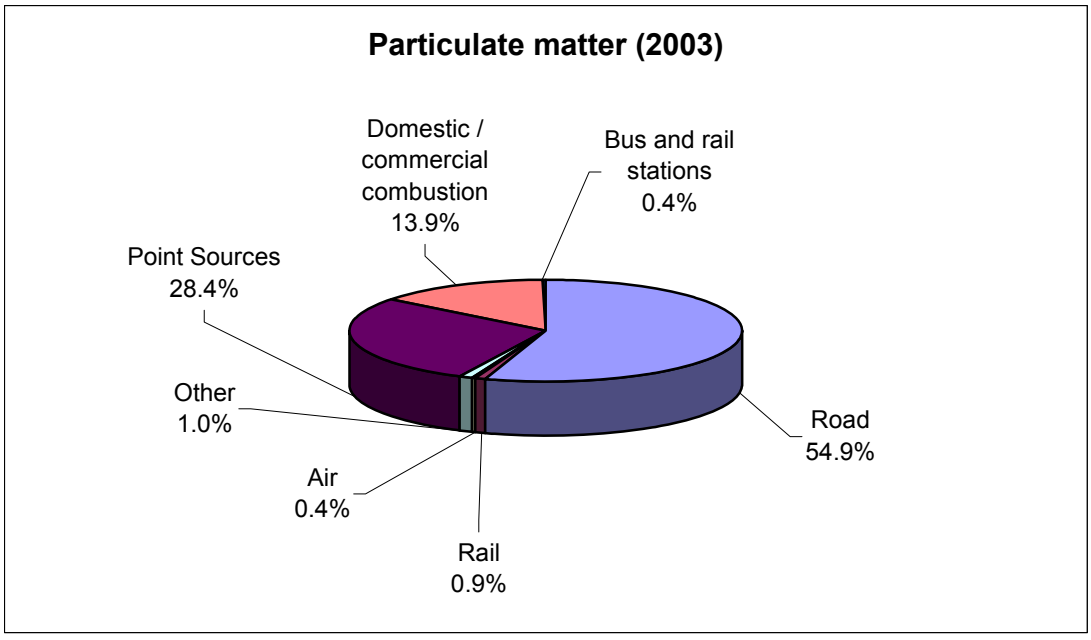
The database contains information on the emissions of pollutants identified in the UK's Air Quality Strategy (Appendix 2.0) from all identifiable sources in the area. The emissions are grouped into three broad categories:

- Stationary point sources – predominantly industrial processes
- Mobile line sources – emissions from road, rail and air transport
- Area based sources – this category includes emissions from domestic and commercial combustion

The latest EMIGMA inventory shows that road transport is the most significant source of pollution across Greater Manchester for both nitrogen oxides and PM10, contributing 68% and 55% of total emissions in 2003 respectively (Figure 2.1 below). Emissions from road transport are emitted at ground level unlike the majority of emissions from industrial and combustion sources where the emission point is often from a chimney stack (A higher point of release allows the pollution to disperse more effectively). Consequently, emissions form road transport has a greater direct impact on human health

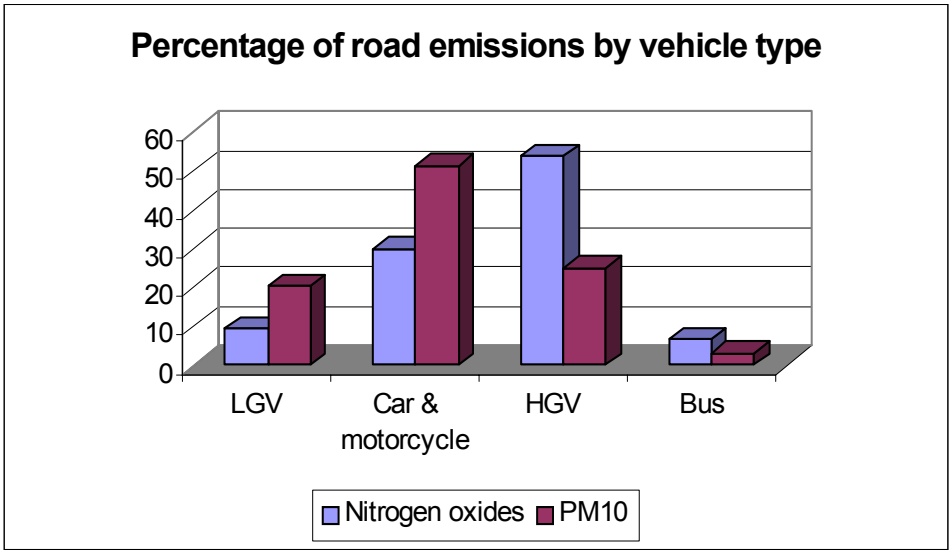
Fig. 2.1: Emission sources of nitrogen oxides and particulate matter (PM_{10}) in Greater Manchester (2003) (do not include emissions in Warrington)
(Source: The Greater Manchester and Warrington Emissions inventory 2003 Update, March 2005, prepared by CATE and GMTU on behalf of the Greater Manchester and Warrington Authorities)





The emissions from road transport have been broken down into vehicle type. Despite making up a relatively small proportion of vehicles on the road, heavy goods vehicles contribute over half of the emissions of nitrogen oxides on major roads in Greater Manchester (and Warrington) as can be seen in the graph below. Emissions from cars and motorcycles are also a significant source of both PM10 and nitrogen oxides.

Fig. 2.2 Percentage of road emissions by vehicle type in 2003
(Source: The Greater Manchester and Warrington Emissions inventory 2003 Update, March 2005, prepared by CATE and GMTU on behalf of the Greater Manchester and Warrington Authorities)



Whilst buses contribute to only a small proportion of the total, in some locations buses can contribute to elevated pollution levels. Since improvements to the public transport system are needed to encourage modal shift, it is therefore important that future actions address emissions from buses as well as other road traffic.

Emissions from industrial sources and domestic fuel burning contribute towards a much lower proportion of ground level pollution concentrations than road traffic. Emissions from these sources may not lead to exceedances of the air quality objectives on their own, but in combination with other sources they do contribute to the problem. Action to address emissions from non-transport sources is being taken by the Greater Manchester Authorities through a separate, but complimentary process, to the GM LTP2.

The major road network, in particular the motorways, are identified as areas where ground level pollution concentrations are highest. The correlation between

the highways network and high levels of emissions is clearly evident by looking at the Greater Manchester AQMA map (Figure 2.0).

The EMIGMA database will continue to be updated on behalf of the Greater Manchester authorities; it will be used to provide data for LTP2 monitoring reports to enable trends in emissions to be assessed. Further detailed air quality dispersion modelling will be carried out during 2006/07, this will include an assessment of the contribution that road and non-road sources make to ground level pollution sources in line with DEFRA guidance.

2.7 National Air Quality Summary

Since 1993 air quality in urban areas of the UK has improved significantly whereas rural areas have not shown any particular trend. To date, 183 Local Authorities have declared AQMAs, the majority of which are linked to exceedances of the nitrogen dioxide air quality objective.

The government acknowledges that both national and local transport measures are required in order to meet air quality objectives. Although the focus of this strategy and action plan is on local transport measures, it is important that any measures are complimentary and consistent with national policy. Key recent national policies relating to the road transport sector are summarised in the table below. Wider marketing or information programmes within the transport sector have not been included:

POLICY	DETAILS
Unleaded Petrol	Went on sale in 1986 and was compulsory for new vehicles after 1st April 1988 in the UK. Leaded fuel was phased out in 1999.
Euro I engine standards*	Mandatory from 1993 for new cars and heavy vehicles (and 1994 for light goods vehicles). Accompanying change in petrol and diesel quality.
Lower Sulphur diesel fuel	Introduced for diesel for road transport, such that fuel containing less than 0.05% or 500ppm, sulphur was mandatory after 1st October 1996.
Euro II engine standards*	Mandatory for new vehicles from 1996 – 1998.
Euro III engine standards*	Mandatory for new vehicles from 2001 - 2002
Change Sulphur Content	Reduced in 2000 to 150ppm for petrol and 350ppm for diesel. (along with changes to benzene content),
Ultra-low Sulphur fuel	Due to be introduced in 2005 and reduced sulphur content to 50ppm for petrol and diesel. The UK implemented this policy early in 2000 to 2001, through the introduction of duty differentials.
Euro IV engine standards*	Mandatory for new vehicles from 2006
***Please refer to Fig 5.1 for further information relating to EURO Standards**	

Source: Evaluation of the Air Quality Strategy (2004) – AEA Technology

National air quality policy and measures have had a positive impact on the pollutants as highlighted in the table below:

Policy	NO_x	PM_{10}	CO	VOC	1,3 But	Benz.	B[a] P	CO_2	SO_2	Lead
Unleaded Petrol										✔
Euro I cars	✔	✔	✔	✔	✔	✔	✔	✔		
Euro I all vehicles	✔	✔	✔	✔	✔	✔	✔			
Lower S diesel fuel		✔							✔	
Euro II	✔	✔	✔	✔	✔	✔	✔			
Euro III	✔	✔	✔	✔	✔	✔	✔			
Change S content		✔							✔	
Ultra-low S fuel		✔							✔	
Euro IV	✔	✔	✔	✔	✔	✔	✔			

Source: Evaluation of the Air Quality Strategy (2004) – AEA Technology

The estimated reductions in pollutant levels from 1990 to 2001 due to national policies and measures, relative to a no abatement scenario, are as follows:

POLLUTANT	OVERALL EMISSION REDUCTION
Due to fuel based standards	
Lead	99%
SO2	96%
Benzene	84%
Due to EURO Vehicle Emission Standards	
NO_x	36%
PM_{10}	48%
CO	42%
VOC	55%

Source: Evaluation of the Air Quality Strategy (2004) – AEA Technology

The emission reductions associated with national policies and measures are projected to increase in the period up to 2010. The forecast reductions relative to a no abatement scenario are summarised in the table below:

POLLUTANT	OVERALL EMISSION REDUCTION
NO_x	69%
PM_{10}	76%
CO	78%
VOC	81%

Source: Evaluation of the Air Quality Strategy (2004) – AEA Technology

Progressively stringent mandatory EURO low emission engine standards (See Figure 5.1 – EURO Emissions Summary) on all new vehicles is identified as a as a key national policy in lowering road transport emissions. Further emission reductions are projected to occur past 2010. National policies have only had a small effect in reducing carbon dioxide emissions, the levels have actually increased relative to 1990 due to subsequent rise in transport activity.

2.8 Carbon Dioxide and Climate Change

Transportation in the UK contributes significantly towards total UK greenhouse gas emissions. In particular, the burning of fossil fuels produces significant amounts of carbon dioxide and nitrous oxide. Transport carbon emissions from road transport in the UK account for 24% of total emissions, and it is expected to rise by a further 9% by 2010.

Greenhouse Gases

Carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and a group of halogenated compounds (such as CFCs, PFCs and SF_6) are the main greenhouse gases produced by human activities.

GREENHOUSE GAS	DESCRIPTION
CARBON DIOXIDE (CO2)	Produced when carbon-based fuels are burned in combustion engines and processes. Oxygen from the atmosphere combines with the carbon emissions to produce carbon dioxide.
METHANE	Some human activities, such as landfilling and raising livestock, add to the levels of methane in the atmosphere. A direct product of the manufacture and combustion of some biofuels and fossil fuels.
NITROUS OXIDE (NOx)	The major source of man-made nitrous oxide emissions is from agricultural soils. Other sources include agriculture, biomass burning, industry, and fossil fuel powered transport.
HALOGENATED COMPOUNDS	CFCs are being phased out, but are still present in older refrigerators and air conditioners.

The Greenhouse Effect & Climate Change

The phenomenon whereby the earth's atmosphere traps solar radiation, caused by the presence in the atmosphere of gases such as carbon dioxide, water vapour, and methane that allow incoming sunlight to pass through but absorb heat radiated back from the earth's surface. Human activity, in particular the burning of fossil fuels, has increased the amount of greenhouse gas in the atmosphere. Evidence strongly suggests that this is causing global climate change which will have serious implications for humans and biodiversity alike if the release of greenhouse gases continues un-abated.

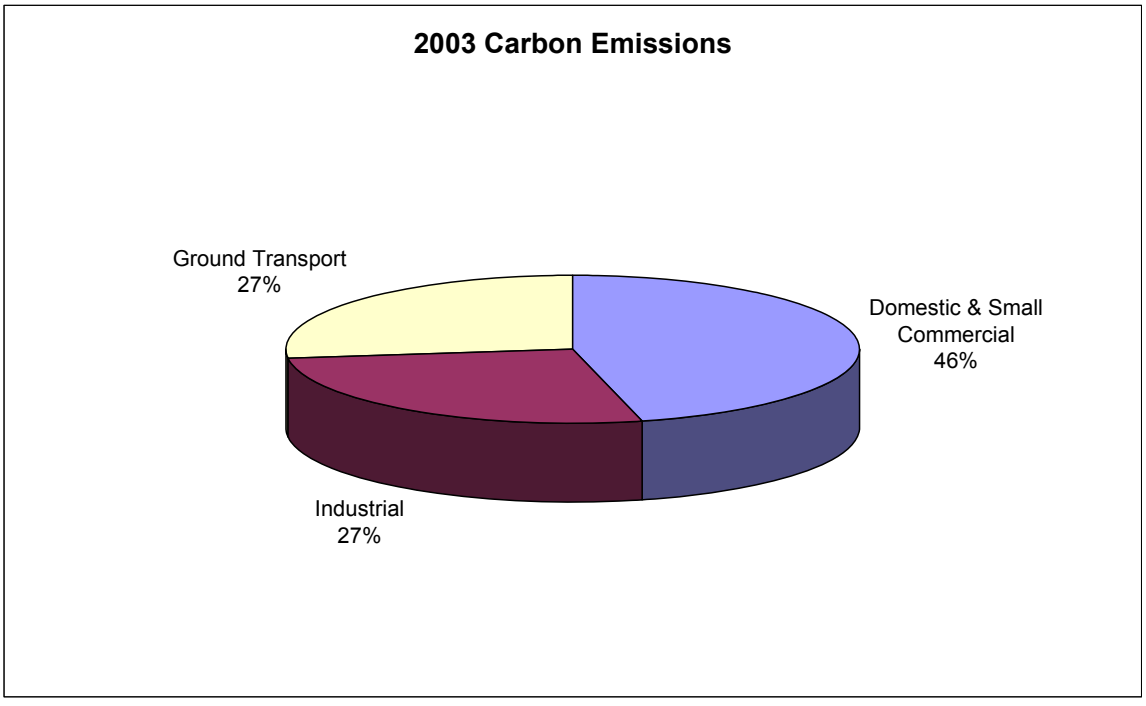
In February 2003, the Government published its Energy White Paper, *Our Energy Future - Creating a Low Carbon Economy*. The White Paper reaffirmed the commitment originally set out in the UK Climate Change Programme (CCP) in 2000. This was to meet the UK's international legally binding target of reducing

greenhouse gas emissions by 12.5% below 1990 levels by 2008-12, and move towards the domestic goal of cutting carbon dioxide (CO2) emissions by 20% below 1990 levels by 2010. In addition, it announced the intention to reduce total current carbon dioxide emissions by some 60 per cent by 2050. Measures to reduce emissions from transport are therefore vital if the UK is to meet its climate change objectives.

Although climate change is regarded as a global phenomenon the causes and therefore solutions to the problem need to be addressed at a local level. The LTP2 Guidance (2004) highlights that all local transport plans must endeavour to contribute towards the UK's CO2 commitment and demonstrate how wider local transport policies would contribute to the achievement of CO2 targets.

In GM ground transportation is a major source of carbon dioxide emissions. Fig.2.3 below shows the results of carbon baseline work conducted in 2005 as part of the Sustainability Northwest and Manchester Knowledge Capital initiative "Manchester: The Green Energy Revolution". Transport modeling reveals that without significant action carbon dioxide emission levels will increase as polluting vehicle activity increases.

Fig. 2.3 – 2003 Greater Manchester Carbon Emissions by Sector



Source: Manchester: The Green Energy Revolution Final Report (2005). Quantum Strategy & Technology & Partners

2.9 Manchester Airport & Air Quality

Manchester Airport is the third busiest airport in the UK and one of the busiest in Europe, handling 23 million passengers in 2005. The Airport has three passenger terminals and two runways; the second runway opened in February 2001, providing the most substantial increase in national airport capacity for many years. The Airport serves a wide catchment area across Northern Britain, although the majority of passengers are from the North West Region.

Globally, aviation is growing at 4-6% per year. The Government's White Paper "The Future of Air Transport" identifies that Manchester Airport will play a significant part in providing capacity, both for the North of England and as a relief for the increasingly congested South East. It is forecast that 40 million passengers could travel through Manchester Airport by 2015. This will result in a commensurate increase in aircraft movements and, unless managed properly, the potential for greater impact upon the environment and the local community.

Over the years, Manchester Airport has developed its air quality monitoring and modelling capability to more fully understand the impact of airport-related activities on local air quality, including the production of a comprehensive emission inventory for the site and annual reporting of air emissions. Nitrogen dioxide (NO2), particulate matter (PM10), sulphur dioxide (SO2) and ozone are measured using an AURN monitoring station operated jointly with Manchester City Council, located at the airport/community boundary. Regular meetings with Local Authority Environmental Health Officers permit a wider debate on the local air quality issues.

The main sources of ground sourced emissions associated with the airport include:

- Road traffic accessing the airport site.
- Fugitive emissions (e.g. evaporation) during fuelling of vehicles and aircraft.
- Exhaust emissions from operational vehicles and mobile plant on site.
- Power generation plant: diesel generators, boiler plant and the combined heat and power plant.
- Miscellaneous emissions from activities such as fire training.

The main source of NO2 is from aircraft operations and road traffic, whilst most particulates and SO2 arise from vehicles and ground service equipment.

Manchester Airport has implemented several initiatives to reduce air emissions, including the provision of fixed electrical ground power (mains electricity) to supply an aircraft's electrical system whilst parked. This reduces the use of a jet aircraft's auxiliary power unit or mobile diesel generator and the resultant atmospheric emissions and noise. New, low-emission airside and car park buses

have been purchased and the fitting of particulate traps is currently taking place which will remove about 90% of these emissions from the vehicle's exhaust. Regular testing of vehicles, both around the terminals and on the airfield, takes place to ensure MOT emissions standards are being met.

Manchester Airport has set a target to increase the number of surface access journeys by passengers and staff by public transport. This has impacts in terms of congestion, air emissions, including greenhouse gases and the use of land for car parking.

Recent work has included funding the rail link to the Airport, working with train operators to develop a comprehensive network of direct rail services and subsidising off-peak bus services. The Station, a £60M transport interchange, opened in summer 2003, providing a high-quality facility for passengers, staff and the general public to change between rail, local bus, coach and in the future, Metrolink with convenient access to the terminal areas.

The Airport's Employee Travel Plan details how car journeys by staff will be tackled through a series of improvements and incentives to encourage the use public transport – the main message being that small changes in travel habits will make a difference.

The Airport is committed to managing and controlling emissions of all pollutants arising from Airport operations and has therefore developed its own action plan to support those being produced by local authorities in Greater Manchester and Cheshire. The Airport Company also promotes industry best practice for air quality management with service partners. The policies and targets within this action plan are given in the Airport's Environment Plan to 2015. Progress against these targets is reported annually in the Airport's Sustainability report. The Environment Plan also includes a chapter on the Airport's climate change strategy, the calculated emissions and future targets.

Emissions directly linked to aircraft are not included within this strategy. Central Government is directly responsible for aviation emissions. Further information can be found in the 2003 White Paper, "The Future of Air Transport".

2.10 Highways Agency & Air Quality

The Highways Agency (HA) strategic approach to air quality is outlined in "Towards a Balance with Nature – HA Strategic Environmental Plan". The plan outlines the HA approach to air emissions management

"To take practical steps to minimise emissions. This includes appropriate highway designs to influence vehicle operation plus controls on the performance of contractors. In addition we seek to encourage our partners in the vehicle and construction industries to play their part in reducing emissions"
Towards a Balance with Nature – HA Strategic Environmental Plan (1998

The key HA document of relevance to transportation and air quality in GM is the M60 Route Management Strategy (2005) Aspects of the M60 RMS strategy of relevance to air quality are summarised below:

Policy Objective – (ENV4) Seek to reduce the effects of the road network on air and noise pollution.

Route Outcome – (Ongoing High Priority) Improved Air Quality for residents adjacent to the Route and reduced greenhouse gases. (Route Outcomes set out what the HA will seek to obtain from the Route over the 10 year period of the Route Management Strategy).

Targets - (Environment) Improve air quality by meeting the Air Quality Strategy targets for carbon dioxide, lead, nitrogen dioxide, particles, sulphur dioxide, benzene and 1,3 butadiene (Joint with the Department for Environment, Food and Rural Affairs).

Problems and Issues - The Route Performance Report reviews indicate that the annual mean objectives for 2005 on the M60 will be exceeded for NO2 and PM10 for Oldham, Rochdale and Tameside and just NO2 for Bury and Stockport. The annual mean objectives for 2010 are likely to be exceeded for NO2 and PM10 for Oldham and Rochdale and just NO2 for Stockport. The remaining authorities within Greater Manchester through which the route passes are expected to follow a similar trend with exceedances of both NO2 and PM10 in 2005 and 2010. In particular, the report highlighted issues through Sharston Bypass M56 J1 to J3, M60 adjacent to Urmston/Brookhouse M60 J5 to J8, M60 J12 to J13, along the A663 'Broadway' and the M602 J2 to J3. Projections show that the volume of traffic will increase resulting in an increase in carbon dioxide.

Action - The HA recognise in M60 strategy that they should consult with local authorities to confirm air quality 'hot spots' along the route and work with them to identify measures available to reduce exposure levels of properties adjacent to the route and to prioritise and implement measures

Other HA Route Management Strategies of relevance in GM include the M6 Route Management Strategy developed in 2002

3. Strategy Development

3.1 Drivers

This strategy and action plan has been developed in a bid to reduce emissions associated with local transportation in GM over the next five years. The key drivers for the development of this document are:

- The release of DfT & DEFRA guidance outlining the requirement for local authorities to integrate the Air Quality Action Plans (AQAPs) with LTP2s.
- The need to update the GM strategy dealing with air quality and transportation.
- The need to improve integration and partnership working between strategic GM air quality stakeholders in order to effectively address air quality issues through local transport measures.

3.2 Function

This strategy and action plan is submitted as part of the GM LTP2. The key functions of this document are to:

- Provide an expanded air quality & local transport strategy that supports and compliments the GM LTP2.
- Provide a summary and baseline of the current air quality situation in GM highlighting any significant problems and issues.
- Outline key strategic air quality actions to be delivered across GM
- Provide guidance for GM Districts to aid integration of air quality elements into future transportation works programmes.
- Outline specific air quality actions to be delivered by the GM LTP2 Steering group, the Greater Manchester Public Transport Executive (GMPTE), the Freight Quality Partnership (FQP) and LTP2 Air Quality Working Group.
- To help develop effective partnerships with key strategic air quality stakeholders, in particular the Highways Agency and Manchester Airport, in order to holistically address all transport related air quality issues

3.3 Integration with GM AQAP

The following extract is taken from guidance released by DEFRA in March 2005 regarding the integration of AQAPs into LTP2s:

"It will ultimately be up to those local authorities with AQMAs to decide whether they should integrate their AQAPs into the LTP. However, it is recommended that integration should take place, where, for example, local road transport is identified as a major source of local air pollution concentrations (aside from background concentrations) within the AQMA or where local road traffic is the major source of predicted exceedances of the air quality objectives."
(LAQM PGA(05) DEFRA (March 2005)

The advice is reiterated in the full guidance on LTPs:

"Local authorities responsible for local air quality management should integrate Air Quality Action Plans, where transport is the primary factor, into the Local Transport Plan covering their area. The Government strongly recommends this approach, because this integration should enable air quality problems to be dealt with in a more corporate and multi-disciplinary way and will encourage transport planners to work more closely with environmental health departments and other colleagues in devising appropriate solutions."
LTP2 Full guidance, DfT (2004)

The GM authorities agreed to build on existing joint air quality work and integrate the GM AQAP and the GM LTP2. The guidance stipulates integration is permitted if local road transport is identified as a major source of local air pollution. The emission source apportionment analysis (Fig 2.1-2.2) clearly indicates that road transport is a primary source of air emissions linked to the designation of AQMAs. Analysis of the AQMA map (Fig 2.0) also reveals a strong correlation between emissions and the highways network.

In addition to meeting the criteria stated in the guidance GM recognises a number of benefits associated with the integration process:

- It will help increase the profile of air quality in local and sub-regional transport planning.
- It will provide a source of long-term funding for schemes that benefit air quality.
- It should increase communication across local authority districts and departments i.e. transport planners, air quality officers and sustainability officers will have to work together.
- Integration should ensure that air quality is being dealt with in a more corporate and multi-disciplinary manner, providing best value for use of available resources.

3.5 Integration & Development

Local transport and air quality action planning integration work has been undertaken in GM since 2001 through work by the GM Air Quality Action Planning Group. The group was attended by Environmental Health Officers, Transport professionals and planners. More recently in 2004 the GM Air Quality Steering group, the Association of Greater Manchester Authorities (AGMA) and the LTP2 steering group recommended a joint approach to addressing air quality issues. An air quality workgroup (including air quality, transport policy and sustainability officers) has been meeting since autumn 2004 in order to progress the integration process. Activity to date includes:

- Monthly meetings held by the LTP2 air quality workgroup to move forward the integration agenda.
- Separation of the transport and non-transport actions within the GM AQAP.
- Review and updated of the existing transportation actions in the GM AQAP to reflect new air quality research and new guidance.
- A workshop was held on 17th June 2005 to update relevant stakeholders (including the Highways Authority, Manchester Airport, GMPTE & district representatives) of the integration progress
- Full review of relevant national guidance and strategy documents
- Consultation with appropriate stakeholders.
- Development of an evidence based approach.
- Consideration of the recommendations of the GM LTP2 Strategic Environmental Assessment (SEA)

During the process of integration it was recognised that a more robust transportation and air quality strategy and action plan was required to effectively address emerging issues. Of particular importance was the need to address carbon dioxide (CO2) and other greenhouse gases. The GM AQAP does not directly address carbon dioxide (because it is not and emission that is directly harmful to human health). New research also indicates that secondary NOX pollutants and smaller particulates (PM2.5) related to transport need to be addressed due to the negative impact on human health (Further details in Section 2.2 and Section 4 below). These issues have been considered during the development of this strategy.

4. Strategy, Guidance and Research Review

4.1 Introduction

The following chapter contains a review of national guidance and research documents relevant to air quality in the context of *local transport.* There are two main aims of this section

a) Review and assure compliance with relevant central government guidance and strategy
b) Summarise key research documents relevant to air quality and local transport

A more extensive list of relevant local transport/air quality publications can be found in the "References" section at the back of this document.

4.2 National Guidance & Strategy

There exists a large body of European and international policy that is relevant to the GM LTP2. The policies and programmes do not appear below but the content will tend to be reflected through national policy and legislation.

For guidance and analysis regarding the integration of GM LTP2 and the GM AQAP please refer to Chapter 3.0

Local Transport Plan Two (LTP2) Guidance (Dec 2004) - DfT

Guidance released for local authorities in 2004 that details the methodology and approach that should be adopted when producing the second round of local transport plans. The guidance states local transport plans covering air quality should:

- Build on local air quality review and assessment work, and local air quality strategies, where these exist
- Quantify the source of contributions to the predicted air quality exceedances
- Set out how the measures contained in the LTP, as a whole, will enable authorities to move towards meeting the air quality objectives - and identify any measures that are specifically aimed at addressing these issues
- Report on all the options that have been considered - including any air quality management options that fall outside the responsibilities of local transport authorities - and justify the selection of the approach proposed by the authority, if possible in terms of value for money
- Quantify the expected air quality and wider environmental, social and economic impacts of the proposed measures/actions that are to be implemented, and indicate, where possible, as to whether these measures will be sufficient to work towards meeting the air quality objectives

- Set out, where possible, a 2004/05 baseline and a 2010/11 target relating to pollutant concentrations, supplemented by annual trajectories for progress against targets for intermediate outcomes (see below for further information) related to air quality objectives
- Indicate how progress will be monitored and reported through Annual Progress Reports, and how the authority will evaluate the effectiveness of the actions planned
- Include evidence of relevant internal or external consultation activities carried out by the local authorities involved, particularly with local stakeholders such as the Highways Agency and local business/community groups
- Demonstrate that risks towards achievement of the objectives have been fully considered
- Seek to integrate the air quality assessment with Strategic Environmental Assessment of all LTPs subject to SEA requirements.

National Air Quality Strategy for England, Scotland, Wales and Northern Ireland (2000) - DEFRA

The strategy outlines the plans drawn up by the Government to improve and protect ambient air quality in the UK in the medium-term. The proposals aim to primarily protect people's health but also the environment without imposing unacceptable economic or social costs.

The strategy sets objectives for the reduction of ground-level concentrations of eight air pollutants deemed harmful to human health (Appendix 2.0). Monitoring and performance assessment against these objectives is conducted by local authorities in areas where people are regularly present and might be exposed to air pollution. The objectives are the same or similar to mandatory limit values set in European Directives, which the UK Government is legally obliged to meet. The Air Quality Strategy is currently under review, focussing mainly on measures to help deliver the objectives. Local authorities have a duty to review and assess local air quality against seven of the pollutants subject to the Strategy. Where it is found these objectives for those pollutants are unlikely to be met by the due date, they must declare Air Quality Management Areas (AQMAs) and prepare Action Plans setting out proposals to tackle the problems.

The Future of Transport: a network for 2030 White Paper (2004) - DfT

A Government white paper released in 2004 outlining the government's strategy for delivering a coherent, multi-modal, sustainable transport network. The three main themes outlined for delivery are sustained investment over the long-term, improvements in transport management and effective planning ahead. One of the key objectives underlying the strategy is balancing the need to travel with the need to improve quality of life. In particular, the strategy indicates there should be

a focus on delivering improvements in design and technology to improve air quality and reduce greenhouse gas emissions.

Transport 2010 – The 10 year plan (2000) – DETR

This document was produced by the Department of the Environment, Transport and the Regions (DETR) in 2000 and outlines the Government's ten year transport plan. The strategy identifies the following air quality and greenhouse gas UK targets:

- Environment: To improve air quality by meeting our National Air Quality Strategy targets for carbon dioxide, lead, nitrogen dioxide, particles, sulphur dioxide, benzene and 1,3 butadiene.
- Environment: To reduce greenhouse gas emissions by 12.5% from 1990 levels, and move towards a 20% reduction in carbon monoxide emissions by 2010

DTI – Energy White Paper – Our Energy Future – Creating a Low Carbon Economy (2003)

In February 2003, the Government published its Energy White Paper, Our Energy Future - Creating a Low Carbon Economy. The White Paper reaffirmed the commitment originally set out in the UK Climate Change Programme (CCP) in 2000. This was to meet the UK's international legally binding target of reducing greenhouse gas emissions by 12.5% below 1990 levels by 2008-12, and move towards the domestic goal of cutting CO2 emissions by 20% below 1990 levels by 2010. In addition, it announced the intention to reduce total current carbon dioxide emissions by some 60 per cent by 2050. Measures to reduce emissions from transport are therefore vital if the UK is to meet its climate change objectives.

4.3 Air Quality & Local Transport National Research & Review

The following section contains a summary of key air quality and local transport research and review documents that have been considered in the production of this strategy and action plan:

An Evaluation of the Air Quality Strategy (2004) – AEA report to DEFRA

In 2004 AEA technology conducted a review and evaluation of the 2000 National Air Quality Strategy on behalf of DEFRA. A number of conclusions and recommendations were drawn:

- For the transport sector it is possible that the UK may now be at the stage where targeted local action is more cost-effective than national level policies, in particular regarding nitrogen dioxide reduction. This is because

the remaining exceedances of the NOX objective (Appendix 2.0) are mostly in the centres of large urban areas.

- The NO2 objective is currently being met in the great majority of the UK and cost benefit assessment alone does not support further action beyond the existing objectives for NO2. This is because NO2 is probably a threshold pollutant, unlike, for example, particulates.

- The NO2 objective and further action to reduce NOX may be justified in cost-benefit terms when associated NOX linked secondary pollutants (nitrates and ozone) and additional impact categories (ecosystems) are included in the analysis.

- However, such secondary pollutants are regional pollutants; locally based objective levels are not relevant. Therefore future policy approach might achieve greater overall health and environmental benefits by considering different policy approaches e.g. by trying to reduce overall pollution weighted exposure to these secondary pollutants rather than focusing on hot-spots.

- Future air quality policies should take account of secondary pollutants such as ozone and secondary particulates. The modelling and analysis of these pollutants is complex and time consuming, and this will have potential implications for the resources needed for future appraisal.

- It is widely accepted that there is no safe population threshold for PM10. Further PM10 reductions will have continued health benefits.

- The greatest health benefits, per tonne of PM10 abated will occur in large urban areas. This is because these areas have higher population densities (and so emission reductions lead to a much greater reduction in population weighted exposure). Emission reductions in these areas are therefore likely to be much more cost effective, as they have order of magnitude greater benefits than say emissions in rural areas. This may also mean that future policy will be more cost-effective (in improving health) if it is targeted towards specific sources. To illustrate, for road transport PM10 we know heavy goods vehicles undertake most of their vehicle km on motorways. A more cost effective approach to targeting PM10 emissions from road transport areas might therefore be to target the diesel light goods vehicle fleet at a national level, reflecting their higher urban activity levels.

- Future air quality policies need to be strongly linked with greenhouse gas emissions reductions. This is important because the air pollution costs of the transport sector and ESI have reduced enormously since 1990 – and are predicted to continue falling to 2010. With respects to the full social

costs of road transport or electricity production, the social cost of carbon will become as important (if not more so) than the social costs of air pollution. This is in strong contrast to the position in the early 1990s.

- Policies therefore need to adopt a more holistic approach to environmental policy making, with closer links between air quality and climate change policy.

An Evaluation of the Air Quality Strategy - Local Road Transport Measures (2004) – AEA report to DEFRA

In addition to the main National Air Quality Strategy evaluation report an additional study focusing on local transport measures in the context of air quality improvements was undertaken by AEA for DEFRA. The key findings of the report are summarised below:

- Scheme that are directed at emissions improvements, such as low emission zones, scrappage schemes and motorway speed restrictions lead to the biggest emissions improvements, and have the largest air quality and health benefits.

- Most of the local transport schemes that are primarily aimed at improving traffic flow or public transport have relatively low emission and air quality benefits, though this is not surprising because these schemes are aimed at other problems (e.g. congestion).

- Local transport measures are potentially effective, but effectiveness is extremely site specific.

- The most effective measures for improving health are not necessarily the most effective measures for achieving the air quality objectives because of the nature and extent of health effects from different pollutants. To illustrate, an individual scheme may have large health benefits (when compared to another) but actually achieve less progress towards air quality objectives

- There are two ways to consider the future effectiveness of air quality improvement:
  - To focus on the progress towards legally binding air quality limit values or objectives.
  - The second is to focus on maximising health benefits. i.e. to focus on economic efficiency and delivering most health benefits for least cost.

- These two policy objectives are not necessarily consistent, i.e. achieving the air quality objectives does not necessarily deliver maximum health benefits. The reasons are as follows:

- Nitrogen Dioxide is probably a threshold pollutant at least for short-term exposure. Once the standard has been achieved there maybe no additional health benefits from reducing concentrations further.
- Thee are however benefits in reducing NOX emissions and associated secondary pollutants.

- In contrast health benefits do occur when reducing PM10 at concentrations below the existing objective level, as there is no threshold of effect for the pollutant. Moreover, PM10 dominates the health impacts of air pollution.

- Future PM10 reduction policy will be more effective if overall health improvement is the primary driver of air quality improvements by targeting PM10 reductions, even below the objective levels, across large urban areas, i.e. focusing on the population weighted reduction. This is in contrast to the current focus on the meeting of the air quality objectives (or progress to lower objectives) at specific hot-spots. The implication is that policy and any local measures might best be targeted towards PM10 reductions at the entire urban (city-wide) level, rather than at local measures that target particular roads or corridors. Such an approach should maximise the population-weighted reduction in exposure. This is different to the focus on reducing air quality exceedances, where the location of emissions is important, i.e. where particular roads or transport corridors are usually of concern. We also have found that the health benefits from PM10 reductions are greatest in very large urban areas (i.e. London and other major conurbations), due to the high population density in these areas. Reducing pollution in these areas will achieve greatest health benefits per tonne of pollution abated. All of these issues have important implications for the types of future policy initiatives and the policies and schemes introduced to address them.

- For future policy for nitrogen dioxide and oxide reduction, greater health and environmental benefits might be achieved by considering different policy approaches that aim to reduce NOX and secondary pollutants, rather than focusing on NO2 hot-spots (certainly beyond the current objective).

- The study found that the local measures that are most effective in improving air quality are different to the measures that have greatest overall urban benefits across wider urban sustainability objectives. This stresses the importance of achieving the right balance at local level between actions that concentrate on local measures primarily aimed at improving local air quality, and/or those that give the greatest benefits consistent with improving the urban environment more generally (i.e. towards overall urban sustainability that improves congestion, accidents, noise, air quality, etc).

- The study predicts that the improvements in air quality from many local measures will decline in future years, as the traffic fleet becomes cleaner (even accounting for traffic growth). This means that the same measure will

have less effect if introduced in 2007 than if introduced in 2000. The ranking of measures will also change over time, depending on the scheme type, and whether it affects certain vehicles in the fleet, or modal shift more generally.

Climate Change Programme Review – Sustainable Development Commission (May 2005)

The Sustainable Development Commission (http://www.sd-commission.org.uk/) is the Government's independent advisory body on sustainable development. The Commission reports to the Prime Minister and the First Ministers of the Devolved Administrations.

Transport Carbon emissions from road transport account for 24% of the total emissions, and it is expected to rise by a further 9% by 2010. The recently published figures for carbon emissions from the UK in 2004 confirm that the emission reduction path towards the 2010 target is not on track. The Climate Change Programme Review provides recommendations on how the government can achieve the climate change commitment of reducing CO2 levels by 20% (over 1990 levels) by 2010 and by 60% in 2050. A goal of achieving a 50% cut in carbon emissions from road transport by 2025 (over 1990 levels) through a combination of technological and behavioural change.

The report highlights a number of transportation measures that can be introduced to achieve carbon savings, in particular demand management measures:

- Prioritisation of behavioural change measures in Local Transport Plans
- Good public transport facilities, cycling/walking infrastructure services at points close to this infrastructure
- Removal of financial barriers: such as benefits in kind, and higher mileage rates for larger, more polluting vehicles;
- All public sector bodies to adopt travel plans and modal shift targets

For carbon savings to be made through the demand management measures listed above complimentary measures must also be developed in order to "lock-in" improvements. These include:

- Co-ordinated parking restraints between local authorities
- Implement road charging schemes that will dramatically reduce congestion as well as emissions. A combination of distance and congestion charging will be necessary to tackle both congestion and carbon emissions.
- Increasing the contribution of biofuels to 5% of all road transport fuels
- Reducing the speed limit from 70mph to 65mph can make a significant difference to vehicle emissions, and while there may be some loss of time this is likely to be balanced out by less congestion, fewer accidents and therefore less public spend. France enforced strict speed limits on main motorways in 2003 and succeeded in reducing accidents by 30% and carbon emissions by

19%. It is worth exploring how this success could be replicated in the UK as a policy option for emissions saving. Our assessment is that around 1.5MtC could be saved per year through speed control measures.

- Specific measures to ensure take up of lower carbon vehicles: we have concentrated on the impact of increased VED levels, and on industrial policy for encouraging manufacture of hybrid vehicles in the UK;

Technical and Non-technical Options to Reduce Emissions of Air Pollutants from Road Transport (2005), *AEA report to DEFRA*

The report contains many best practice local road transport policies, schemes and technological examples that can be implemented and utilised to lower road transport linked emissions and improve local air quality.

5. Problems and Issues

5.1 Introduction

This section further expands on countywide transport related air quality problems and issues highlighted in Chapter 2.0. There are three key areas of focus. A summary of the emissions of concern, a summary of the different sources of emissions and an analysis of environmental and behavioural factors that influence the type, amount and impact of emissions released.

5.2 Emissions Summary

Like many urban centres in the UK, local road transport emissions in GM adversely affects air quality. Figure 5.0 provides a summary of the key pollutants that have been identified as an issue. Of the emissions listed, nitrogen dioxide (NO2) is the most significant. All of the GM AQMAs (Figure 2.0) have been declared on the basis of predicted exceedances of the NO2 objective in 2010 if corrective action is not taken. In addition, the mandatory assessed LTP2 air quality indicator and target (LTP8) is directly linked to reducing NO2 concentrations in areas that exceed the NO2 health based objective.

Fig 5.0 – Key Emissions Summary

Pollutant	Summary
Particulates (PM10)	The PM10 national air quality objective (Appendix 1) is generally being met across GM. There are however concerns relating to levels in the regional centre and on urban centre roads with high bus usage. Research indicates that PM10s is not a "threshold pollutant" i.e. there is no safe level for human exposure; however, lower concentrations have a lesser impact. This is reflected in the new Clean Air For Europe (CAFÉ) EU Thematic Strategy (2005) which states that EU Member States must significantly lower the current PM10 objective level by 2010. It is likely that many areas of GM will not meet a more stringent objective unless efforts continue to reduce transport linked PM10s.
Ultra fine Particulates (PM2.5)	A new objective for "Ultra-fine" PM2.5 reduction is proposed in the EU CAFÉ Thematic Strategy. Evidence indicates that elevated levels of PM2.5 have a significant negative impact on human health. Presently there is limited knowledge of PM2.5 levels in GM. Initial assessments indicate that actions will be required to reduce PM2.5 in order to meet any future UK targets linked to EU legislation.
Nitrogen Oxides (NOX)	Transport related NOX emissions are a significant problem in GM. Accordingly, the level of NOX in GM is a mandatory target within GM LTP2 with a challenging 30% reduction of transport related NOX emissions by 2010/11. The impact of NOX is particularly significant given it is a precursor for other harmful pollutants, notably NO2 and ozone. Actions to reduce levels of NOX need to continue in order to meet the target set.
Nitrogen Dioxide (NO2)	NO2 is a secondary "threshold" pollutant (i.e. it is thought there is a safe exposure level). All the AQMAs in GM were declared on the basis of exceedances of the NO2 national air quality objective. Significant progress has been made over the past five years to reduce the level of NO2. Further work must continue, in particular if reduction methods also reduce levels of the NO2 precursor NOX.
Regional Pollutants - (Ozone, Nitric Acid, Photochemical Smog)	Regional pollutants are defined because they are inherently transboundary in nature i.e. emissions are prone to "drift" from the point of origin. This has implications for directly monitoring and assessing the effects of local transport measures on local air quality. Consequently, the requirement to achieve regional pollutant objectives remains the UK Government's responsibility; however, GM is committed to contribute towards meeting regional pollution objectives.
Green House Gas (GHG) Emissions	The most significant transport linked GHG emission in GM is Carbon Dioxide. The GM LTP2 has adopted a subsidiary target to address CO2 levels across the conurbation. Although not directly harmful to human health the continued growth of GHG emissions has serious environmental, social and economic implications for everyone. Trends indicate CO2 transport linked emissions have been steadily increasing in GM. Without action to address this issue the emissions will continue to rise.

5.3 Emission Source Summary

This section provides a summary of air quality problems and issues associated with different transportation modes across GM.

Cars

National measures introduced since the early 1990's, including mandatory Euro standards for new cars (Figure 5.1), lead free petrol, low sulphur fuel and improved fuel efficiency have had a significant impact in lowering harmful emissions associated with cars. Significant reductions have been achieved in NOX, sulphur, lead and particulate emissions. The trend of cleaner cars is set to continue as older, more inefficient cars are removed from the active vehicle stock and replaced with cleaner, more efficient newer cars.

In GM, emission levels linked to the average active car stock are falling in line with the national trend; however, the number of car journeys is increasing with a forecast increase of over 200,000 cars over the next 5 years. In particular, there is an increase in women drivers and the working population in general as economic activity increases. More journeys coupled with associated increased congestion are negating to some degree the positive impact of cleaner vehicle technologies. In particular, the increased number of car kilometres travelled per year is contributing significantly to transport linked CO2 emissions.

A further issue negating the impact of cleaner technologies concerns the rise in popularity of sports utility vehicles (SUVs) otherwise known as 4x4. In general, SUVs produce more emissions than other types of car due to larger engine sizes (Appendix 4.0). Research also indicates that fatalities and injury severity increases in road accidents involving SUVs compared to other types of car (Appendix 5.0)

The increasing use of air conditioning in cars is another relatively new issue that is contributing towards local pollution problems. Additional fuel is consumed (therefore more emissions are produced) in order to create the additional energy needed to power air conditioning system.

Fig 5.1 – EURO Emissions Summary

EURO EMISSION STANDARDS

Regulation of both fuels and vehicles has lead to emissions being made progressively cleaner over time. 'Euro Standards', set out by the European Union, state the maximum allowable vehicle emissions. Before new vehicles can be sold in Europe they have to meet the relevant Euro Standard that limits the amount of pollution that they emit. Four groups of pollutants are regulated by these standards, carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx) and particulates (PM). It must be noted that carbon dioxide is not one of the pollutants tested, however, reductions have been achieved through increased fuel efficiency associated with EURO standards.

The first Euro Standard, Euro 1, was phased in from 1992. The emissions limits have been reduced progressively with each following standard introduced. The next standard, Euro II, was phased in from 1996 and Euro III from 2000. Future standards to be phased in will be Euro IV, to take effect from 2005/2006, and additionally for heavy-duty engines Euro V, from 2008. Euro V (light duty engines) and Euro VI (heavy-duty engines) limits are being developed and should come into force around 2010 and 2013 respectively. Evidence indicates that EURO standards are having a significant impact on decreasing emissions associated with road transport across the UK.

Table: Summary of Years of Euro Standards Introduction

	Car	LGV	HGV	Bus
Euro I	1993	1994	1993	1993
Euro II	1997	1997-8	1996	1996
Euro III	2001	2002	2001	2001
Euro IV	2006	2006	2006	2006

Appendix 6.0 highlights emission reductions associated with each EURO standard for different types of vehicles. There is a clear trend downward trend to the degree of impact each new EURO standard is

Buses

The key emission associated with buses in GM is particulate (PM10) and fine particulate matter (PM2.5). Across GM buses contribute only a small proportion of total emissions (Fig 2.2). The GMPTE and GM Districts actively work with bus operators to promote clean technologies and buses with Euro-standard engines (Fig 5.1) are gradually increasing in number.

Many air quality issues associated with buses in GM are localised due to the nature of bus transport i.e. fixed routes and stationery public transport hubs. The most vulnerable sites are urban areas with high bus use and/or a high proportion of older buses, such as Oxford Road and Piccadilly Gardens in the regional centre. Buildings in urban areas tend to reduce the rate of dispersion increasing the concentration and creating pollution “Hotspots”. These areas tend to have a high population density and through flow because they are often residential, shopping, entertainment and employment centres. As a consequence, even though buses produce a proportionally small amount of pollution compared to

other forms of transport in GM, it tends to have a significant health impact due to the high level of population exposure. Further compounding the problem, toxicological evidence suggests that sporadic exposure to very high but short lived 'spikes' of particles, as found in "Hotspots" is more toxic than exposure to the same dose spread evenly throughout the day (Source: MANUni).

Freight – Light Goods Vehicles (LGV) & Heavy Goods Vehicles (HGV)

The GM LTP2 contains a Freight Strategy and action plan. The mission statement of the strategy is *"To promote efficient, safer and environmentally friendly freight movement in Greater Manchester, review existing environmental safeguards, and address the need for improved efficiency and environmental performance, in the context of existing conditions and those likely to arise as a result of increasing traffic growth on the County's transport network".* The Freight Quality Partnership (FQP) was set up in 2002, with the purpose of developing and delivering the GM Freight Strategy.

In 2004 there were 27,230 goods vehicles are registered in Greater Manchester, with an average age of 4.6 years. Heavy goods vehicle flows on local roads has fallen nearly half between 1991 and 2003 and by 4% on motorways. This has largely compensated for the growth in car and light goods vehicle flows on local roads. One-third of road freight tonnage in the county passes through the area without stopping.

Despite making up a relatively small proportion of vehicles on the GM roads, heavy and light goods vehicles contribute over 60% of the emissions of nitrogen oxides and over 40% of PM10s (Fig 2.2). National measures, such as the introduction of Euro standards (Fig 5.1) will partially address this issue but further local transport measures and action is required.

Taxis

Taxis are an important form of public transport. They provide a demand responsive alternative when other modes of transport are unsuitable. Taxis are particularly important to help deliver improved accessibility for the mobility impaired. In 2004 there were 7884 private hire taxis and 1814 hackney carriages in GM. Based on Wigan mileage data average mileage for private hire vehicles is 39,351 per year and 33,630 for hackney carriages. Therefore total estimated mileage for taxis in GM is 371,248,104 miles per year.

Many of the issues relating to taxis and air quality are much the same as those for privately owned cars; however, there are a few slight nuances. There are far fewer taxis than private cars but the average taxi travels many more miles per year. The majority of taxi trips are undertaken in urban areas and areas of high population and generally existing poor air quality due to high traffic volumes. As with buses, these facts potentially increase the impact that emissions from taxis

have due to high population exposure relative to the amount of emissions produced.

Reports produced as part of the GM Cleaner Vehicles emissions testing programme have revealed that higher proportion of taxis fail emissions tests compared to private cars. A detailed analysis of taxi activity in GM can be found in the report “An assessment of the potential effectiveness of introducing an age limiting vehicle licensing policy on controlling exhaust emissions from taxis within the Greater Manchester and Warrington areas (2005).

Powered two-wheelers (PTW)

Powered two-wheelers (PTW) offer a low emission motorised vehicle option. They make up less than 1% of the modal share for all trips made across GM. As part of the LT”P2 process a PTW Strategy is being developed which will include further air quality impact analysis.

Light Rail - Metrolink

Electric powered light railway transportation, such as the Metrolink in GM, produces zero/low point of source emissions therefore do not have a direct, negative impact on human health. However, light rail contributes indirectly towards greenhouse gas emissions if the electricity used is generated from fossil fuel sources.

Heavy Rail

As with light rail, electric powered heavy rail produces zero/low point of source emissions but contributes indirectly towards greenhouse gas emissions if the electricity used is generated from fossil fuel sources. Rail fuelled directly by fossil fuel can have a negative impact on local air quality, particularly when older locomotives are regularly used.

Cycling & Walking

Cycling and walking are zero emission modes of transportation. Modal shift to cycling and walking from other types of transport will improve air quality and reduce greenhouse gas emissions. Key issues relate to addressing the difficulties in changing peoples travel patterns and encouraging a modal shift away from polluting modes of transportation, in particular the car, to walking and cycling. The GM LTP2 contains a cycling and a walking strategy.

5.4 Behaviour and Environment Summary

This section provides a summary of behavioural and environmental factors that have an impact on air quality, emissions and exposure to pollutants.

Increased Mileage by Polluting Modes

Increasing the number of trips made by polluting vehicles in an area will increase point of source of emissions unless cleaner vehicle improvements reduce emissions at source thus negating the impact of more trips.

GM transport models indicate mileage could increase by 4% between 2006 and 20011. It is expected that the majority of growth will occur on motorways given the past trends on local roads, past and proposed increases in motorway capacity, and proposed reallocation of local road capacity to benefit public transport, pedestrians and cyclists

Congestion

There is a clear correlation between areas of congestion and air quality issues. Levels of emissions are higher on congested roads compared to the same roads with free flowing traffic. There is a strong correlation between areas with high congestion levels and poor air quality across GM.

High Speeds

Motorised vehicles travelling at high speeds, in particular, or over 60 miles per hour, are less efficient than when travelling at lower speeds and therefore create proportionally more emissions per mile travelled (Rotterdam: 2004). High speeds on the highways network also contribute towards congestion by creating bottlenecks and contributing towards congestion at junctions and roundabouts.

Motorways

Due to high speeds, high traffic volumes and the tendency for congestion to build up during busy periods of the day, motorways and the areas around them, are associated with high levels of transport related emissions.

Within GM, traffic on the M6, M60 circular, M602, M66, M62, and M56 is linked to high levels of modelled and monitored emissions. The 2005 GM AQMA map (Fig 2.0) shows a clear correlation between the motorway network and high concentrations of nitrogen dioxide. GM transport modelling forecasts an increase in vehicle mileage the motorway network during the next five years.

Urban Centres

Many urban centres are prone to poor air quality at ground level. In part, this is due to the high volumes of traffic and associated traffic flow problems leading to congestion. However, areas with tightly packed high-rise buildings surrounding busy roads act as emissions traps and hinder ground level dispersion of

emissions. As a result, very high, harmful pollution concentrations can build up very quickly during busy periods. Evidence suggests that exposure to high levels of emissions, in particular NO2 and particulates, for short periods of time is more harmful than an even dose throughout the day.

In the GM Regional Centre, monitoring and modelling studies undertaken in the areas around Piccadilly Gardens and along Oxford Road suggest harmful "peaks" of particulates and NO2 occur. The GM AQMA map (Fig. 2.0) is indicative that similar problems exist in other urban centres throughout GM.

Population Exposure

Changes in emission levels directly harmful to human health in areas with a high population density and/or through flow will have a proportionally greater impact on human health per emission unit released than less populated areas. Action in urban areas is therefore likely to be much more cost effective, as it will result in benefits of a greater order of magnitude than emissions in rural areas. There are two key issues with this approach however -

- It can promote the displacement and movement of pollution opposed to overall reduction and therefore is not consistent with CO2 targets. (CO2 is not directly harmful to human health).
- Population exposure approach is less effective for non-threshold pollutants, where there is no safe level for exposure. Potentially you may be causing greater problems by dispersing pollution over a greater area, exposing a greater number of people to a lesser dose.

Vehicle Age

Due to improvements in fuel efficiency and vehicle emission standards, in particular EURO standards (Fig 5.1 & Appendix 6.0), older vehicles produce disproportionate amounts of pollution compared to similar newer vehicles. By increasing the number of EURO standard vehicles in the vehicle stock, overall emission reductions will be achieved. Further details of the impact of vehicle age on emissions specific to GM can be found in the 2004 "GM Cleaner Vehicle" scheme analysis report (2005).

Vehicle Maintenance

Poor vehicle maintenance can increase levels of emissions by a significant amount. The problem is often compounded because older vehicles are often those in a state of poor maintenance. By simply servicing and tuning vehicles at regular intervals significant emission reductions will be achieved. Further details regarding the impact of vehicle maintenance on emissions specific to GM can be found in the 2004 "GM Cleaner Vehicle" scheme analysis report (2005).

Alternative Fuels & Low Emission Technology

As a general rule fuels that produce the lowest amount of total end pipe emissions per kilometre travelled (i.e. hybrid, electric) offer the best option to improve local air quality. The situation is complicated somewhat because different types of fuel produce different types of emissions in different quantities. It is therefore important when choosing to use and promote fuel in a specific location that local air quality conditions are considered. For instance, vehicles running on diesel produce relatively high levels of particulate matter when compared to other fuels. An increase of diesel vehicles in an AQMA declared on the basis of particulate exceedances would be counter productive. Figure 5.2 below contains a summary of different fuels and relative emission levels.

The two key issues in GM hampering attempts to increase the uptake of alternative fuels and technology are the relatively high cost of emission abatement technology and fast pace of development limiting futurity. Secondly, the lack of alternative fuel refuelling infrastructure in the area. It will be difficult to address these issues locally without national support, including grant schemes for clean technologies and changes to fuel duty regime to the benefit of fuels with lower emissions

Fig 5.2 – Relative Emission Comparison for Different Fuels

	EMISSIONS		
FUEL TYPE	**CO_2**	**NO_x**	**Particulates**
Petrol	**HIGH**	**HIGH**	**LOW**
Diesel	**HIGH**	**MEDIUM**	**HIGH**
Electric	**LOW**	**ZERO**	**ZERO**
LPG	**MEDIUM**	**HIGH**	**LOW**
Hybrid Electric	**MEDIUM**	**MEDIUM**	**LOW**
5% Bio Diesel	**MEDIUM**	**MEDIUM**	**HIGH**
100% Bio Diesel	**LOW**	**MEDIUM**	**HIGH**
5% Bio Ethanol	**MEDIUM**	**HIGH**	**MEDIUM**
100% Bio Ethanol	**LOW**	**HIGH**	**MEDIUM**
Fuel Cell (Hydrocarbon)	**MEDIUM**	**ZERO**	**ZERO**
Fuel Cell (Hydrogen)	**LOW**	**ZERO**	**ZERO**
Natural Gas	**MEDIUM**	**MEDIUM**	**LOW**
Cycle/Walk	**ZERO**	**ZERO**	**ZERO**

Air Quality & Social Deprivation

The 2000 report produced by AEA for DEFRA "Analysis of Air Pollution and Social Deprivation" suggested a tentative correlation between poor air quality and social deprivation in some areas of large cities in the UK.

Financial & Social Inequities

Potentially indiscriminate "Polluter Pay" schemes including types of road user charging and congestion charging may result in the car becoming an un-affordable mode of transport for many sections of the public regardless of their needs. The most vulnerable users are likely to be self-employed trades people, people with mobility problems and working single parent families. The GM LTP2 Accessibility strategy fully addresses issues associated with transport and inequities.

Accessible Developments

There is a correlation between areas with high levels of sustainable accessibility and areas with existing poor air quality. This poses a problem as to whether to permit developments in these areas where it is known that the air quality will have a negative impact on human health. However, developments in less sustainably accessible locations with comparatively better air quality will cause wider strategic problems. For example, isolated Greenfield business park site developments encourage the use of cars for commuting journeys. The overall number of trips will increase by more polluting non-sustainable modes if development occurs in areas with poor sustainable transport accessibility.

5.5 Detailed District Problems and Issues

The GM Air Quality Action Plan Progress Report 2005 contains a detailed breakdown of air quality problems, issues and emission levels for each GM District. The report was produced and submitted to DEFRA and the DfT (LTP2 APR) in 2005. A progress report will be produced annually and submitted both to DEFRA and as part of the LTP2 annual progress report. GM Districts also conduct a detailed air quality review and assessment every three years to monitor and report on local air quality issues.

6. Strategy Overview

6.1 Objective and Aims

The key objective for delivering lower local transport related emissions in Greater Manchester is:

To sustainably reduce the negative impact of local transport related emissions to a minimum; in doing so contribute towards meeting national health based air quality objectives and national greenhouse gas reduction commitments

The supporting aims are to:

- Reduce the negative impact on human health of transport linked emissions.
- Reduce the need to make trips by polluting modes.
- Reduce the number of trips made by polluting modes by applying the sustainable transport hierarchy principle in the decision making process. In particular, focus on increasing the number of zero emission walking and cycling trips in instances when travel is necessary.
- Promote and use emission abatement technologies and alternative fuels to reduce emissions associated with polluting vehicles. Focus on addressing issues relating to the most polluting vehicles and in areas where emissions have proportionally greater impact on human health per emission unit released.
- Facilitate, promote and encourage the use of clean public transport as an alternative to the car.
- Improve fuel efficiency and therefore reduce emissions by providing appropriate information, route planning and driver training.
- Influence travel behaviour to reduce emissions by implementing intelligent traffic management measures and road design aspects to increase fuel efficiency and support low emission modes.
- Deter and prohibit activity responsible for contributing towards transport related pollution problems and issues through regulation and enforcement.
- Support and promote developments in sustainable, accessible locations
- Consider population weighted exposure to negative emission impacts in addition to total emission output when planning, assessing and prioritising schemes intended to improve air quality.
- Where appropriate, target specific emission “hotspots”, but in doing so, do not displace pollution and associated problems and issues to different locations.
- Support national air quality measures and contribute towards regional and national air quality and climate change targets and objectives.

6.2 Strategy Themes

The following section highlights local transport strategy themes and practices that if adopted will deliver air quality improvements and greenhouse gas emission reductions across GM. Each section includes details of best practice examples and present and future opportunities in GM to improve air quality. The air quality actions contained in Chapter 8 are directly linked to themes and practices outlined in this section.

1. TRANSPORT MANAGEMENT & INFRASTRUCTURE

Intelligent transport management and improvements in sustainable transport infrastructure have potential to impact positively on both air quality and congestion.

Speed Control Measures – Recent studies and research (Rotterdam 2004) have indicated that by reducing the maximum speed limit on motorways to 50 mph significant emission reductions can be achieved. The emission reductions are realised as a result of increased fuel efficiency of cars at lower speeds and better through flow at junctions, roundabouts and friction points resulting in reduced congestion linked emissions.

Walking and Cycling Infrastructure – The creation of new, and the enhancement of existing walking and cycling infrastructure and environments will promote and facilitate the use of these modes. This will benefit air quality because walking and cycling are zero emission modes of transport.

Car Parking – Effective management and enforcement of car parking responsibilities can be used to improve air quality. In particular, demand management of car parking space can contribute towards limiting the volume of polluting vehicles in pollution "Hotspot" areas. Cross District co-ordination and communication is necessary for effective management and delivery of desired outcomes.

Public Transport Priority Measures – Public transport priority measures fall into two major categories. Measures that are based on facility design that usually consists of exclusive lanes for buses on arterials as well as infrastructure design that facilitates the movements of the public transport vehicles. Secondly, measures that rely on traffic control and range from changes to fixed-time signal settings so that they favour the movements of public transport vehicles, to signal priority locally or network-wide to assist their movements in real-time. Such measures will help to improve air quality by increasing the popularity of public transport and reducing the number of polluting vehicles on the road by "locking-in" road space for sustainable modes.

2. REGULATION AND ENFORCEMENT

Regulation and enforcement are key tools in both removing emissions at source and controlling emission levels. Measures can function as deterrents, restrict polluting activity and help to raise awareness. Application can be somewhat limited at the local transport level due to reliance on national policy to grant sufficient financial resource and statutory powers.

Roadside Emission Testing – Roadside emission testing is an effective way of addressing emission issues associated with poorly maintained and old vehicles. The Cleaner Vehicles Campaign was successfully implemented in LTP1 and is an excellent example of a "polluter pays" measure. A combination of formal and informal emission checks were conducted, with fixed penalty notices issued if vehicles failed to meet required emission standards. The 2004 GMTU "Cleaner Vehicle" scheme analysis report (2005) provides further details regarding the success of the campaign. Further opportunities for vehicle emission testing can be delivered in partnership with Vehicle and Operator Services Agency (VOSA) www.vosa.gov.uk.

Public Transport Service Provider Contracts – Contracts with public transport service providers can include EURO emission standard requirements (Fig 5.1) and other air quality abatement criteria such as particulate traps and the use of zero/low emission fuels (Fig 5.2).

Road User Charging (Area) – A designated area, as in London, where a driver of a polluting vehicle incurs a cost upon entering. Although an effective measure to reduce emissions within the targeted area, caution must be exercised to ensure the emission problem is not relocated. In particular, areas on the periphery of a designated zone can be vulnerable.

Road User Charging (Distance) – A scheme in which a charge is applied per kilometre travelled. Likely to see more uniform emission reductions across all areas which will be beneficial for "non-threshold" (no safe exposure level) emissions i.e. particulates. Intelligent pricing tariffs in certain areas could be used to target "hotpots" of threshold pollutants (Those pollutions with a recognised safe exposure level).

Traffic Regulation Conditions – Use powers granted by the revised regulations to limit the emissions associated with public transport on heavily polluted corridors. Conditions provide an important mechanism to target specific pollution hotspots with a high population density and/or through flow.

3. SMARTER CHOICES

There is concern that improvements secured through cleaner vehicle technology will be overtaken by continued growth in traffic leading to an increase in air emissions. To combat this effect there is a need to encourage modal shift from more polluting forms, such as single use car journeys to more sustainable, lower emissions modes.

Professional and co-ordinated marketing, promotion and communication are essential for the success of modal shift change. Recent research by UCL/Halcrow funded by the DfT New Horizons fund concludes that behavioural change must contribute two-thirds of the total transport related CO2 emissions reduction required to meet Kyoto targets. Measures including personalised travel planning, increased access to information, effective training and the provision of guidance materials are important. Such measures are often grouped together under the banner of “Smarter Choices”. The key aim of Smarter Choice schemes is to encourage the use of existing sustainable transport infrastructure by improving the delivery and quality of transportation information provided. Typical measures include:

Workplace, Residential and School Travel Plans – Travel plans provide an effective mechanism for organisations to deliver, assess and improve “Smarter Choice” type initiatives in order to achieve modal shift to sustainable modes of travel from the car.

Home Delivery & Remote Working – Reduce emissions by encouraging behaviour that negates the need to travel. For example, home working, home delivery of products and services and video conferencing.

Personalised Travel Planning Information – Deliver personalised travel information to individuals and small groups to encourage modal shift towards lover polluting forms of transport.

Marketing Campaigns – Raise awareness and promote the use of lower polluting modes of transport. Support national sustainable travel campaigns including “Change the Way We Travel Month”, “Bike to Work Day”, “In Town Without My Car” day and “Walk to School Week”.

Car Clubs and Car Sharing Schemes – Reduce the number of car trips made by increasing the number of passengers. Fewer trips will result in lower emissions. Car clubs also offer an opportunity to integrate emission control i.e. develop car clubs with low emission vehicles such as hybrids and electric.

4. PLANNING POLICY & DEVELOPMENT CONTROL

Planning policy and development control can be used effectively to reduce emissions associated with transport at source and delivering change in the medium and long-term. There are three key methods of approach:

- Encourage development in sustainable locations
- Prevent development in vulnerable areas i.e. areas of existing poor air quality with high population density or through flow. However, there is a need to balance this approach with the needs of regeneration and economic growth and development.
- Secure air quality mitigation measures through planning gain and section 106 agreements such as travel plans and sustainable travel infrastructure investment.

The GM Authorities and the Greater Manchester Passenger Transport Executive (GMPTE) will work closely with planning policy and development control departments to integrate transport related air quality issues, aspects and impacts at a district and regional planning level.

Planning Policy – Increase the profile of air quality in the Regional Spatial Strategy, Local Development Frameworks, Sustainable Communities Plan and Neighbourhood Renewal Strategies. In particular, protect infrastructure that reduces the negative impact of freight on air quality and infrastructure supportive of sustainable and accessible transport schemes and policy.

Air Quality Planning Guidance – Develop air quality guidance to influence GM local authority development plans to consider impacts of developments and highlight mitigation measures. Guidance should include details of air quality mitigation measures including restrictions of the number car parking spaces associated with a development and securing travel plans through 106 agreements.

Impact Assessments – Utilise impact assessment tools in the planning system to identify negative air quality impacts and inform mitigation measures. Health impact assessments (HIA), environmental impact assessments (EIA) and transport assessments (TA) should be used where appropriate.

5. CLEAN/ TECHNOLOGY, FUELS & PRACTICES

Clean technologies and fuels offer an opportunity to negate and reduce emissions at point of source. Increased uptake will result in reduced emissions and therefore contribute towards improving local air quality. Although many clean technology and fuel measures are delivered at a national level i.e. low fuel duty on biodiesel, EURO engine standards (Fig. 5.1), it is possible to promote and help facilitate measures locally to increase uptake.

EURO Emission Standards - Appendix 6.0 highlights the potential of EURO engine standards to reduce tail pipe emissions. Significant local emission reductions can be achieved by encouraging the use of EURO III accredited or later vehicles.

Financial Support – Provision and facilitation of grant and financial support for low emission technologies and practices. The highest impact can be realised when targeted at the most polluting vehicles such as freight vehicles, Council fleets and buses in urban centres.

Sustainable Fuel Infrastructure – Encourage suppliers to provide sustainable fuel and electricity charging points across GM, in particular in urban centres and supporting freight and local authority fleets.

Local Authority Fleet Management – Utilise lower emission technology by developing GM Local Authority fleet management policies that consider air quality issues. Expand down the supply chain by including air quality standards in tenders and contracts for service providers.

Older Vehicle Scrappage Schemes – Scrappage schemes work by reducing the number of older, high polluting vehicles within the current vehicle stock, consequently reducing total vehicle stock emissions. Recent Transport Research Libratory (TRL) research indicates that by removing 50% of pre-1993 cars from the road network a reduction of approximately 5% in average urban concentrations of NO2 and PM10 could be achieved.

Driver Training - Effective driver training can reduce the amount of tailpipe emissions from all polluting vehicles. Often measures can be simple such as telling bus drivers to turn the engine off when stationary for extended periods at bus stops and stations.

6. INTERNAL AND EXTERNAL PARTNERSHIPS

Effective partnerships with internal and external air quality stakeholders are essential in efforts to lower transport related emissions.

- Hold regular internal meetings in each GM District involving transport policy, planning policy, environmental health, sustainability and travel planning officers and managers in order to effectively deliver the key strategic actions within this document.
- Work with the Highways Agency to identify schemes on motorways and trunk roads can improve air quality.
- Continue to work closely with Manchester Airport to address ground and air related emissions.
- Encourage stakeholder participation in the Carbon Trust management scheme
- Develop partnerships and promote Groundwork and the local Energy Efficiency Advice Centres.
- Continue to work closely with bus operators to lower emissions.
- Develop internal District air quality groups that include representatives from planning, transport, environmental health and sustainability.
- Develop partnerships with Sustainability Northwest and Manchester Knowledge Capital GM carbon dioxide reduction initiative “Manchester: The Green Energy Revolution”.
- Work with developers to improve the air quality impact of new developments.

7. Key Stakeholders & Delivery Strategy

7.1 Summary

The key deliverables of this strategy and action plan are to

- Provide an expanded air quality & local transport strategy that supports and compliments the GM LTP2.
- Provide guidance for GM Districts to aid integration of air quality elements into transportation works programmes.
- Provide a summary and baseline of the current air quality situation in GM highlighting any significant problems and issues.
- Outline key strategic air quality actions to be delivered across GM
- Outline specific air quality actions to be delivered by the GM LTP2 Steering group, the Greater Manchester Public Transport Executive (GMPTE), the Freight Quality Partnership (FQP) and LTP2 Air Quality Working Group.
- To develop effective partnerships with key strategic air quality stakeholders, in particular the Highways Agency and Manchester Airport, in order to holistically address all transport related air quality issues

7.2 Action Plan Delivery

The actions within the GM LTP2 Air Quality Action Plan Table (Chapter 8) are grouped into the following five sections:

- A: LTP2 Air Quality Working Group Actions
- B: GM LTP2 Steering Group Actions
- C: GM Freight Quality Partnership (FQP) Air Quality Actions
- D: GMPTE/GMPTA Actions
- E: Greater Manchester Countywide Actions

Sections A to D have been grouped together according to the air quality stakeholder specifically responsible for project managing the delivery of the action. For example, all the actions in Section A will be project managed by the GM LTP2 Air Quality Working Group; however, other stakeholders may well be involved with actual delivery of the action. The majority of these actions are specific in nature and will be delivered by stakeholder representatives of AGMA and the GMLTP2 strategy and process.

Section E contains strategically themed countywide actions applicable to all air quality stakeholders within GM. All GM Districts have taken account of these actions when developing individual District LTP2 local transport works programmes and during GM segment working discussions (For further details relating the GM segment approach please refer to the main LTP2 document*).*

7.2 Key Delivery Stakeholders

Below is a summary of the key stakeholders responsible for implementing the GM air quality actions outlined in the action plan table in Chapter 8:

LTP2 Steering Group - Group responsible for steering, managing the delivery and co-ordinating the development of the GM LTP2. Members include representatives from the GM Districts, GMPTE, GMPTA, Highways Agency and Manchester Airport.

GM Districts - The ten GM Authorities – Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Stockport, Tameside, Trafford and Wigan. Transportation managers are primarily responsible for project managing the delivery of relevant GM wide actions and liaising with appropriate internal and external district air quality partners.

LTP2 Air Quality Working Group - Group created in 2004 following the decision to integrate the GM AQAP and the GM LTP2. The group consists of air quality, planning, transport and sustainability officers from the GM Districts. The role of the group is to improve co-ordination and partnership working between appropriate air quality stakeholders and provide expertise on air quality issues. Membership of he group will expanded in the LTP2 period to include officers from the GMPE, Highways Agency and Manchester Airport. The group reports to the LTP2 Steering Group and the GM Air Quality Steering Group.

Greater Manchester Passenger Transport Executive (GMPTE) & Greater Manchester Public Transport Association (GMPTA) - GM Districts contribute finance from local taxes and appoint local councillors to the GMPTA to represent their district. The Authority decides on public transport policy for the county and provides the funds for GMPTE to carry out these policies. GMPTE is the trading name of the county's Passenger Transport Executive whose role is to carry out these policies.

Freight Quality Partnership (FQP) - The FQP was set up in 2002, with the purpose of developing a Freight Strategy to improve the efficiency of freight movement in Greater Manchester, whilst mitigating its environmental impact. The Freight Strategy was a required component of LTP1, but had to sit within the context of the Regional Freight Strategy. Membership is the FTA (chair), RHA, GMTU, Wigan, Trafford, Bury (environmental health re. air quality), Manchester , Stockport, Highways Agency, GM Police, Traffic Commissioner (watching brief only), Freightliner, EWS, Freight Forwarders, and Manchester Airport. Anybody can join if they have a freight role or a particular freight movement concentration in their area. The FQP reports to the LTP2 steering group.

7.3 Other Stakeholders

Below is a summary of those stakeholders that have an important function in delivering better air quality in GM.

GM Air Quality Steering Group – Responsible for development and management of non-transport linked countywide air quality actions and consultation on actions developed by the Transport Air Quality Working Group. The group consists of senior environmental health, GMPTE and transport officers and planners.

Public Health Bodies & Public Health Directors – Public health bodies, namely the Association of GM Strategic Health Authorities and Association of Greater Manchester Primary Care Trusts, are consulted on the wider transport and health agenda, including the negative health impact of poor air quality.

Highways Agency (HA) – The HA is responsible for managing the trunk road and motorway network. HA representatives sit on appropriate LTP2 linked transportation and air quality groups.

Manchester Airport - Manchester Airport is the third busiest airport in the UK and one of the busiest in Europe. The Airport serves a wide catchment area across Northern Britain, although the majority of passengers are from the North West Region. Airport representatives sit on appropriate LTP2 linked transportation and air quality groups

Manchester: The Green Energy Revolution – A Manchester Knowledge Capital initiative aimed at reducing transport and non-transport linked carbon dioxide emissions.

GM Environmental Managers Group – The group consists of GM District environmental and sustainability officers and managers. Part of the remit of the group is to work towards reducing non-transport and transport carbon dioxide emissions across GM.

Planning Officers Group (POG) – The Greater Manchester Planning Officers Group has membership drawn from the ten GM planning authorities and is also supported by representatives of other organisations including Government Office North West (GONW), GMPTE, Manchester Airport and the AGMA Planning Units. It meets regularly to consider matters of concern, such as AGMA's contribution to the Regional Spatial Strategy.

7.5 Future Development/ & Continuing Improvement

A number of areas have been identified that require further development in order for this strategy and action plan to continue to effectively address air quality issues as and when they arrive. Accordingly, actions have been included within the revised action plan for work to progress in the areas below.

Evidence Base – Work will continue to strengthen the air quality evidence base on which decisions are made and local transport schemes and interventions are developed. This will be delivered through improvements in air quality modelling, monitoring, consultation and scheme assessment methodology.

Training & Capacity Building – Training will be organised by the GM AQ Working Group and GMLTP2 Steering Group to capacity build Districts to improve delivery of better air quality in local transport schemes. This will be supported through the segment & corridor approaches (see below) adopted by the central GM LTP2 document to encourage and improve cross GM District working and integration.

GM LTP2 Segment & Corridor Approach – Further work will continue to develop air quality actions and monitoring regimes to be delivered in identified GM congestion corridors and GM segments. (For further details regarding the GM segment & corridor approach please refer to the main GM LTP2 document).

Further Research - A consistent and up to date evidence base is essential to successfully address dynamic air quality issues and solutions and to accurately inform policy, guidance and promotional materials it is essential to conduct pilot feasibility studies of innovative approaches for effective air quality management.

New Actions - The central GM action plan and associated District action plans will be reviewed annually. The review will take into account any new evidence, national strategy and research/pilot results. Relevant stakeholders will be consulted on the development of new actions

Air Quality Monitoring & Reporting - All GM Districts will continue to monitor and assess air quality in their areas in line with regulatory responsibilities outlined in the Environment Act (1995). Chapter 9 provides further details regarding monitoring and reporting.

Update District AQAPs- Districts will create internal working groups that include representatives from planning, transport, environmental health and sustainability officers to further progress improved local air quality actions.

Non-transport GM AQAP Actions – The GM Air Quality Steering Group has taken ownership of the non-transport elements of the GM AQAP. Further work is planned to revise and develop the actions in the near future.

8. Action Plan

8.1 The Action Plan Tables Explained

Below is a brief summary of the terms used in the air quality action plan tables:

Reference – Short reference code for action.

Project Manager – Stakeholder(s) listed in Section 7.1 responsible for the project management of the action. The actions have been split into five sections based on project manager responsibility.

Delivery – Stakeholder(s) responsible for delivery of the action.

AQ Impact – Expected, relative air quality impact if the action is implemented successfully – Low, Medium or High

AQ Improvement – Detailed description of the expected air quality and carbon dioxide improvement associated with an action if implemented successfully.

Non-AQ Effect – Social and economic impacts of implementing the action.

Timescale – Timescale for completion of the action.

Cost – Expected financial cost of implementing the action. £ = Less than 100K, ££ = 100K-500K, £££ = 500K-1 million, ££££ = Over 1 million

Progress to Date – Details on progress of the action to date.

Supporting Strategy & Information – Local, regional or national strategy or information of relevance to the action. Although not stated, the GM LTP2, the GMLTP2 SEA, the GM Integrated Transport Strategy and the GM AQAP are linked to and support all listed actions.

Air Quality Action Table Index – (Grouped by Project/Action Manager)

PROJECT/ACTION MANAGER - A: LTP2 Air Quality Working Group Actions, **B**: GM LTP2 Steering Group Actions, **C**: GM Freight Quality Partnership (FQP) Air Quality Actions, **D**: GMPTE/GMPTA Actions, **E**: Greater Manchester Countywide Actions

A: GM LTP2 Air Quality Working Group Air Quality Actions

REFERENCE	A1
ACTION	**To implement a Roadside Emissions Testing Scheme**
DESCRIPTION	A vehicle emissions test programme, with fixed penalty notices issued to drivers if their vehicles do not meet formal emissions standards. Vehicles are chosen at random and tested for carbon monoxide, hydrocarbons, carbon dioxide and nitrogen oxides. Diesel powered engines are subject to a smoke test. Integral to the scheme is public advertising and information campaign to help raise awareness including the provision of emission tests sites where members of the public can bring their vehicles for testing free of charge and without the threat of being issued with a fine. Work will continue in the LTP2 period in partnership with Vehicle and Operator Services Agency (VOSA).
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	Manchester City Council is the lead authority
AQ IMPACT	Medium
AQ IMPROVEMENT	The programme will take place across the whole of the conurbation. The scheme promotes the use of cars with lower emissions therefore it will have a positive impact on air quality. The programme will focus on the environmental impact of poorly tuned vehicles, as well as increasing personal awareness and accountability for travel behaviour Analysis of the data generated on testing days will provide a valuable source of information to help inform future schemes aimed at delivering better air quality.
NON-AQ EFFECT	There may be some social exclusion implications as low-income groups are more likely to be the recipients of the fixed penalty notices. However, the scheme is aimed to be primarily an awareness-raising project, with a long lead in time giving drivers prior notice before the enforcement action begins. Drivers will also save money by reducing fuel bills in the long term.
TIMESCALE	2004/5 to 2010/11
COST	£££
PROGRESS TO DATE	The scheme was initiated in the LTP1 period. Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	GMTU Report 1063 – July 2005 – Analysis of the results of the autumn 2004 roadside tests of vehicle emissions in Greater Manchester. GMTU Report 963 – Analysis of the results of the 2003/4 roadside tests of vehicle emissions in Greater Manchester.

REFERENCE	A2
ACTION	**AQ Studies and Research**
DESCRIPTION	Studies and research to further understanding of air quality issues as they arise in order to enable an appropriate response to changing circumstances. Particularly important to identify specific problems and issues and highlight targeted, evidence based solutions. Proposals for research may be generated by AGMA Chief Execs, LTP2 Steering Group or appropriate air quality sub-groups. Proposed study – M60 air quality study in partnership with the Highways Agency - Impact of enforcing speed controls, impacts of different types of fuels, monitoring station on M60, air quality mitigation measures, population exposure and health impact study. Investigate possibility of match funding support form the Highways Agency. Proposed Study – Development of Greater Manchester specific vehicle emission factors.
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	AQ Consultants, GMTU, District Air Quality Officers
AQ IMPACT	Medium
AQ IMPROVEMENT	Associated air quality improvements resulting from identifying specific air quality problems and issues and developing targeted, evidence-based solutions.
NON-AQ EFFECT	Reduce congestion resulting from actions/studies that improve air quality i.e. speed controls
TIMESCALE	Ongoing – Annual delivery
COST	££
PROGRESS TO DATE	New action. Will build on areas of research identified (Low Emission Zones) in addition to new proposals
SUPPORTING STRATEGY & INFORMATION	M60 Route Management Strategy, Low Emission Zone (LEZ) Study.

REFERENCE	A3
ACTION	**Taxi Licensing Review**
DESCRIPTION	Conduct a review of the of private hire and hackney carriage licensing regime and incorporate measures aimed at reducing emissions associated with taxis.
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	Manchester Licensing Managers Group, Manchester Area Pollution Advisory Council (MAPAC) & District Taxi Licensing Officers
AQ IMPACT	Low
AQ IMPROVEMENT	Activity resulting in fuel efficiency improvements and the take up of cleaner technologies will reduce emissions of PM10, N0X and CO2. The air quality improvement will be most significant in urban areas where many taxis operate and air quality exceedances are a significant issue.
NON-AQ EFFECT	Financial benefits from increased fuel efficiency and lower duties on alternative fuels. It will help to raise awareness of environmental issues with passengers travelling in “Green” taxis. Inclusion and ownership of new measures should be pursued to avoid potential resentment.
TIMESCALE	2006
COST	£
PROGRESS TO DATE	Work is in progress to integrate this action within the LTP2 Taxi Strategy. Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	LTP2 Taxi Strategy

REFERENCE	A4
ACTION	**Vehicle Clean-Up Programme**
DESCRIPTION	A package of measures aimed at reducing CO2, NOX and PM10s emissions linked to freight, taxis, buses and Council fleet transportation (including Council fleet sub-contractors i.e. GM Waste) in Greater Manchester: - Grant provision to fit particulate traps to Euro 3 standard vehicles or later utilising central government "Transport Energy" grants. (Transport Energy programme currently under review) and LTP2 funds. - Development of freight route planning tool - Supporting seminars, website and publicity materials aimed at outlining the business benefits of measures to lower emissions, in particular fuel efficiency and effective route planning/congestion avoidance.
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	District Taxi Licensing Officers, Sustainable Travel Co-ordinators, AQ Consultants, Freight Quality Partnership (FQP), GMPTE, LTP2 Air Quality Working Group.
AQ IMPACT	Medium
AQ IMPROVEMENT	Activity resulting in fuel efficiency improvements and the take up of cleaner technologies will reduce emissions of PM10, N0X and CO2.
NON-AQ EFFECT	Financial benefits from increased fuel efficiency and lower duties on alternative fuels. Reduced congestion.
TIMESCALE	Ongoing – Annual delivery
COST	£££
PROGRESS TO DATE	New action. GMPTE has undertaken some work.
SUPPORTING STRATEGY & INFORMATION	LTP2 Freight Strategy, LTP2 Taxi Strategy

REFERENCE	A5
ACTION	**Air Quality Training**
DESCRIPTION	Air quality training and capacity building for District transportation policy officers, engineers and transportation managers. The aims of the training are to: - Raise awareness of air quality issues in transportation - Provide and introduction to air quality obligations and commitments in local government - Introduction to types of pollutions and their impacts - Provide advice on how best to tackle air quality issues through transportation works programmes - Create an LTP2 scheme air quality impact assessment tool
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	External specialist consultants
AQ IMPACT	District LTP2 transportation work programmes will more effectively deliver better air quality resulting in the reduction of emissions.
AQ IMPROVEMENT	High
NON-AQ EFFECT	Many of the schemes associated with delivering better air quality in District works programmes will result in lower congestion. Encourage improved cross-District working supporting the segment and corridor approach to transportation works programmes promoted by Greater Manchester.
TIMESCALE	2006-8 - Review of impact in 2007/8, if successful continue scheme
COST	£
PROGRESS TO DATE	New action
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	A6
ACTION	**Improve and Develop Manchester Airport Air Quality Partnership**
DESCRIPTION	Work closely with Manchester Airport to address ground transport related emissions
PROJECT MANAGER	LTP2 Air Quality Working Group & LTP2 Steering Group
DELIVERY	Manchester Airport, LTP2 Steering Group, LTP2 Air Quality Working Group
AQ IMPACT	Low-Medium
AQ IMPROVEMENT	Lower emissions relating to Manchester Airport transportation
NON-AQ EFFECT	Economic benefit associated with improved access and lower congestion levels
TIMESCALE	Ongoing
COST	£
PROGRESS TO DATE	Work is in progress. Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	Manchester Airport Environment Plan to 2015, Manchester Airport Air Quality Action Plan

REFERENCE	A7
ACTION	**Develop GM Supplementary Air Quality Planning guidance and Mitigation Measures**
DESCRIPTION	Develop GM wide guidance for developers submitting planning applications including a list of mitigation measures that could be included in building design (including travel plans, cycle racks and showers) and could be secured through planning conditions and Section 106 agreements.
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	LTP2 Air Quality Working Group, District Planning Officers, District Air Quality Officers, Planning Officers Group
AQ IMPACT	Medium
AQ IMPROVEMENT	Undertaking the assessment in itself would not improve air quality, however, should the assessment reveal that the air quality impact of the development was significant mitigating measures could be designed into the scheme in order to ameliorate the problem. The SPG will facilitate and encourage the use of sustainable, low emission, modes of transport to the site in the future, reducing negative impacts on air quality.
NON-AQ EFFECT	The guidance will improve consistency across the Greater Manchester authorities regarding the types of development for which an air quality assessment is required and the appropriate methodology to follow. This will make the planning process more transparent. The guidance will also raise awareness of air quality and sustainable development principles. The introduction of mitigating measures may enable development to take place in circumstances that could otherwise result in refusal of planning consent. Encouraging good design may also enable developers to consider sustainable development principles. The measures may also lead to other improvements to the natural and built environment, such as reduced noise and visual impact. The guidance would allow more consistent consideration of possible mitigating measures across Greater Manchester.
TIMESCALE	2006
COST	£
PROGRESS TO DATE	In development. Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	Wigan Council Draft Air Quality Planning Guidance Document" (2005)

REFERENCE	A8
ACTION	**Promotional Campaign**
DESCRIPTION	Develop an air quality promotions campaign and website to raise the profile of air quality issues in Greater Manchester. Work closely with smarter choices initiatives and travel planner and improve links with “Manchester is My Planet” carbon dioxide reduction initiative.
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	LTP2 Air Quality Working Group, District Sustainable Travel Planners, “Manchester is My Planet” Officers
AQ IMPACT	Low-Medium
AQ IMPROVEMENT	Air quality improvements will be realised by raising awareness and by contributing to changing travel behaviour to more sustainable, lower polluting modes.
NON-AQ EFFECT	Will help to build partnerships with complimentary schemes and groups. Will help to identify and promote the links between transportation and health.
TIMESCALE	Ongoing
COST	£
PROGRESS TO DATE	Partially delivered through the Cleaner vehicles campaign. “Manchester is My Planet” Knowledge Capital initiative underway.
SUPPORTING STRATEGY & INFORMATION	“Manchester is My Planet” strategy

REFERENCE	A9
ACTION	**Air Quality Monitoring**
DESCRIPTION	Monitoring and modelling of air quality emissions
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	District Air Quality Officers, GMTU, GM Air Quality Steering Group
AQ IMPACT	No direct impact
AQ IMPROVEMENT	N./A
NON-AQ EFFECT	No direct effect
TIMESCALE	Ongoing
COST	££
PROGRESS TO DATE	Monitoring ongoing.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	A10
ACTION	**Develop GM Fuel Strategy**
DESCRIPTION	Development of a fuel strategy for Greater Manchester. Investigate the potential of using alternatives to fossil fuels such as biofuels, hybrids, hydrogen cell and electric. Investigate supply issues.
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	LTP2 Air Quality Working Group, GMPTE, FQP
AQ IMPACT	Low
AQ IMPROVEMENT	Increased use of lower emission fuels will have a positive impact on air quality.
NON-AQ EFFECT	Creation of new jobs due to increased demand for new types of fuels and technologies. Particular focus on utilising biofuels.
TIMESCALE	2007
COST	£
PROGRESS TO DATE	New Action
SUPPORTING STRATEGY & INFORMATION	Freight Strategy

B: GM LTP2 Steering Group Actions

REFERENCE	B1
ACTION	**Create the Greater Manchester LTP2 Air Quality Working Group**
DESCRIPTION	Create a Greater Manchester Air Quality Working Group to co-ordinate air quality promotional activity, produce and contribute to relevant Greater Manchester air quality guidance and policy documents, and provide a forum for cross-area air quality issues to be discussed and addressed.
PROJECT MANAGER	LTP2 Steering Group
DELIVERY	LTP2 Steering Group
AQ IMPACT	No direct impact
AQ IMPROVEMENT	Will enable effective implementation of appropriate air quality actions.
NON-AQ EFFECT	Improved links between different stakeholders with an interest in sustainable issues.
TIMESCALE	Delivered - Ongoing
COST	£
PROGRESS TO DATE	Group has been formed but needs to expand member base to include representatives from all stakeholder groups.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	B2
ACTION	**Continue to Build Partnerships with the Highways Agency**
DESCRIPTION	Greater Manchester districts will work with the Highways Agency and their consultants to assist in the development of the M60 Route Management strategy, and other schemes, to ensure that air quality improvement is a key objective. In particular, we will encourage the Highways Agency to identify schemes on motorways and trunk roads where speed control could improve air quality. Work is currently being undertaken with the HA to address HGV air quality linked air quality issues at Heywood Distribution centre (M62 Junction 19). This is included within the HA M60 Route Management Strategy.
PROJECT MANAGER	LTP2 Steering Group
DELIVERY	LTP2 Steering Group & LTP2 Air Quality Working Group
AQ IMPACT	Potentially High
AQ IMPROVEMENT	Air quality improvement will be identified during the development of joint working. Air quality improvements can be realised by introducing speed restrictions on the motorway network.
NON-AQ EFFECT	Reducing vehicle speeds may increase journey times off-peak but is expected to smooth traffic flows and reduce congestion during busy periods. There may also be a reduction in traffic noise and improved safety. Reductions in speed limits may be unpopular with some motorists and could lead to traffic being displaced onto other roads in the area.
TIMESCALE	Ongoing
COST	££
PROGRESS TO DATE	Joint working with the Highways Agency is currently underway. Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	M60 Route Management strategy

REFERENCE	B3
ACTION	**Road user and workplace-parking charges**
DESCRIPTION	Explore the contribution that road user and workplace-parking charges might make to the improvement of air quality. Any consideration of such charging schemes will take place in accordance with the following conditions: - Full consultation with residents, businesses and other stakeholders will be carried out. - New high quality alternatives such as Metrolink and Quality Bus Corridors must be significantly advanced before charges can be introduced. - A regional approach to charging must be taken to ensure that it does not harm overall competitiveness and areas introducing charges are not disadvantaged.
PROJECT MANAGER	LTP2 Steering Group
DELIVERY	LTP2 Steering Group, AGMA, Highways Agency, GM Districts
AQ IMPACT	High
AQ IMPROVEMENT	Could have a significant positive impact depending on the amount of traffic reduction achieved, which in turn will result in holistic air emission reductions.
NON-AQ EFFECT	Congestion would be considerably reduced. Public transport would operate more reliably, and would potentially gain increased patronage transferring from the car. There could be adverse impacts on businesses within the charging zone, especially near the cordon, as a result of drivers going elsewhere to avoid paying the charge.
TIMESCALE	Ongoing
COST	£ to research, ££££ to implement
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	B4
ACTION	**Employ Greater Manchester Travel Plan Co-ordinator**
DESCRIPTION	Post to effectively deliver and co-ordinate Greater Manchester wide “Smarter Choice” initiatives.
PROJECT MANAGER	LTP2 Steering Group
DELIVERY	LTP2 Steering Group
AQ IMPACT	Low
AQ IMPROVEMENT	Increased number of trips by sustainable, low pollution modes at the expense of car journeys will reduce transport related air emissions
NON-AQ EFFECT	Positive health impacts of increased number of journeys made by “active” modes i.e. walking and cycling. Increased travel choice will result in increased accessibility to essential education, employment, healthcare and leisure opportunities. Reduced congestion. Improved “segment” working and delivery of LTP2.
TIMESCALE	Ongoing
COST	££
PROGRESS TO DATE	Post has successfully been in place since the LTP1 period
SUPPORTING STRATEGY & INFORMATION	LTP2 “Smarter Choices” initiatives, draft Greater Manchester travel plan supplementary planning guidance, GM Smarter Choice Strategy

REFERENCE	B5
ACTION	**Work Jointly with the Manchester "The Green Energy Revolution" Programme**
DESCRIPTION	Manchester: The Green Energy Revolution is a Manchester Knowledge Capital initiative aimed at reducing transport and non-transport linked carbon dioxide emissions.
PROJECT MANAGER	LTP2 Steering Group
DELIVERY	LTP2 Steering Group
AQ IMPACT	Low
AQ IMPROVEMENT	Carbon dioxide reductions
NON-AQ EFFECT	Carbon dioxide reductions
TIMESCALE	Ongoing
COST	£
PROGRESS TO DATE	Consulted as part of the LTP2 process
SUPPORTING STRATEGY & INFORMATION	"Manchester: The Green Energy Revolution", (2005) Quantum Strategy & Technology & Partners

C: GM Freight Quality Partnership (FQP) Air Quality Actions

REFERENCE	C1
ACTION	**Promote & Develop Freight Air Quality Best Practice Guidance**
DESCRIPTION	Promotion of appropriate air emission reduction practices, fuels, and technologies including lower emission vehicle specifications, driver training, vehicle tuning, and journey planning for circulation amongst HGV and fleet operators
PROJECT MANAGER	FQP in partnership with LTP2 Air Quality Working Group
DELIVERY	LTP2 Air Quality Working Group
AQ IMPACT	Medium
AQ IMPROVEMENT	Without a measure of the rate at which operators adopt measures it is not possible to quantify the improvement in HGV emissions that may be expected, but if campaigns were successful a significant improvement could be expected. Road freight key source of harmful emissions in Greater Manchester.
NON-AQ EFFECT	Fuel bills to operators should be reduced, as will the general sustainability impact of HGVs. However, there is a view that servicing and maintenance costs of alternatively fuelled vehicles may rise.
TIMESCALE	2006
COST	£
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	LTP2 Freight Strategy

REFERENCE	C2
ACTION	**Produce Greater Manchester Drivers Freight Map**
DESCRIPTION	Produce Greater Manchester Drivers Freight Map to aid journey planning
PROJECT MANAGER	FQP
DELIVERY	FQP
AQ IMPACT	Low
AQ IMPROVEMENT	Improved journey planning results in lower fuel usage and reduced emissions.
NON-AQ EFFECT	Contributes towards lower congestion and cost savings through improved fuel efficiency.
TIMESCALE	Complete
COST	£
PROGRESS TO DATE	Complete
SUPPORTING STRATEGY & INFORMATION	LTP2 Freight Strategy, Greater Manchester Drivers Freight Map

REFERENCE	C3
ACTION	**Sustainable Distribution Guidance**
DESCRIPTION	Seek the support and guidance of Central Government in relation to the promotion and implementation of Sustainable Distribution guidance amongst commercial operations and other agencies in the region. - Consult with Central government - Disseminate Sustainable Distribution guidance to relevant stakeholders - Engage vehicle operators
PROJECT MANAGER	FQP
DELIVERY	FQP, District Fleet Managers
AQ IMPACT	Low
AQ IMPROVEMENT	More efficient distribution should lead to fewer miles being run and therefore lower emissions.
NON-AQ EFFECT	More efficient distribution should lead to fewer miles being run and therefore financial savings will be realised.
TIMESCALE	2006
COST	£
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	LTP2 Freight Strategy

REFERENCE	C4
ACTION	**Night time Freight Deliveries**
DESCRIPTION	Examine the feasibility of night-time deliveries by investigating the relaxation of delivery curfews relating to existing or proposed commercial premises, ensuring that there is a full consideration of the potential noise/nuisance impact.
PROJECT MANAGER	FQP
DELIVERY	FQP, GMTU, LTP2 Air Quality Working Group
AQ IMPACT	Low
AQ IMPROVEMENT	The transfer of goods vehicle journeys from day to night will reduce congestion during the day on major routes. Emission reductions should occur due to quieter roads resulting in more fuel-efficient driving practices.
NON-AQ EFFECT	Reduced congestion, reduced journey times, and less driver fatigue/stress, however there is a potential for greater noise nuisance during the night.
TIMESCALE	2007
COST	££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	LTP2 Freight Strategy

REFERENCE	C5
ACTION	**Identify And Address Key Environmental Impact Points for Freight on the Road And Rail Network**
DESCRIPTION	Assessment of all points on the road/rail network where freight has the biggest detrimental impact, or has the potential to have a positive impact, on the environment, and implement any feasible actions.
PROJECT MANAGER	FQP
DELIVERY	FQP, LTP2 Air Quality Working Group, GMTU
AQ IMPACT	Medium
AQ IMPROVEMENT	Potential air quality improvements could be high, depending on the actions identified and the funds available to implement them.
NON-AQ EFFECT	It may lead to reductions in congestion and general nuisance problems from HGVs and improve rail use.
TIMESCALE	2007
COST	££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	LTP2 Freight Strategy

D: GMPTE Air Quality Actions

REFERENCE	D1
ACTION	**Work With Bus Operators To Reduce Bus Emissions**
DESCRIPTION	This will include grant-aid for low-pollution technology and changes to conditions for services that GMPTE procures: - Issue grants to operators to encourage low pollution technology - Research and revise GMPTE procurement contracts and integrate appropriate conditions aimed at reducing emissions - Research, develop and trial new technologies - Provide driver training aimed at improving fuel efficiency
PROJECT MANAGER	GMPTE
DELIVERY	GMPTE, LTP2 Air Quality Working Group
AQ IMPACT	High
AQ IMPROVEMENT	There is potential for significant reduction in particulates, NOX and CO2 emitted by buses in Greater Manchester.
NON-AQ EFFECT	Creation of local employment and encouragement of local entrepreneurs who wish to develop clean vehicle technologies. It will help to raise awareness of sustainability issues. Increased fuel efficiency will lead to financial gains.
TIMESCALE	Ongoing
COST	£££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	D2
ACTION	**Set Up Bus Quality Agreements (BQA) that Include Challenging Air Quality Standards**
DESCRIPTION	Research and revise Bus Quality Agreements and integrate appropriate conditions aimed at reducing emissions.
PROJECT MANAGER	GMPTE
DELIVERY	GMPTE, District Transport Managers
AQ IMPACT	Medium
AQ IMPROVEMENT	Air emission reductions will vary depending on what measures are implemented; however, there is a great deal of potential for improvement.
NON-AQ EFFECT	It will help to ensure that better quality buses are used on Quality Bus Corridors. Improved accessibility.
TIMESCALE	Ongoing
COST	££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	D3
ACTION	**Traffic Regulation Conditions**
DESCRIPTION	Investigate the feasibility of applying new Traffic Regulation Conditions on buses on highly polluted corridors e.g. Oxford Rd/Stockport Road.
PROJECT MANAGER	GMPTE
DELIVERY	GMPTE
AQ IMPACT	Low
AQ IMPROVEMENT	Lower emissions associated with buses in targeted area.
NON-AQ EFFECT	Improved streetscape/ environment.
TIMESCALE	2006
COST	£
PROGRESS TO DATE	New action
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	D4
ACTION	**Real time information**
DESCRIPTION	Continue with the programme of upgrading to provide real time information on the public transport network.
PROJECT MANAGER	GMPTE
DELIVERY	GMPTE, Districts, GM LTP2 Steering Group
AQ IMPACT	Low
AQ IMPROVEMENT	The provision of real time information makes public transport more competitive against the car. It can remove the uncertainty of using the network making public transport more attractive, especially for non-users. The result is that emissions are reduced and air quality can be improved. Furthermore, operators can use real time information for monitoring purposes. It can allow buses to be turned short if bunching is occurring for instance, reducing the number of 'wasted' miles, and as a result, reducing emissions. Speculatively it could give us information about the pinch points for buses - i.e. where buses are held up. We could target these pinchpoints by bus priority measures so that buses get through more quickly. This will reduce bus emissions and, by improving bus journey times, attract more people away from cars.
NON-AQ EFFECT	Real time information systems remove some of the uncertainty of travelling by public transport. With constantly updated information the passenger can avoid lengthy waits at a cold bus stop or train station by using the information provided to ensure that they arrive at the stop at the time the service is actually going to arrive, as opposed to the time the service is supposed to arrive. With constantly updated information passengers can see whether or not their service has already left, is running late, or even if it has been cancelled, before they have even left their house or place of work. The equipment used to operate real time information systems can also be used for monitoring purposes. This can result in improved reliability of the network and so an improved service for passengers, as well as a reduction in costs for the operators.
TIMESCALE	Ongoing
COST	~~£~~~~£~~~~£~~~~£~~
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	D5
ACTION	**Public Transport Subsidies**
DESCRIPTION	Continue to subsidise public transport through bus subsidies to encourage bus usage.
PROJECT MANAGER	GMPTE
DELIVERY	GMPTE, Districts, LTP2 Steering Group
AQ IMPACT	Medium
AQ IMPROVEMENT	The subsidies encourage the use of public transport and provide an alternative to the use of the private car.
NON-AQ EFFECT	Concessionary support provides subsidised public transport for children and senior citizens making access to other services cheaper for them. Subsidies for some bus services ensure that public transport is available in areas that it would otherwise not be provided in. Improved accessibility in general.
TIMESCALE	Ongoing
COST	~~£~~~~£~~~~£~~~~£~~
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	D6
ACTION	**Clean Bus Research**
DESCRIPTION	Investigate the feasibility of and implement public transport that produces no pollution at street level e.g. electric buses.
PROJECT MANAGER	GMPTE
DELIVERY	GMPTE, Districts, LTP2 Air Quality Working Group
AQ IMPACT	Currently Low but potential to be High
AQ IMPROVEMENT	Will promote zero pollution at street level. It may also provide impetus for banning polluting vehicles from parts of town and city centres
NON-AQ EFFECT	Electric vehicles provide a modern, clean image that attracts inward investment, as well as being an effective form of public transport. There are also regeneration and streetscape benefits.
TIMESCALE	Ongoing
COST	££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	D7
ACTION	**Metrolink Expansion**
DESCRIPTION	Increase the capacity of Metrolink Phase 1 and continue to extend the existing Metrolink network to include: Oldham and Rochdale, East Manchester and Ashton-under-Lyne, South Manchester and Manchester Airport, Trafford Park and the Trafford Centre, Lowry Spur and East Didsbury, and Stockport.
PROJECT MANAGER	LTP2 Steering Group
DELIVERY	LTP2 Steering Group, AGMA, Districts
AQ IMPACT	High
AQ IMPROVEMENT	Phases 1 and 2 have removed 2.6-million car journeys per year from roads, which has reduced pollution proportionately. Roads running parallel to Metrolink have seen traffic reductions of up to 10%, and within 2 km of the line between 14 and 50% of car trips to Metrolink-served destinations have switched from car to the system. The three extensions are projected to save a further 6.4 M car journeys per year with consequent pollution reductions. It is estimated that the switch from car to tram on Phases 1 and 2 of Metrolink has removed 3,643 metric tonnes of CO2, 486 tonnes of CO and 15 tonnes of NOX per annum from the atmosphere. The proposed Metrolink extensions therefore have the potential for the following reductions in emissions: 8967 tonnes CO2, 1196 tonnes CO, 36.9 tonnes NOX. Further work to assess the air quality impact of Metrolink is planned.
NON-AQ EFFECT	Metrolink is a system with a low level of impact on the community. It will help to achieve regeneration, and a reduction in the rate of traffic growth, and hence congestion, as users increase in preference to the private car. It will also increase accessibility to employment, healthcare, leisure and fresh food for Greater Manchester residents.
TIMESCALE	2011 if funding is secured
COST	££££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 and main GM LTP2 for further details.
SUPPORTING STRATEGY & INFORMATION	

E: Greater Manchester Air Quality Actions

REFERENCE	E1
ACTION	**Continue to implement Quality Bus Corridors**
DESCRIPTION	
PROJECT MANAGER	GM LTP2 Steering Group
DELIVERY	Districts, GMPTE, GM LTP2 Steering Group
AQ IMPACT	Medium
AQ IMPROVEMENT	Improvements can be expected from reductions in car journeys arising from modal shift and from the reduced pollution generated by the new buses themselves, as a result of progressive adoption of more stringent Euro engine standards
NON-AQ EFFECT	Journey times will become more reliable, thus benefiting existing passengers, with possible savings in operating costs. As QBC's are often implemented in association with other street improvement schemes, there is also a wider local environmental benefit. Improved accessibility.
TIMESCALE	Ongoing until 2009
COST	££££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	GM Bus Strategy

REFERENCE	E2
ACTION	**"Park and Ride"**
DESCRIPTION	Implement, where appropriate, new "Park and Ride" schemes including rail park and ride with a focus on increasing parking spaces at railway stations.
PROJECT MANAGER	GM LTP2 Steering Group
DELIVERY	District Air Quality Officers & Transport Officers, GMPTE, GM LTP2 Steering Group
AQ IMPACT	Low
AQ IMPROVEMENT	Depends on whether existing public transport is used more efficiently or new services are provided. Overall there is no evidence that Park and Ride will reduce emissions in Greater Manchester. Each case needs to be treated on its merits. However, "Park and Ride" schemes offer the opportunity to displace pollution from areas with particularly high exceedances harmful to human health.
NON-AQ EFFECT	Increased access to, and viability of, town centres including the ability to re-allocate spaces used for car parking in centres. However significant issues include land requirements (often Green Belt), and unwanted environmental effects (such as noise and congestion) near sites. It may result in additional or longer car trips to Park and Ride sites. Overall there is no evidence that Park and Ride would reduce car mileage in Greater Manchester.
TIMESCALE	Ongoing consideration
COST	~~£~~~~£~~~~£~~~~£~~
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	E3
ACTION	**Air Quality Promotion and Integration**
DESCRIPTION	Promote actions to improve air quality using a variety of promotional methods including leaflets, displays, seminars, press releases, emissions testing, and websites. Raise awareness of air quality issues internally within each District, with business and the public through promotional campaigns. Integrate with other aspects of transportation and planning work, in particular travel planning and smarter choices. Support national campaigns concerned with improving air quality.
PROJECT MANAGER	LTP2 Air Quality Working Group
DELIVERY	District Air Quality Officers & Transport Officers, GMPTE, Sustainable Travel Co-ordinators
AQ IMPACT	Medium
AQ IMPROVEMENT	Raising the profile of air quality issues will result a more holistic and effective approach to emissions reduction.
NON-AQ EFFECT	Encourage partnership working both internally within Districts and externally. Supports travel planning and smarter choice initiatives and schemes.
TIMESCALE	Ongoing
COST	£
PROGRESS TO DATE	New action, however, work was conducted during the LTP1 period associated with the Cleaner Vehicles Campaign.
SUPPORTING STRATEGY & INFORMATION	LTP2 “Smarter Choices” initiatives

REFERENCE	E4
ACTION	**Enforce Reviewed Taxi Licensing Regime**
DESCRIPTION	Districts to enforce new, stricter air quality taxi licensing standards
PROJECT MANAGER	Manchester Licensing Managers Group,
DELIVERY	Manchester Licensing Managers Group & District Licensing Officers
AQ IMPACT	Low-Medium
AQ IMPROVEMENT	Activity resulting in fuel efficiency improvements and the take up of cleaner technologies will reduce emissions of PM10, N0X and CO2. The air quality improvement will be most significant in urban areas where many taxis operate.
NON-AQ EFFECT	Financial benefits from increased fuel efficiency and lower duties on alternative fuels. It will help to raise awareness of environmental issues with passengers travelling in “Green” taxis. Inclusion and ownership of new measures should be pursued to avoid potential resentment.
TIMESCALE	When licensing regime has been fully reviewed.
COST	£
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details. LTP2 taxis strategy in development.
SUPPORTING STRATEGY & INFORMATION	LTP2 Taxi Strategy

REFERENCE	E5
ACTION	**District Fleet Management Policies**
DESCRIPTION	Districts to develop fleet management policies aimed at reducing vehicle emissions Draw on central GM research and review appropriate air emission reduction practices, fuels and technologies and co-ordinate activities with other Districts.
PROJECT MANAGER	FQP
DELIVERY	LTP2 Air Quality Working Group in consultation with District Sustainable Travel Co-ordinators, District Fleet Managers, GMPTE, Freight Quality Partnership
AQ IMPACT	Low-Medium
AQ IMPROVEMENT	Fuel efficiency measures and switching to alternative fuels can lead to significant reductions in all emissions.
NON-AQ EFFECT	Increased fuel efficiency and switching to alternative fuels with lower fuel duties can lead to financial benefits for operator sub-contractors and District fleets.
TIMESCALE	2007
COST	£
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details. Some Districts have fleet management policies.
SUPPORTING STRATEGY & INFORMATION	LTP2 Freight Strategy

REFERENCE	E6
ACTION	**Improve Links with Health Professionals.**
DESCRIPTION	Highlight the links between air emissions and health by consulting with health professionals.
PROJECT MANAGER	GM Air Quality Steering Group
DELIVERY	District Environmental Health Officers
AQ IMPACT	Low
AQ IMPROVEMENT	Increased support to help reduce emissions harmful to human health.
NON-AQ EFFECT	Raise the profile of the impact of transport related air emissions on human health.
TIMESCALE	Ongoing
COST	£
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	E7
ACTION	**Encourage and promote walking and cycling**
DESCRIPTION	Infrastructure developments and promotional activity
PROJECT MANAGER	District Transportation Planning Managers
DELIVERY	District Engineers, District Transport Managers, GM LTP2 Steering Group, Cycling & Walking Strategies/Officers, Sustainable Travel Co-ordinators
AQ IMPACT	Medium
AQ IMPROVEMENT	Any trips made by walking and cycling are zero emission modes of transport and therefore will have no adverse impact on air quality.
NON-AQ EFFECT	Reduces congestion, and promotes healthy lifestyle. Increases choice and accessibility.
TIMESCALE	Ongoing
COST	£-££££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details and LTP2 Cycling and Walking strategies.
SUPPORTING STRATEGY & INFORMATION	LTP2 Cycling and Walking strategies

REFERENCE	E8
ACTION	**Implement Travel Plans and Smarter Choice Initiatives**
DESCRIPTION	Promote the development and implementation of Travel Plans and Smarter Choice initiatives. All GM Council's to adopt and implement travel plans and travel plan co-ordinators.
PROJECT MANAGER	GM Sustainable Travel Plan Co-ordinator
DELIVERY	District Sustainable Travel Plan Co-ordinators, District Planning Officers, District Transportation Planning Managers
AQ IMPACT	High
AQ IMPROVEMENT	Travel Plans and Smarter Choice initiatives improve air quality by providing a mechanism to develop and implement schemes, and practices, that encourage the use of low emission sustainable modes of transportation in organisations.
NON-AQ EFFECT	Travel Plans can reduce on and off-site congestion and parking problems. Travel Plans can improve the environmental image of businesses and other organisations. Travel plans also promote a healthy lifestyle by promoting active modes of transportation (walking and cycling) over passive car journeys.
TIMESCALE	Ongoing
COST	££££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details
SUPPORTING STRATEGY & INFORMATION	Draft Travel Plan Supplementary Planning guidance, GM Smarter Choice Strategy

REFERENCE	E9
ACTION	**Implement School Travel Plans**
DESCRIPTION	Promote the development and implementation of School Travel Plans
PROJECT MANAGER	GM Sustainable Travel Plan Co-ordinator
DELIVERY	District Sustainable Travel Plan and School Travel Plan Co-ordinators, District Planning Officers, , District Transportation Planning Managers
AQ IMPACT	High
AQ IMPROVEMENT	Travel Plans improve air quality by providing a mechanism to develop, and implement schemes and practices that encourage the use of low emission sustainable modes of transportation in schools. There will be improvements in local air quality on roads around schools, particularly during peak periods. This will contribute to overall emission reductions throughout Greater Manchester as a result of a reduction in car use.
NON-AQ EFFECT	School Travel Plans can reduce on and off-site congestion and parking problems, improve relations between schools and local communities, and increase social cohesion between pupils travelling together. They can also encourage healthier and fitter children, improve the environment and road safety around schools for everyone, and equip children with better road awareness.
TIMESCALE	Ongoing
COST	~~£~~~~£~~~~£~~~~£~~
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	Draft Travel Plan Supplementary Planning guidance, GM School Travel Strategy, GM Smarter Choice Strategy

REFERENCE	E10
ACTION	**Improve Traffic Control Systems**
DESCRIPTION	Use traffic control systems to reduce congestion and minimise pollution
PROJECT MANAGER	GM LTP2 Steering Group
DELIVERY	, District Transportation Planning Managers, District Engineers
AQ IMPACT	Medium
AQ IMPROVEMENT	Devices to reduce vehicle exhaust emissions generally work best at constant vehicle speeds, with engines fully warmed up. Start-stop traffic conditions, especially when engines are cold, leads to the worst pollution emissions. Therefore co-ordination of signals, which smoothes traffic flow, can improve local air quality.
NON-AQ EFFECT	The capacity of junctions can be maximised and this should reduce the variability of journey times, whilst in some cases there will be actual savings. There will be opportunities for safer pedestrian movement where such facilities are incorporated.
TIMESCALE	Ongoing
COST	££££
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details
SUPPORTING STRATEGY & INFORMATION	LTP2 Intelligent Transport Systems initiatives, M60 Route Management Strategy

REFERENCE	E11
ACTION	**Implement "Home Zones"**
DESCRIPTION	Investigate potential schemes to create "Home Zones" and implement where appropriate.
PROJECT MANAGER	District Transportation Planning Managers
DELIVERY	District Transportation Planning Managers, District Engineers
AQ IMPACT	Medium
AQ IMPROVEMENT	Will promote zero emission forms of transport such as walking and cycling.
NON-AQ EFFECT	Reduce rat running, improve safety, improve the quality of streetscape, open areas up for social activity, and improve the local environment.
TIMESCALE	Ongoing
COST	~~£~~~~£~~~~£~~~~£~~
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	E12
ACTION	**Car Parking Enforcement & Control**
DESCRIPTION	Meet the obligations of the decriminalisation of car parking enforcement.
PROJECT MANAGER	District Car Parking Managers
DELIVERY	District Car Parking Managers
AQ IMPACT	Low
AQ IMPROVEMENT	Deterrent to the illegal parking of cars that may pose a barrier to lower polluting more sustainable modes of transport.
NON-AQ EFFECT	N/A
TIMESCALE	Ongoing
COST	£
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	District Car Parking Strategies

REFERENCE	E13
ACTION	**Car Sharing, Car Clubs and Car Pools**
DESCRIPTION	Promote and encourage car-sharing and car pool schemes
PROJECT MANAGER	GM Sustainable Travel Plan Co-ordinator
DELIVERY	District Sustainable Travel Plan and School Travel Plan Co-ordinators, District Transportation Planning Managers
AQ IMPACT	Low-Medium
AQ IMPROVEMENT	Increased car sharing will reduce the number of cars on the road, therefore lowering total emissions.
NON-AQ EFFECT	Increased social interaction and lower economic costs associated with sharing the costs of the journey.
TIMESCALE	Ongoing
COST	£
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	E14
ACTION	**Utilise GM Supplementary Air Quality Planning guidance and Mitigation Measures**
DESCRIPTION	Agree, approve and utilise the GM supplementary air quality planning guidance and mitigation measures document.
PROJECT MANAGER	District Transportation Planning Managers and District Planning Managers
DELIVERY	District Planning Officers, District Air Quality Officers, District Transport Officers/Managers
AQ IMPACT	Medium
AQ IMPROVEMENT	Potential to address air quality issues at the earliest stage to deliver optimum air quality benefits.
NON-AQ EFFECT	Encourage inter-departmental working
TIMESCALE	2007
COST	£
PROGRESS TO DATE	GM Supplementary Planning Guidance in development
SUPPORTING STRATEGY & INFORMATION	Wigan Council Draft Air Quality Planning Guidance Document" (2005)

REFERENCE	E15
ACTION	**Implement public transport priority schemes**
DESCRIPTION	Continue to identify and secure funding to implement public transport priority schemes and assess their effect on air quality
PROJECT MANAGER	District Transportation Planning Managers
DELIVERY	District Transportation Planning Managers, LTP2 AQ Working Group
AQ IMPACT	N/A
AQ IMPROVEMENT	Enable further investment in measures to improve air quality.
NON-AQ EFFECT	Reduce demand on limited LTP2 funds.
TIMESCALE	Ongoing
COST	£
PROGRESS TO DATE	Ongoing
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	E16
ACTION	**Improve the safety and security of the public transport network**
DESCRIPTION	Improve safety and security infrastructure and promotion and marketing to remove real and perceived threats.
PROJECT MANAGER	District Transportation Planning Managers in partnership with the GMPTE
DELIVERY	District Transportation Planning Managers, GMPTE
AQ IMPACT	Low
AQ IMPROVEMENT	Improving safety and security, as well as the perception of it, encourages a modal shift from car to public transport. In addition, the improvements to safety and security can enhance the reliability of services operated, thus retaining existing ridership and avoiding the exodus back to the car. The result is a reduction in car use, or at the least, a reduction in the growth of car use. Thus, air quality does not deteriorate due to excessive use of the car.
NON-AQ EFFECT	Greater feelings of safety and security by all passengers can lead to an increase in use. This results in greater revenues, which, in turn, can help ensure that the network remains stable and trustworthy. Actual improvements in safety and security results in less criminal activity, which makes public transport more pleasant to use. In addition, the reduction in criminal activity leads to greater reliability of the network as assets are in use, as opposed to being taken out of service for repair.
TIMESCALE	Ongoing
COST	~~£~~~~£~~~~£~~~~£~~
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	

REFERENCE	E17
ACTION	**Encourage shift to the use of rail transport for freight**
DESCRIPTION	Highlighting the need for freight capacity improvements to the rail network, encouraging Development Plans/ Local Development Frameworks to protect suitable intermodal sites, retaining private siding facilities wherever possible when sites are redeveloped.
PROJECT MANAGER	District Transportation Planning Managers
DELIVERY	District Transportation Planning Managers, FQP, District Freight Representatives, GM LTP2 Steering Group, District Planning Officers
AQ IMPACT	Medium
AQ IMPROVEMENT	Reducing HGV traffic in the region will have a significant positive impact on air quality.
NON-AQ EFFECT	Fewer goods vehicles on the roads will reduce congestion generally. Extra demand on the railway network may encourage investment in the longer term from the SRA, which will be beneficial in itself, and may in turn increase capacity for passenger services. Real improvements in the rail network will require a high level of strategic investment and extensive collaboration with a fragmented railway industry. There is a danger that, without necessary improvement, an increase in rail freight transport will be difficult to achieve. There is likely to be increased local HGV traffic at the loading/unloading points on the railway network.
TIMESCALE	Ongoing
COST	~~£~~~~£~~~~£~~~~£~~
PROGRESS TO DATE	Refer to the GM AQAP Progress report 2005 for further details.
SUPPORTING STRATEGY & INFORMATION	LTP2 Freight Strategy

REFERENCE	E18
ACTION	**Improve low/zero emission fuel infrastructure and availability**
DESCRIPTION	Invest and support in low/zero/emission sustainable and alternative fuel infrastructure.
PROJECT MANAGER	District Transportation Planning Managers
DELIVERY	District Transportation Planning Managers, FQP, District Freight Representatives, District Planning Officers
AQ IMPACT	Medium
AQ IMPROVEMENT	Lower transport linked emissions. Can place refuelling points in AQMAs to address hotspots.
NON-AQ EFFECT	Increased awareness of environmental issues. Increased availability of lower cost fuels can address socio-economic and accessibility linked issues.
TIMESCALE	Ongoing
COST	££
PROGRESS TO DATE	Biodiesel refuelling station opened near Piccadilly station. . A number of GM Districts are investigating the possibility of using Energy Saving Trust grants to improve low/zero emission fuel infrastructure.
SUPPORTING STRATEGY & INFORMATION	Powering Future Vehicles (2002)

9. Monitoring and Reporting

9.1 Summary

This section expands on details included in the monitoring technical appendix submitted as part of the main GM LTP2 document. The indicators within this section have been developed according to the DfT technical guidance and with consideration given to advice from the DEFRA sponsored Air Quality Action Plan helpdesk.

9.2 Monitoring Background

Air quality in Greater Manchester has been monitored routinely since the early 1960s and currently nine of the ten Greater Manchester Authorities possess at least one automatic monitoring station. Monitoring stations use expensive and sophisticated equipment capable of giving accurate, almost real-time concentrations of pollutants. At present there are 18 automatic monitoring facilities in the Greater Manchester. The locations and real-time air quality information from all sites can be accessed at the Manchester Area Pollution Advisory Council website http://www.greatairmanchester.org.uk/.

Major sources of pollution within GM are calculated using the **EM**issions **I**nventory for the **G**reater **M**anchester **A**uthorities and Warrington (EMIGMA). EMIGMA is an inventory that aims to identify and quantify significant sources of emissions to the atmosphere. The data has been collected since 1997 and is used to quantify the major sources of emissions of carbon and pollutants identified in the UK's Air Quality Strategy (Appendix 2.0). There are three main categories of emission sources used within EMIGMA -

- Stationary point sources – Predominantly industrial processes
- Mobile line sources – Emissions from road, rail and air transport. Transport flow data is provided by the Greater Manchester Transport Unit (GMTU) using the GM Spatial Planning Model (SPM). The SPM is the key model used as part of the LTP2 process to model, forecast and set LTP2 targets and measures
- Area based sources – Includes emissions from domestic and commercial combustion

The EMIGMA database is upgraded and improved annually. It is now becoming possible to identify trends in pollution emissions for particular sectors and emissions sources. The latest report was produced in March 2005 and estimates the emissions produced from major transport and non-transport sources in the area for 2003.

The EMIGMA database is used to inform the review and assessment of local air pollutant levels against national health based air quality objectives (Appendix 1.0)

conducted every three years by GM authorities. Local authorities have statutory duties for local air quality management (LAQM) under the Environment Act (1995) and the subsequent National Air Quality Strategy (2000) and Air Quality Regulations. The last review and assessment or air quality in GM took place in 2003. Further detailed air quality dispersion modelling and assessment will be carried out during 2006/07. The modelling will provide more accurate and improved baseline and forecast data for pollution concentrations in GM that are monitored as part of the LTP2 process.

9.3 GM LTP2 Air Quality and Greenhouse Gas Indicators

Figures 9.1, 9.2 & 9.3 below summarise the indicators that will be used to assess the performance of local transport measures to improve air quality and lower greenhouse gas emissions. Specific targets and trajectories associated with each target are detailed within the LTP2 Monitoring Technical Appendix. Progress against indicators will be reported in the GM LTP2 Annual Progress Reports (APR).

LTP2 INDICATORS EXPLAINED

Headline Indicators: Indicators that GM will be assessed against by the DfT. Failure to meet indicator targets will result in financial penalties. All mandatory and some local indicators are classed as headline indicators. Most Headline Indicators will be reported on annually in the LTP2 Annual Progress Reports (APR). The remaining will be reported on once in the final LTP2 APR against an initial set baseline.

Mandatory Indicators: Indicators that the DfT require GM to set targets against and report on in annual or the final APR.

Local Indicators: Set of indicators GM has chosen to report on. Local indicators can be Headline (assessed by DfT) or Subsidiary (Not formally reported or assessed).

Subsidiary Indicators: Local indicators that GM will collect and analyse and use for internal performance management purposes. Not formally reported to or assessed by the DfT.

Intermediate Indicators: Proxies or milestones indicators used to assess and report annual progress towards Headline indicators that often cannot be reported on annually.

Outcome Indicators: Indicators that directly measures achievements of shared priorities

Scheme Indicators: Indicator used to describes the performance of a particular local scheme or initiative

Figure 9.1 - NOX/NO2 Emissions LTP2 Indicator & Target

TYPE	INDICATOR	NOTES
Mandatory Headline Indicator (LTP9)	**Concentration of NO2 at chosen worst case or near worst case receptor points in each GM District AQMA**	• An NO2 concentration receptor point has been selected for each District and the GMPTE for monitoring purposes. (See Appendix 7.0 for details and locations of receptor points in GM). • A 2005 baseline and 2010 target have been set for each District. • Receptor point baseline data will be updated in 2006/7 following new GM air quality and assessment work. • Progress against this indicator will be assessed and reported in the final APR in 2011. • Intermediate years' progress will be monitored through a proxy indicator (Below)
Intermediate Headline Indicator	**Number of tonnes NOx emitted annually from road transport in each District**	• Proxy intermediate indicator used to assess progress towards the mandatory headline indicator (above). • Reported annually in the LTP2 APR
Subsidiary Local Indicator	**Exposure To Poor Air Quality - Number of properties in areas where National Air Quality Objectives are likely to be exceeded**	
Subsidiary Local Indicator	**Average number of days at real time monitoring sites where air quality is classed as moderate or worse**	
Subsidiary Local Indicator	**Number of monitoring sites where the annual mean NO2 objective is exceeded**.	

Figure 9.2 - PM10 Emissions LTP2 Indicator & Target

TYPE	INDICATOR	NOTES
Subsidiary Local Indicator	**Number of tonnes PM10 emitted annually from road transport in each District**	• Not a mandatory indicator because all GM AQMAs have been declared on the basis of NO2 exceedance.
Subsidiary Local Indicator	**Exposure to poor air quality: numbers of properties in areas where AQ objectives likely to be exceeded.**	
Subsidiary Local Indicator	**Average number of days at real time monitoring sites where air quality is moderate or worse.**	
Subsidiary Local Indicator	**Number of sites where the 24hour mean PM10 objective is exceeded.**	

Figure 9.3 - CO2 Emissions LTP2 Indicator & Target

TYPE	INDICATOR	DESCRIPTION
Local Headline Indicator	**Number of tonnes CO2 emitted annually by the road transport sector in GM**	
Subsidiary Local Indicator	**Tonnes of CO2 emitted by vehicle type**	
Subsidiary Local Indicator	**Tonnes of CO2 emitted by vehicle-kilometre**.	
Subsidiary Local Indicator	**Indicator LTP2: Area-wide road traffic flows. Change in area wide vehicle kilometres.**	• This indicator is included as a proxy indicator for improvements in air quality and a reduction in greenhouse gas emissions.

9.4 Reporting – Guidance

GM will report to DfT and DEFRA as set out in DEFRA guidance LAQM PGA05 (see below). Progress against headline indicators outlined in the section above will be reported in GM LTP2 Annual Progress Reports (APRs).

"For those AQAPs that have been integrated within the LTP, DEFRA still expects to receive progress on implementation of the measures for improving the local air quality. Local authorities have to submit annual LTP progress reports (APRs) every July and authorities should therefore attach a table in the APR (as set out in Box 3.1 in LAQM.PRG(03), which sets out the recommended format for the progress report). Local authorities will also have to show progress in reaching their target(s). For all other stand-alone AQAPs, authorities are still expected to submit their AQAP progress reports in the recommended format by April of each year. This can be submitted at the same time as any Air Quality Progress Report, where applicable."

DEFRA, LAQM.PGA(05)

9.5 Reporting – Greater Manchester

GM Districts will report on progress against District action plans using the recommended format outlined in Box 3.1 in LAQM.PRG03 (Appendix 8.0). Conurbation wide progress towards the actions outlined in Chapter 8.0 of this document will use the same format. All progress reports will be collated centrally and submitted to DEFRA and to the DfT as part of the annual LTP2 APR (Please refer to Greater Manchester Air Quality Action Plan Progress Report 2005 submitted with the 2005 GMLTP1 APR).

10. Funding

10.1 Summary

This section outlines current and potential sources of non LTP2 funding streams for air quality monitoring and local transport measures that help lower emissions.

10.2 Monitoring

Funding for monitoring and modelling air pollution across Greater Manchester is obtained from a variety of sources. There are currently 18 real-time monitoring sites in the area. Of these, 8 are part of DEFRA's AURN (Automated Urban and Rural Network) network of monitoring sites. Funding for consumables, repairs collection of the data and bi-annual checks are provided through DEFRA, with the host local authority providing local support through visits to the site at least every 2 weeks. The remaining 10 sites are all owned and operated by the local authority where they are located. Funding to purchase the equipment is often available through Supplementary Capital Expenditure (SCE) bids to DEFRA, but the revenue cost of operating the site and ensuring accurate data is collected comes direct from the local authority budget.

The Greater Manchester authorities have been successful in the past with Supplementary Capital Approval (SCA) (now replaced with SCE) bids to DEFRA, which have enabled dispersion modelling of the area to be carried out to identify areas where the air quality objectives may not be met and ascertain the major sources of pollution in the area.

In the future further funding through SCE bids for modelling, monitoring or for small schemes to improve air quality may be available. Bids can be made at the start of each financial year by individual or groups of authorities. The areas of work that will receive priority are usually identified by DEFRA.

Local transport data used in GM air quality modelling and assessment work is financed through the GMLTP2 programme.

10.3 Other Funding Sources

In addition to LTP2 here are numerous sources of potential funding that can be used to implement local transport air quality measures and actions.

Developer Contributions – Funds can be obtained from developers to mitigate the air quality impact of developments through section 106 agreements and similar voluntary arrangements. Developers should also conduct or provide financial contributions to air quality modelling/monitoring as part of health impact assessments (HIA) of new medium and large developments.

Strategic Air Quality Partners – Jointly funded projects with key strategic partners provide opportunities to deliver best value solutions to achieve shared and complimentary objectives. Key air quality partners in GM include Manchester Airport, the Highways Agency and the Manchester Green Revolution partnership.

DfES Grants – Schools with an approved travel plan are eligible for grants from the Department of Education and Skills of approximately £5,000 for primary schools, and £10,000 for secondary schools. The funding is aimed at paying for improvements on the school site to encourage sustainable (and therefore low emission) travel for example, cycle parking facilities and walking route improvements.

Europe - EU grants schemes can provide funding for air quality and local transport projects. The Intelligent Energy Europe (IEE) programme has a total budget of 250 million Euros, which is used to co-finance international projects, events, and the start-up of local or regional agencies in 4 main fields: energy efficiency (SAVE); renewable energy sources (ALTENER); energy aspects of transport (STEER); and co-operation with developing countries (COOPENER).

New Deal for Communities – New Deal funding can be used to improve walking and cycling infrastructure including street lighting and footpaths.

Neighbourhood Renewal Fund — The Neighbourhood Renewal Fund has a floor target for air quality objectives to be met in line with the statutory objectives.

Transport Energy (http://www.est.org.uk/fleet/) – Grant support and information resource to help deliver cleaner vehicles, fleets & travel plan initiatives.

11. References & Reading List

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"National Air Quality Strategy for England, Scotland, Wales and Northern Ireland" (2000) DEFRA
"Greater Manchester Air Quality Action Plan", (2004) AGMA
"Greater Manchester Local Transport Plan 1 - 2000/1-2005/6", (2001) AGMA
"2003 EMIGMA Report", (2005) ARIC
"Evaluation of the Air Quality Strategy" (2004) AEA Technology
"Our Energy Future – Creating a Low Carbon Economy Energy White Paper", (2003) DTI
"UK Climate Change Programme (CCP)", (2000) DEFRA
"Local Transport Plan Two (LTP2) Guidance", (2004) DfT
"Manchester: The Green Energy Revolution", (2005) Quantum Strategy & Technology & Partners
"Manchester Airport Environment Plan to 2015", (2001) Manchester Airport
"M60 Route Management Strategy", (2005) Highways Agency
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"Tyndall Report – Decarbonising the UK", (2005), Tyndall
"An assessment of the potential effectiveness of introducing an age limiting vehicle licensing policy on controlling exhaust emissions from taxis within the Greater Manchester and Warrington areas", (2005) Rebecca Harris and Paul Cartmell
"School of Earth, Atmospheric and Environmental Sciences – Draft GM LTP2 Consultation Response", (23rd February 2006) Dr Ian Langley
"Analysis of Air Pollution and Social Deprivation", (2000) DEFRA
"Technical and Non-technical options to reduce emissions of air pollutants from road transport", (March 2005) DEFRA
"Rotterdam Speed Control Zone Study", (2005), Martin Kroon
"GMTU Report 1063 – Analysis of the results of roadside testing", (July 2005), GMTU
"Future Vehicle Emissions Standards document (2010 and Beyond) Discussion Document =" – (2005) DfT
"Traffic Management and air quality research programme (final report)", (2006) DEFRA
"LAQM.PRG(03) Progress Report Guidance", (2003) DEFRA
"Greater Manchester Air Quality Action Plan Report 2005", (2005), AGMA
"Powering Future Vehicles", (2002) DfT

APPENDICES

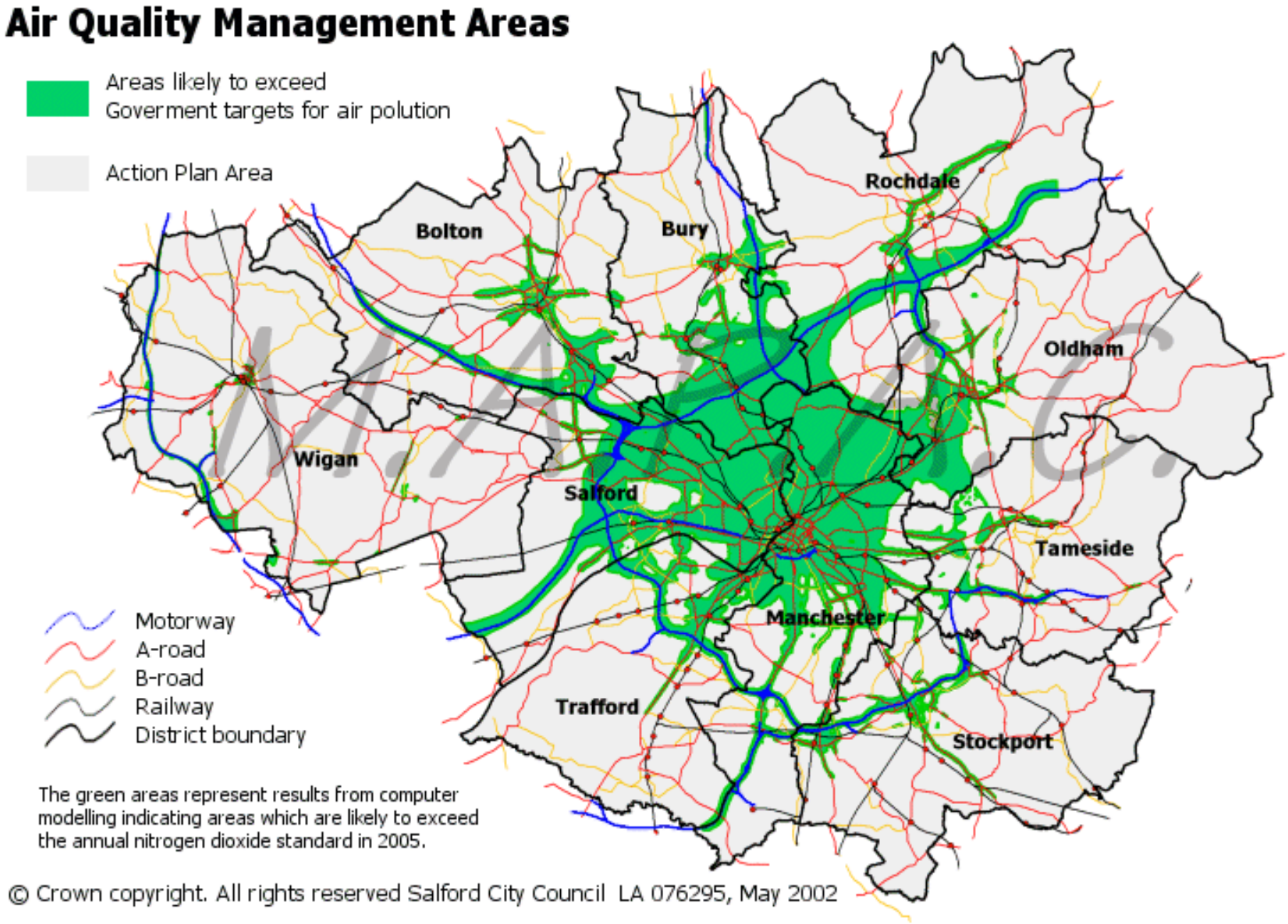
APPENDIX 1.0 - Pollutants and objectives as described in the Air Quality (England) Regulations 2000 and 2002 amendment regulations

Pollutant	Objective/Standard Concentration	Measured as	Date Introduced / Objective Date
Carbon Monoxide	10 mg/m^3	Max. Daily Running 8-Hour Mean	31.12.2003
Lead	0.50 ug/m^3	Annual Mean	31.12.2004
	0.25 ug/m^3	Annual Mean	31.12.2008
Nitrogen Dioxide	**40 ug/m^3**	**Annual Mean**	**31.12.2005**
	200 ug/m^3	**Hourly Mean not to be exceeded more than 18 times per year**	**31.12.2005**
Particles (PM_{10})	50 ug/m^3	24 Hour Mean not to be exceeded more than 35 times per year	31.12.2004
	40 ug/m^3	Annual Mean	31.12.2004
Sulphur Dioxide	266 ug/m^3	15 Min Mean not to be exceeded more than 35 times per year	31.12.2005
	350 ug/m^3	Hourly Mean not to be exceeded more than 24 times per year	31.12.2004
	125 ug/m^3	24 Hour Mean not to be exceeded more than 3 times per year	31.12.2004
Benzene	16.25 ug/m^3	Running Annual Mean	31.12.2003
	5 ug/m^3	Annual Mean	31.12.2010
1,3-Butadiene	2.25 ug/m^3	Running Annual Mean	31.12.2003

Indicative/provisional limit values to be achieved by 1 January 2010 – not included in Regulation

Pollutant	Objective/Standard Concentration	Measured as	Date Introduced / Objective Date
Particles (PM_{10}) - indicative	**50 ug/m^3**	**24 Hour Mean Not to be exceeded more than 7 times per year**	**01.01.2010**
	20 ug/m^3	**Annual Mean**	**01.01.2010**

APPENDIX 2.0 – Greater Manchester AQMA 2002



APPENDIX 3.0 - Schedule 8 EU Air Quality Standards (through AQ Daughter Directives 99/30, 2000/69 and 2002/3 Implemented through the Air Quality Limit Values Regulations 2003)

Nitrogen dioxide

- **Hourly limit value for the protection of human health:** 200μg/m^3 not to be exceeded more than 18 times per calendar year. Target date: 1/1/2010.
- **Annual limit value for the protection of human health:** 40μg/m^3 target date 1/1/10.
- **Alert threshold**: 400μg/m^3 measured for over 3 hours.
- **Annual limit for the protection of vegetation:** 30μg/m3. Target date - Two years after Directive enters force.

Particulate matter (PM10)

STAGE 1

- **Daily limit value for the protection of human health:** 50μg/m^3, may not be exceeded more than 35 times per calendar year. Target date 1/1/2010
- **Annual limit value for the protection of human health:** 40μg/$m^{3.}$ Target date 1/1/2005

STAGE 2

- **Indicative daily limit for the protection of human health:** 50 μg/m^3 not to be exceeded more than 7 times per calendar year. Target date 1/1/2010.
- **Indicative annual limit value for the protection of human health:** 20μg/m^3 target date 1/1/10.

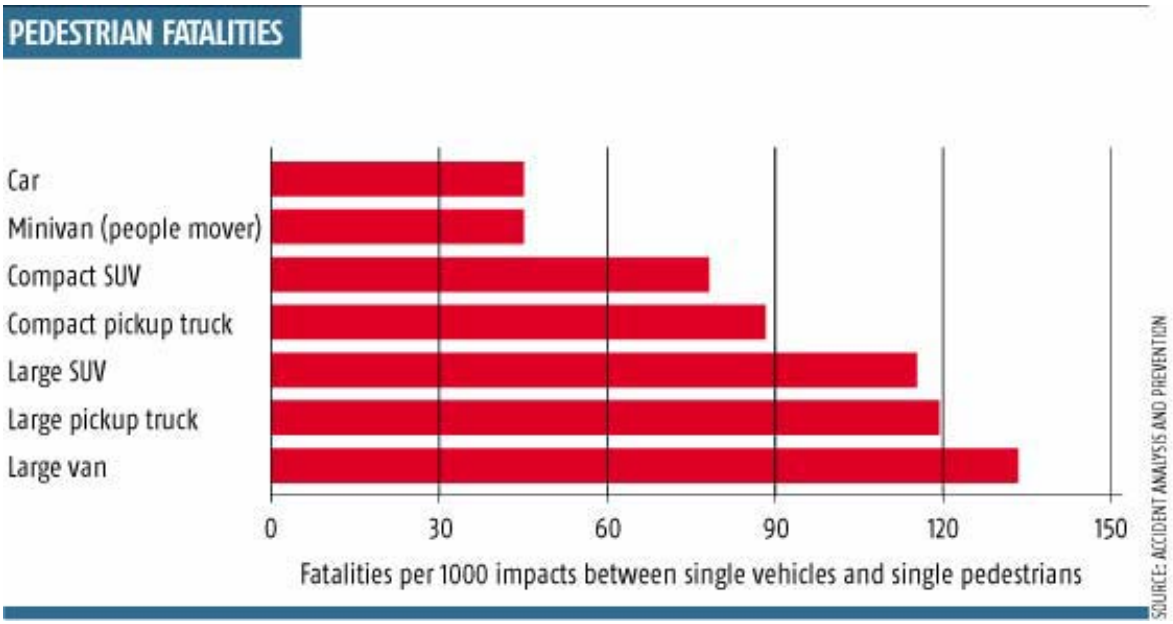
APPENDIX 4.0 – Emissions and Vehicle Type

The table below summarises the Department for Transports labelling system designed to inform people about the environmental credentials of different types of vehicle. The system uses a grading system from A to F with A being the least polluting and F the most. Typically, vehicles with large engines such as Sports Utility Vehicles (SUVs) fall within the most polluting categories.

Rating band	CO2 Emissions	Examples
A	<100 g/km	Battery electric vehicles
B	101-120 g/km	Toyota Prius 1.5 petrol-electric hybrid Smart car 0.7 petrol Citroen C2 1.4 diesel
C	121-150 g/km	Fiat Panda 1.2 petrol Ford Ka 1.3 petrol VW Golf 1.9 TDI diesel Jaguar X-type 2.0 diesel saloon
D	151-165 g/km	Mini One 1.6 petrol, manual Ford Fiesta 1.6i petrol Peugeot 307 1.4 petrol
E	166-185 g/km	Ford Mondeo 1.8i petrol Vauxhall Vectra 1.8 petrol Rover 75 1.8 petrol Toyota Avensis 1.8 petrol
F	>185 g/km	Land Rover Freelander 2.0 diesel Audi A4 1.6 petrol saloon BMW X5 4.8 petrol Jaguar X-type 2.0 petrol saloon automatic Toyota RAV4 2.0 petrol Lamborghini Murcielago 6.2 petrol

APPENDIX 5.0 – Road Accidents - Vehicle Type & Pedestrian Fatalities

The New Scientist (12 December 2003) reported that American researchers have discovered that a pedestrian struck by a large sports utility vehicle is more than twice as likely to die as someone hit by a saloon car travelling at the same speed.



Research conducted by Dr. Clay Gabler and Devon Leflers indicated that pedestrians hit by large SUVs are twice as likely to die as those hit by a car at the same speed. Cars have a lower profile than vans or SUVs and so tend to cause leg injuries as opposed to head injuries, which are more likely to be caused by vehicles with higher profiles. Head injuries are more likely to result in death than leg injuries. The research concluded that the front shape of a vehicle, as well as impact speed, is a major factor in predicting injury or death.

Previous research has also showed that in collisions between light trucks and cars, car passengers suffered 81% of fatalities.

APPENDIX 6.0 – EURO Standard Emission Tests

The table below outlines the **relative** emission performance of different vehicle type by fuel and emission standard on an urban test cycle. a

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	461	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: 2 stroke	34	135	2	-
	greater than 50cc: 2 stroke	74	338	4	-
	greater than 50cc: 4 stroke	67	68	13	-

Source - http://www.haguidetofreight.co.uk/General/id94.htm

APPENDIX 7.0 - GM LTP2 NO2 Concentration Indicator Sites

District	Modelled 2005 (NO2ug/m3) Baseline	Modelled 2010 (NO2ug/m3) Target	Location	Map Ref. X	Map Ref. Y
Stockport	40.71	29.01	Roadside on the A6	390700	388200
Rochdale	53.18	46.72		388628	411950
Oldham	40.93	35.32	Roadside on the A62	391921	404808
Manchester (Primary)	50.48	29.00	Piccadilly Gardens Bus Station (Monitored baseline)	384314	398338
Manchester (Control)	43.85	37.99	Roadside Oxford Road (Modelled)	384118	397499
Tameside*	48.00	40.00	Roadside A635	393703	398791
Wigan	51.59	45.06	425 Poolstock (North of Marus Bridge roundabout)	356833	403153
Trafford	40.00	31.51		376910	389880
Bolton	42.26	36.39	Turton Street	371955	409865
Bury	47.08	50.09	Roadside on Bolton Road	379090	403990
Salford	48.09	46.07		383035	398560
GMPTE	50.48	29.00	Piccadilly Gardens Bus Station (Monitored)	384314	398338
*Baseline data taken from NOx tubes due to lack of appropriate modelled site. 2010 target is an estimate based on expected trends in the area.					

The receptor points where chosen according to the following criteria unless indicated -

- Be at or near roadside.
- Be the worst case or near worst case point of NO2 concentration exceedance within the District.
- Not directly influenced by emissions from Highway Agency controlled roads
- Unless stated have a 2005 modelled baseline and 2010 target concentration level.
- Be an area where the population is regularly exposed to the poor air quality, either due to residency or through flow.

APPENDIX 8.0 – Recommended Air Quality Action Plan Reporting Format

Action plan measure/target	Original timescale	Progress with measure	Outcome to date	Comments
Roadside emissions testing	To be implemented by February 2003	Roadside emissions testing programme commenced in March 2003, in collaboration with four neighbouring authorities	To date more than 2,000 vehicles have been tested. The failure rate is currently 4%	An article in the local paper regarding the scheme has raised the profile within the area
Publicity Campaign on walking/cycling	Implementation by August 2002, and scheduled to run for 12 months	Introduced on time and due to run 12 months	There has been no observed reduction in traffic levels, but a snapshot review of 5 schools has indicated a 5% increase in cycling	Leaflets available in all public places. Exhibition stands in main shopping centres. Campaign linked to work with schools/universities on sustainable travel
Park and Ride Scheme (state which area in the authority)	To be fully implemented by June 2004	On schedule to be implemented by June 2004	No outcome to date	Scheme being taken forward with support from transport planners
Environment Agency agreed to modify permit to limit emissions	Modification to permit to be implemented by the Agency by January 2004	Negotiations are continuing with the Agency, and the modification is on target to be issued	N/A	Limit on emissions will be effective from *(date)*
Area speed reductions (20 mph zones in residential areas)	To commence implementation in March 2004	Traffic calming around schools is on target to be implemented in March 2004. Additional LTP funding is required to extend the scheme to residential areas	No outcome to date	A generally positive response to the proposed scheme has been received from local residents
Box 3.1: Recommended format for air quality action plan report Source – DEFRA (LAQM.PRG03)				

APPENDIX 9.0 - GM AQAP Non-Transport Actions

Ref	Action	Responsibility	AQ Effect	AQ Improvement	Non-AQ Effects	Timescale	Cost
NTA1	**Enforce the Pollution Prevention and Control (England and Wales) Regulations 2000.**	District Environmental Health Officers	Medium	The Environment Agency have stated that any Agency regulated process making a significant contribution to pollution in an AQMA will, where possible, have its operating conditions altered to reduce emissions.	These regulations also control the release of pollution to land and air from medium to large sized processes. Process authorisation under this regulation can also lead to possible changes in the visual impact of emissions from stacks and a reduction in the number of odour and noise complaints; although fitting abatement technology can be expensive for the company.	Ongoing	£
NAT2	**Continue to enforce Smoke Control Areas.**	District Environmental Health Officers	Low	Continuing to enforce smoke control will ensure emissions from coal burning domestic properties are kept as low as possible.	Smoke Control Areas can lead to improvement of the overall urban and built environment. There is a reduction in the amount of CO_2 and acid rain precursors released into the air. They also encourage the adoption of more efficient heating and combustion processes.	Ongoing	£

Ref	Action	Responsibility	AQ Effect	AQ Improvement	Non-AQ Effects	Timescale	Cost
NTA2	**Promote improved energy efficiency in domestic properties.**	District Sustainability Officers, District Home Energy Conservation Officers	Low	Reduced energy consumption will result in the reduction of gas, oil and solid fuel burning within properties, which will reduce N0x and PM10 emissions into local air. Reduced electricity consumption can help to reduce pollution emissions from power stations which although possibly remote from individual local authorities can disperse pollution over a wide area (emissions from Fiddlers Ferry Power Station have been found to impact on the whole of the Greater Manchester area).	Financial savings, reduced fuel poverty, helps to tackle climate change, and assists the local authority in meeting Home Energy Conservation Act targets.	Ongoing	££

Ref	Action	Responsibility	AQ Effect	AQ Improvement	Non-AQ Effects	Timescale	Cost
NAT3	**Promote energy efficient and sustainable measures to developers.**	Districts	Medium	Reduced energy consumption will result in the reduction of gas, oil and solid fuel burning within premises, which will reduce N0x and PM10 emissions into local air. Reduced electricity consumption can help to reduce pollution emissions from power stations, which although possibly remote from individual local authorities can disperse pollution over a wide area (emissions from Fiddlers Ferry Power Station have been found to impact on the whole of the Greater Manchester area).	Financial savings and helps in tackling climate change.	Ongoing	£
NTA3	**Encourage the conversion of large boilers (>2MWth) operating in hospital, university and commercial buildings from coal or oil to gas.**	Districts	Low	Large boiler emissions contributed 204 tonnes of PM10 across Greater Manchester in 2001, 24% of all point source emissions. Gas fired boilers release around 570 times less CO_2 and almost 1500 times less NOx (per therm) than fuel oil fired plants.	This will also reduce the emissions of pollutants linked to climate change.	Ongoing	£

Ref	Action	Responsibility	AQ Effect	AQ Improvement	Non-AQ Effects	Timescale	Cost
NAT4	**Promote energy efficiency in industrial and commercial premises, including the Council's own non-domestic buildings.**	Districts	Low	Reduced energy consumption will result in the reduction of gas, oil and solid fuel burning within premises, which will reduce N0x and PM10 emissions into local air. Reduced electricity consumption can help to reduce pollution emissions from power stations, which although possibly remote from individual local authorities can disperse pollution over a wide area (emissions from Fiddlers Ferry Power Station have been found to impact on the whole of the Greater Manchester area).	Financial savings and helps in tackling climate change.	Ongoing	£
NTA4	**Raise awareness of the pollution and health effects of burning garden and other waste.**	District Environmental Health Officers	Low	It is expected that the awareness raising campaign will result in a reduction in the number of bonfires. This should result in a reduction in nuisance complaints and an improvement in local air quality, although this may not have a significant impact on annual average pollution concentrations.	This could lead to fewer complaints about smoke nuisance and promote social harmony.	2006/7	£

Ref	Action	Responsibility	AQ Effect	AQ Improvement	Non-AQ Effects	Timescale	Cost
NAT5	**Local authorities to develop Unitary Development Plan (UDP) and Local Development Framework (LDF) policies appropriate for their area to ensure that air quality is a consideration in determining planning applications.**	District Planning Officers	Medium	The policies would seek to ensure that new development does not contribute significantly to elevated pollution concentrations and that sensitive development is appropriately located.	The UDP should balance air quality considerations with other development control factors.	2005/6	£
NewNTA7	**All districts to produce and implement a "Carbon Action Plan".**	District Sustainability Officers, District Transport Officers	Low	Reduction in the emissions associated with district fleet and employee travel.	Will help to raise the profile of sustainable development and the environment.	2008	££