

Glasgow City Council



Air Quality Action Plan



**air quality
action plan**

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- Land Services, Glasgow City Council
- Development and Regeneration Services, Glasgow City Council
- Environmental Protection Services, Glasgow City Council
- Scottish Environment Protection Agency
- Strathclyde Passenger Transport
- WESTRANS
- Scottish Executive
- Local Transport Operators

Contents

Executive Summary	5
1.0 Introduction	7
1.1 Background to Glasgow City Council’s Air Quality Action Plan	7
1.2 Action Plan - Aims and Objectives	8
1.3 Cost-Benefit Analyses/Time Scales	9
1.3.1 Benefit Analyses	9
1.3.2 Estimated Costs of Actions	9
1.3.3 Timescales for Action Implementation	10
1.4 Legislative Framework	10
1.4.1 Environment Act 1995	10
1.4.2 The National Air Quality Strategy - Standards and Objectives	11
1.4.3 Local Air Quality Management in Glasgow	11
2.0 Background to City of Glasgow	15
2.1 Glasgow – Population and Location	15
2.2 Meteorology	15
2.3 Industry and Economy	16
2.4 Transport	16
3.0 Background to Air Quality in Glasgow	19
3.1 Nitrogen Dioxide - Sources and Health Effects	19
3.2 Monitoring and Modelling of NO₂ within Glasgow	19
3.3 Primary Sources of NO_x in Glasgow	21
4.0 Actions	23
4.1 Local Transport Management	23
4.1.1 Proposed M74 Extension	24
4.1.2 East End Regeneration Route (EERR)	32
4.1.3 Variable Message Signs	34
4.2 Public Transport	34
4.2.1 Quality Bus Corridors/Bus Information and Signalling System	35
4.2.2 Park & Ride Schemes	40
4.2.3 Larkhall to Milngavie Rail Link	43
4.2.4 Cycling and Walking Strategies	44
4.2.5 School Travel Plans	46
4.3 Parking and Fiscal Measures	48
4.3.1 Vehicle Emissions Testing/Idling Vehicles	48
4.4 Other Air Quality Enforcement Work	53
4.4.1 Smoke Control and Clean Air Act 1993	53
4.4.2 Statutory Nuisance and Environmental Protection Act 1990	53
4.5 Non-Transport Based Emissions Sources	54
4.5.1 Commercial and Domestic Sources	56
4.5.2 Industrial Sources	57
4.6 Glasgow City Council Leading by Example	58
4.6.1 Vehicle Emissions Testing of Council Fleet	58
4.6.2 Alternative fuels.....	59
4.6.3 Green Travel Plans	62
4.7 Education and Awareness Raising	63
4.7.1 Glasgow City Council Website	63
4.7.2 Walk to School Week	63
4.7.3 Car Free Day	63
4.8 Air Quality Monitoring	64
5.0 Actions Still Under Consideration	67

5.1 M8 Motorway	67
5.2 Clyde Corridor Transport Study	68
5.3 Crossrail Technical Feasibility Study	72
5.4 Emissions from other Transport Sources	73
6.0 Actions Not Considered Feasible At This Time	74
6.1 Low Emission Zone	74
6.2 Road User Charging (Congestion Charging)	76
6.3 Workplace Parking Charges	79
7.0 Summary of Actions Table	81
8.0 Conclusions	82
9.0 Bibliography	85
Appendix 1: Summaries of Existing Plans and Policies	88
1.1 A New Deal for Transport: Better for Everyone (1998)	89
1.2 Travel Choices for Scotland (1998)	89
1.3 National Planning Policy Guidance (NPPG17): Transport and Planning (1999)	89
1.4 'Route map' for Future of Transport in Scotland (2002)	90
1.5 Glasgow and Clyde Valley Joint Structure Plan (2000)	90
1.6 SPT's Strathclyde Public Transport Strategy 2000	91
1.7 Local Transport Strategy 2001 to 2004 – Keep Glasgow Moving	91
1.8 Glasgow City Plan (2003)	94
1.9 Park and Ride In Scotland (1999)	97
1.10 Transport in the Urban Environment (1997)	97
1.11 City Centre Millennium Plan (1995)	98
1.12 Glasgow Access and Walking Strategy (2003)	101
Appendix 2: Consultation on the Draft Air Quality Action Plan	103
2.2 Draft Air Quality Action Plan: Consultation Report	104
2.3 Report on Action Plan Workshop	115

Executive Summary

The City Council is required to undertake regular reviews and assessments of air quality within Glasgow in accordance with Scottish Executive Guidance and Objectives as set out in the Air Quality (Scotland) Regulations 2000. The Council's regular assessments of the seven key air pollutants indicate that the City meets the Objectives on six pollutants. However, concentrations of Nitrogen Dioxide (NO₂) were assessed as being above the acceptable levels at certain locations, and Glasgow City Council was, therefore, required to establish an Air Quality Management Area (AQMA) for the City centre with the aim of improving air quality in this area.

Consequently, in line with our statutory requirements, this Action Plan has been prepared to outline a series of actions aimed at reducing emissions of Oxides of Nitrogen (NO_x) within the designated AQMA to below the Objective level by the required date of the end of 2005. It is estimated that a reduction of up to 70% is required to meet the NO₂ Objective in some locations within the AQMA by the target date.

The Action Plan assesses a range of initiatives and developments in terms of their feasibility, timescale, costs, predicted air quality impact and other advantages/disadvantages. These assessments indicate that there are likely to be eight feasible actions capable of influencing NO₂ levels within Glasgow's AQMA by 2005. These actions include public transport initiatives, vehicle emissions testing and school travel plans and would potentially reduce emissions by up to 11% and can be added to the 12% reduction that is predicted to occur without any intervention. Therefore, although a significant improvement in local air quality is expected, Glasgow is unlikely to achieve the Air Quality Objective for NO₂ at all City centre locations by the 2005 target. This is in line with the situation in many large urban areas elsewhere in Scotland and throughout the UK.

In addition, the document details actions due to be implemented post-2005, such as the M74 extension, which should have a high positive impact on emissions within the AQMA. Other possible initiatives that Glasgow City Council would wish more detailed and wider consideration of are also identified and include issues such as:

- Workplace Parking Charges;
- Encouraging greater use of public transport;
- Lobbying to include NO_x in the MOT test;
- Petitioning for tighter regulation of buses;
- Lobbying for tighter regulation of taxis and their emissions;
- Engagement with the Scottish Executive on actions concerning the M8 and M74 that will have a positive impact on air quality without harming investment in Glasgow;
- Encouraging clean technology and a reduction of emissions from heavy goods vehicles;
- Encouraging the UK Government to provide a clearer message on the use of alternative fuels, e.g. long term tax incentives;
- Encouraging investment in public transport infrastructure in the west of Scotland to encourage a modal shift from cars to public transport;
- National action to change from older, polluting vehicles to newer, cleaner vehicles within the private fleet.

It is possible that in the longer term, these might make a significant contribution to reducing NO₂ within Glasgow's AQMA, but more detailed cost/benefit analysis would be required.

However, it is clear that the Council's responsibilities for improving air quality in general and reducing NO₂ emissions in particular, significantly exceed its capabilities as a single local authority. To deal with this issue more effectively will require concerted and determined action on a range of fronts by a number of organisations and agencies working in partnership, such as SPT, Westrains, Scottish Executive and transport operators. The consultation on this Action Plan represents a key opportunity for engaging with the key bodies and interested parties in pursuing this aim.

1.0 Introduction

Glasgow City Council declared an Air Quality Management Area (AQMA) covering the city centre in January 2002. This was due to predicted exceedences of the air quality objectives for nitrogen dioxide (NO₂).

Under Section 84 of the Environment Act 1995, Glasgow City Council is required to prepare an Air Quality Action Plan following on from the designation of the AQMA, in which it outlines actions it is already taking or intends to take with the intention of meeting the Government's objectives for NO₂. This document therefore represents Glasgow City Council's draft Action Plan outlining these intentions. In order to prepare an effective Air Quality Action Plan, it is important not only to understand the pollutant of interest and its effects, but also to identify local sources of the pollutant, so that methods of reducing emissions from these sources may be investigated.

1.1 Background to Glasgow City Council's Air Quality Action Plan

A range of measures is required to tackle the air quality problem and reduce emissions of NO_x. It should be made clear that no single action will result in significant reduction in NO₂ levels, but rather, a series of actions are anticipated to bring about a cumulative reduction with the aim of bringing levels to within the 2005 statutory requirements.

The main focus of the actions presented in this Action Plan will be centred on road traffic. Improvements in air quality are interlinked with the need to improve some of the congestion problems currently being encountered in the city. The Council also seeks to encourage active participation in the process by the general community through consultation, awareness raising and education on air quality issues.

A Council working group on air quality was set up to allow officers from different services and disciplines to come together and discuss ways in which air quality in the city could be improved and to identify actions that are, or could, be taken that will help to bring about this aim. This group meets with other relevant stakeholders from out with the Council, whom it is felt could have an input into the process, including Strathclyde Passenger Transport, transport operators and the Scottish Executive. The main concern of the Group is to identify the various actions that are available for inclusion in the Action Plan, to evaluate their feasibility and to recommend to Council which actions should be included in the Action Plan. The remit of the Group is as follows:

- Assessing actions required to meet the statutory requirements following on from the declaration of the Air Quality Management Area
- The production of an Air Quality Action Plan for Glasgow City Council
- Ensuring the integration of air quality issues into other relevant decision making processes such as transport planning and development control
- Identifying good practice for the Council and taking forward to implementation
- Improving the understanding of air pollution, both at technical level and through raising awareness with the wider communities of interest

It is important that any actions within the City Council's Air Quality Action Plan are compatible with other City Council initiatives and strategies, including those for Local Agenda 21, Transport and the City Plan.

In March 2002, a series of workshops were held in Glasgow City Chambers to help identify potential solutions to the air quality problems. Seventeen actions in total were identified as being worthy of consideration for the Air Quality Action Plan and these were then amalgamated into six main areas.

Actions and potential future actions will be discussed and evaluated and consideration given to the potential benefits to air quality, the cost effectiveness, achievability and time scale for implementation. A summary table has also been provided which lists the proposed measures and gives a preliminary assessment of costs and benefits. This allows the measures to be prioritised and time-scaled. It should be noted that some of the figures provided in relation to costs, benefits and timescales are approximations.

1.2 Action Plan - Aims and Objectives

It is considered important to list the aims and objectives of Glasgow City Council's Action Plan in order of importance. These are:

1. To achieve the National Air Quality Strategy objectives for NO₂ set for the 31st of December 2005. However, this may be difficult considering that a significant source of NO_x within Glasgow's AQMA (i.e. the M8 motorway) is outwith Glasgow City Council's control.
2. To collaborate with other council services, public bodies and external agencies to develop a long-term acceptable and efficient multi-component strategy to solve Glasgow's air pollution problem.
3. To improve Glasgow's general air quality.
4. To support national strategies to improve air quality.

The Action Plan is intended to outline the actions and long-term strategies that the council and other agencies have investigated as methods of reducing emissions of NO_x within Glasgow. It includes all management measures that have been considered in Glasgow since the declaration of the Air Quality Management Area (AQMA) in 2001. It includes strategies that are currently being implemented or will be implemented in Glasgow (subject to funding), together with actions that are still under consideration and those which have been investigated but are not considered feasible at this time.

In the guidance 'Action Plan Appraisal Checklist' (Casella Stanger), five general sources of air pollutants were identified:

1. Road Transport
2. Other Transport
3. Industry
4. Domestic
5. Aviation

Of these five source types, only Road Transport, Industry and Domestic are considered to represent significant sources of NO_x within Glasgow, and as such, only strategies influencing NO_x emissions from these sources will be discussed in this Action Plan. Furthermore, as road transport represents the predominant source of NO_x in Glasgow

city-wide and within the AQMA, the majority of the strategies considered within this Action Plan relate to methods of reducing emissions from road transport.

1.3 Cost-Benefit Analyses/Time Scales

According to guidance, the Scottish Executive does not expect local authorities to undertake detailed cost-benefit analyses, or to attempt to calculate, for example, the monetary value of lives lost or extended due to actions proposed in air quality action plans. However, local authorities are required to assess the benefits, costs (financial, socio-economical and environmental) and thus feasibility of different actions proposed within the action plan.

It must be noted that many of the actions proposed within Glasgow City Council's air quality Action Plan are not exclusively designed to improve local air quality but to improve transport links/reduce congestion, achieving economic regeneration and increasing social inclusion (the Local Transport Strategy, the East End Regeneration Route). For these actions and others such as awareness raising and green travel plans it is neither feasible nor appropriate to conduct detailed cost-benefit analyses.

1.3.1 Benefit analyses

In terms of the predicted benefit of the actions listed in the action plan with regard to reducing emissions of NO_x, assessments have been conducted where possible, and actions classified as having a (i) neutral, (ii) low, (iii) medium or (iv) high impact. The predicted effect of each of the four classifications on % reduction in emissions of NO_x within the AQMA is presented in Table 1.1.

Table 1.1 Classifications of predicted air quality impacts of actions

Impact on air quality Classification	Approximate % reduction in NO_x emissions
Neutral	0
Low	≤ 1%
Medium	>1% to 5%
High	> 5%

However, it is stressed that these classifications are preliminary due to the nature of the actions, and consequently where feasible, Glasgow City Council will introduce monitoring programmes to quantify the actual impact of each action on NO₂ concentrations. Furthermore, where possible, the potential impact of actions on other National Air Quality Strategy Pollutants has been indicated.

1.3.2 Estimated Costs of Actions

Detailed estimates of the cost of actions included within the Plan have been provided wherever available. In all other circumstances broad estimates of costs have been provided in the form of low, medium and high. The range of costs associated with each of these categories is presented in Table 1.2.

Table 1.2 Estimated Financial Costs of Action Plan Proposals

Costing Category	Estimated Cost of Action (£ million)
Low	< 5
Medium	5 to 50
High	> 50

However, it must be stressed that there are inherent difficulties associated with estimating costs of actions where the precise nature of the proposals have not been confirmed. Therefore, all estimates given are relative and subject to change.

1.3.3 Timescales for Action Implementation

In addition to analyses of the financial costs and predicted air quality benefits of actions, time-scales for the implementation of said feasible actions should be included within the Plan. However, many of the scenarios proposed by Glasgow will be introduced gradually (due to the scale of many of the projects/and the requirement for funding), whilst many of the projects are still being considered. Where available, timescales for implementing projects are included in individual sections.

1.4 Legislative Framework

The Environment Act was introduced in 1995 and set future targets for concentrations of atmospheric pollutants in the UK. It remains the primary enactment pertaining to air quality for local authorities in Scotland. Subsequently, it has led to the publication of the United Kingdom National Air Quality Strategy in 1997, as well as associated Regulations and Guidance Notes. This document was reviewed, and a revamped Air Quality Strategy for England, Scotland, Wales and Northern Ireland, along with new draft Regulations and Guidance Notes, was published in early 2000. Amended regulations ('the Regulations') for Air Quality in England, Scotland and Wales were published in 2002.

1.4.1 Environment Act 1995

This is the primary legislation for local air quality management in the United Kingdom. Air quality is covered in Part IV of the Act. Section 82 of the Act instructs local authorities to conduct regular reviews of air quality within the authority's area. In addition, an assessment must be made of whether air quality standards and objectives are being achieved, or are likely to be achieved within a specified period.

If it appears that any air quality standard and objective is not being achieved, or is not likely to be achieved within the specified period, the local authority shall by order, designate that part of its area affected as an Air Quality Management Area (AQMA). These orders are made under Section 83 and may, following a subsequent air quality review of the affected part, be varied or revoked.

Section 84 of the Act places duties upon local authorities that designate Air Quality Management Areas to assess the quality of the air within the designated area. Local authorities must then prepare a written plan (an Action Plan) in pursuit of the achievement of the air quality standards and objectives in the designated area. They

must also state the time period in which the measures proposed in the Plan may be implemented.

The Environment Act 1995, under Section 87, makes provision for the drawing up of Regulations relating to matters of local air quality management. From this came the Air Quality Regulations 1997. These have now been superseded by the Air Quality (Scotland) Regulations 2000, and 2002.

The Regulations list the air pollutants of concern, the respective objectives and the relevant time periods by which they are to be achieved. All local authority assessments of air quality objectives must consider the level of each air pollutant as it would be at the end of the specified period and all Action Plans must seek to bring air pollutant levels to within the limits set in the Regulations by the same date. The pollutants and objectives listed are discussed in more detail in the following section.

Section 88 of the Act allows the relevant Secretary of State to issue guidance to local authorities with respect to any of the powers or duties conferred to local authorities in Part IV of the Environment Act. Local authorities must have regard to this guidance when carrying out any of their functions by virtue of Part IV.

1.4.2 The National Air Quality Strategy - Standards and Objectives

The United Kingdom government and the Scottish Executive have identified eight air pollutants of current concern. Seven of these are listed in Table 1.1 together with the objective concentration(s) and the date by which they are to be achieved. Ozone represents the eighth pollutant of concern but is not included in Table 1.1 as it isn't dealt with on a local level, due to its ability to transigrate local authority and national boundaries. Instead action to reduce and control ozone concentrations will require to be taken on a national and international basis.

All of the pollutants listed in Table 1.3 are known to have potential adverse affects on human health, and are relatively widespread throughout the United Kingdom. Furthermore, a reasonable amount is known about their ambient concentrations across the United Kingdom and about the major sources of each pollutant. Standards for each air pollutant and fixed objectives for the achievement of each of the standards are set by the Air Quality Strategy. However, following the latest evidence of the impacts of these pollutants on human health and developments within Europe, the objectives for a number of these pollutants have been revised, with tighter objectives being introduced including separate objectives for Scotland.

1.4.3 Local Air Quality Management in Glasgow

The Environment Act 1995 enforces a duty on all local authorities to conduct regular reviews of air quality (seven key pollutants) in their respective areas and assess the findings against current and future air quality standards and objectives. With regard to conducting these reviews, guidance is provided for local authorities in the document '*Local Air Quality Management: Technical Guidance LAQM.TG(03)*' issued by the Department for Environment, Food and Rural Affairs (DEFRA), the Scottish Executive and the Welsh Assembly Government under section 88(1) of the Environment Act 1995 ('the Act').

Table 1.3
The National Air Quality Strategy Objectives for the seven pollutants in Scotland

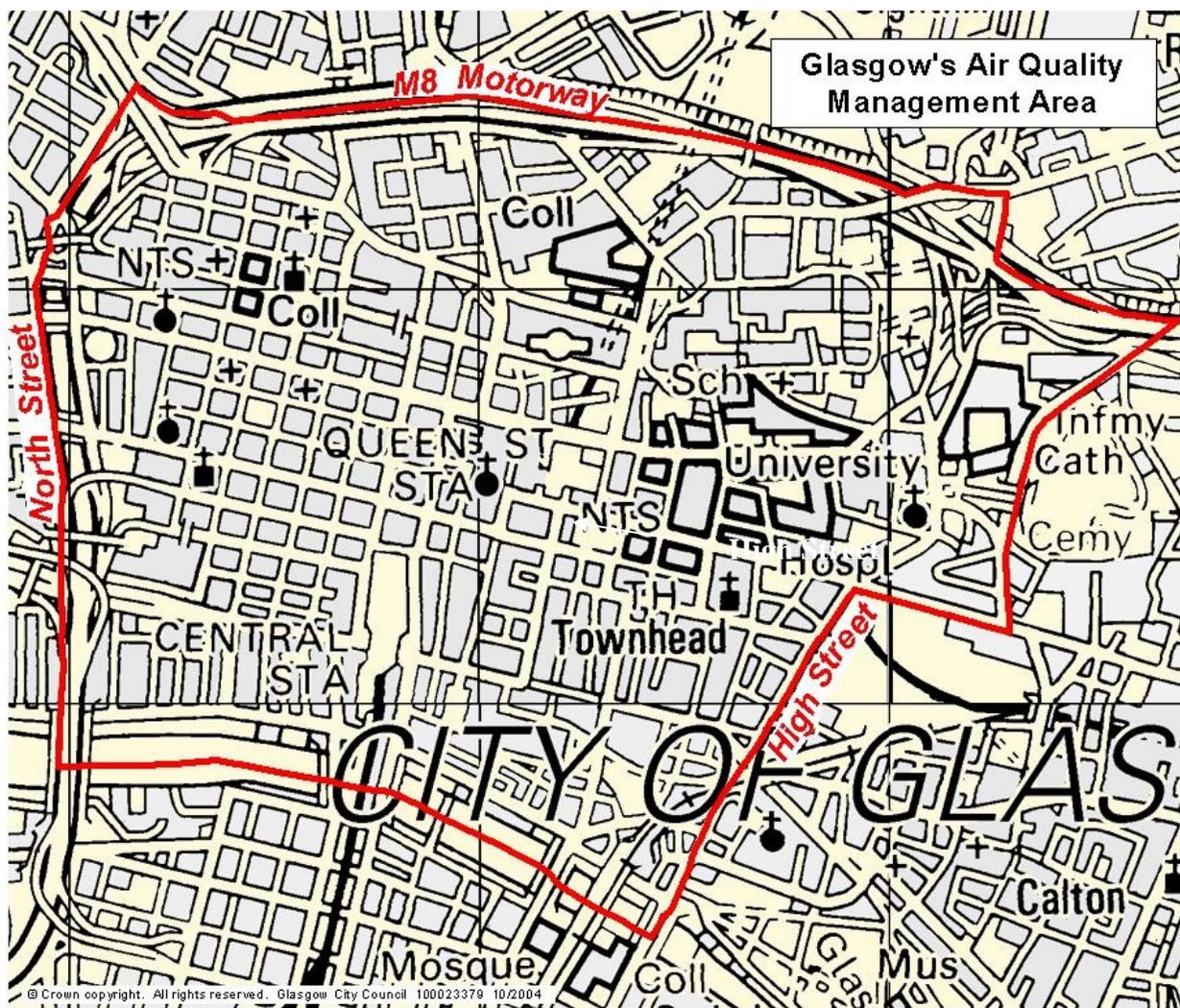
Pollutant	Objective		Date to be achieved by
	Concentration	Measured as:	
Benzene	3.25 $\mu\text{g m}^{-3}$	Running annual mean	31.12.2010
1,3-butadiene	2.25 $\mu\text{g m}^{-3}$	Running annual mean	31.12.2003
Carbon monoxide	10 mg m^{-3}	Running 8 h mean	31.12.2003
Lead	0.5 $\mu\text{g m}^{-3}$	Annual mean	31.12.2004
	0.25 $\mu\text{g m}^{-3}$	Annual mean	31.12.2008
Nitrogen dioxide	200 $\mu\text{g m}^{-3}$ not to be exceeded more than 18 times per year	1 h mean	31.12.2005
	40 $\mu\text{g m}^{-3}$	Annual mean	31.12.2005
Particulate Matter (PM ₁₀)	50 $\mu\text{g m}^{-3}$ not to be exceeded more than 35 times per year	24 h mean	31.12.2004
	40 $\mu\text{g m}^{-3}$	Annual mean	31.12.2004
	50 $\mu\text{g m}^{-3}$ not to be exceeded more than 7 times per year	24 h mean	31.12.2010
	18 $\mu\text{g m}^{-3}$	Annual mean	31.12.2010
Sulphur dioxide	350 $\mu\text{g m}^{-3}$ not to be exceeded more than 24 times a year	1 h mean	31.12.2004
	125 $\mu\text{g m}^{-3}$ not to be exceeded more than 3 times a year	24 h mean	31.12.2004
	266 $\mu\text{g m}^{-3}$ not to be exceeded more than 35 times a year	15 min mean	31.12.2005

In recent years, Glasgow City Council has conducted numerous reviews of air quality, and by 2004 will have completed all four air quality review and assessment documents

required in the first round of review and assessment. In summary, the results of these documents (Stages I-IV) indicated that in Glasgow the ambient concentrations of six of the seven air pollutants listed in the National Air Quality Strategy were likely to meet the relevant air quality objectives. Only nitrogen dioxide (NO₂) was considered likely to fail the objectives outlined, with Stages III (2001) and IV (2003) predicting widespread exceedences of the annual objective in Glasgow city centre.

As a result of the findings of the Stage III air quality review and assessment, in 2002 Glasgow City Council declared a large section of Glasgow city centre as an Air Quality Management Area (AQMA), a map of which is presented below (Map 1.1).

Map 1.1 City of Glasgow's Air Quality Management Area



The Air Quality Management Area (AQMA) comprises the area within the City of Glasgow, which is bounded by (and including the full widths of) the following roads and by the centreline of the River Clyde.

Kingston Bridge / M8 Motorway, from the centreline of the River Clyde to the junction of Piccadilly Street and North Street; North Street, from the Junction with Piccadilly Street to Woodlands Road; Saint George's Road, from Woodlands Road to Phoenix Road; Phoenix Road, from Saint George's Road to the M8 Motorway; M8 Motorway, from Phoenix Road to Baird Street; Baird Street, from M8 Motorway to Castle Street; Castle Street, from Baird Street to M8 on-ramp; M8 Motorway (including on-ramp), from Castle Street to the projected line of the southeast side of Wishart Street. The projected line of the southeast side of Wishart Street, from the M8 Motorway to Alexandra Parade; Wishart Street, from Alexandra Parade to Ladywell Street; John Knox Street, from Ladywell Street to Duke Street; Duke Street, from John Knox Street to High Street; High Street, from Duke Street to Trongate; Saltmarket, from Trongate to Clyde Street; Albert Bridge, from Clyde Street to the Centreline of the River Clyde. The centreline of the River Clyde from Albert Bridge to the Kingston Bridge / M8 Motorway.

2.0 Background to City of Glasgow

In order to successfully outline the initiatives Glasgow City Council intends to implement in order to improve air quality in the AQMA, it is necessary to give a general introduction to the city of Glasgow, with particular reference to factors relevant to air quality.

2.1 Glasgow – Population and Location

Glasgow is Scotland's largest city with an estimated resident population of around 600,000, of which approximately 60% are estimated to be in the 'economically active' 20-65 yr age range. The city is located on the banks of the river Clyde on the western end of Scotland's Midland Valley. Following relatively recent boundary changes, the city now covers the area outlined in Map 2.1, an area comprising some 17,730 hectares or approximately 68 square miles of land, of which about 20 % is classified as countryside or green belt land, whilst some 10 % is vacant land.

Map 2.1 The City of Glasgow's Current Boundaries



2.2 Meteorology

Due to its relatively sheltered position, Glasgow commonly experiences winter temperatures similar to those experienced at locations in southern Britain, but cooler summers than such locations. The mean annual temperature of the city is approximately 9 °C with a mean maximum of around 12 °C and mean minimum of around 5 °C. The diurnal range of temperature is normally a good deal larger in

summer than winter, varying from less than 2 °C in January to an average of about 6 °C in July.

Glasgow experiences a fairly modest 1400 h of sunshine a year but approximately 1200 mm of rainfall, with the first half of the calendar year generally drier than the final six months. Maximum daily levels of precipitation in the Glasgow area are generally around 50 mm. A particular feature of precipitation in the Glasgow area is the combination of heavy rainfall with high winds, which results in 'driving rain', most commonly in a south-westerly direction. Glasgow suffers from this phenomenon more than any other comparably sized settlement in the United Kingdom.

In addition, the Glasgow basin can occasionally experience fogs, which are either carried inland from the Firth of Clyde with light summer winds, carried by advection currents through the Midland Valley from the east coast, or more commonly result from the drainage of cold air into the Clyde Valley from the surrounding hills on calm, cold nights.

2.3 Industry and Economy

In recent decades Glasgow's economy has experienced significant changes. The traditional base of mercantile, engineering, and marine industries still remain but in much smaller numbers. Other production industries have modernised around new technologies and city centre services have increased in importance in recent years. Glasgow is the principal business focus in Scotland and one of the largest office centres in the United Kingdom. Service industries now account for approximately 80 % of the workforce with manufacturing, other production and construction employing the majority of the remaining 20 %.

Despite these changes in industry, Glasgow still produces around 18% of Scotland's gross domestic product and remains the fourth largest manufacturing hub in the United Kingdom, behind London, Birmingham and Leeds. Furthermore, Glasgow represents the largest shopping nucleus in Scotland and the second in the United Kingdom after London. It draws trade from the whole of the west of Scotland and beyond. In addition, the city also attracts large numbers of visitors both national and international to tourist attractions such as museums and galleries, for the use of sports, leisure and business venues, whilst the three Universities located in the city (Glasgow, Strathclyde and Glasgow Caledonia) increase visitor numbers still further.

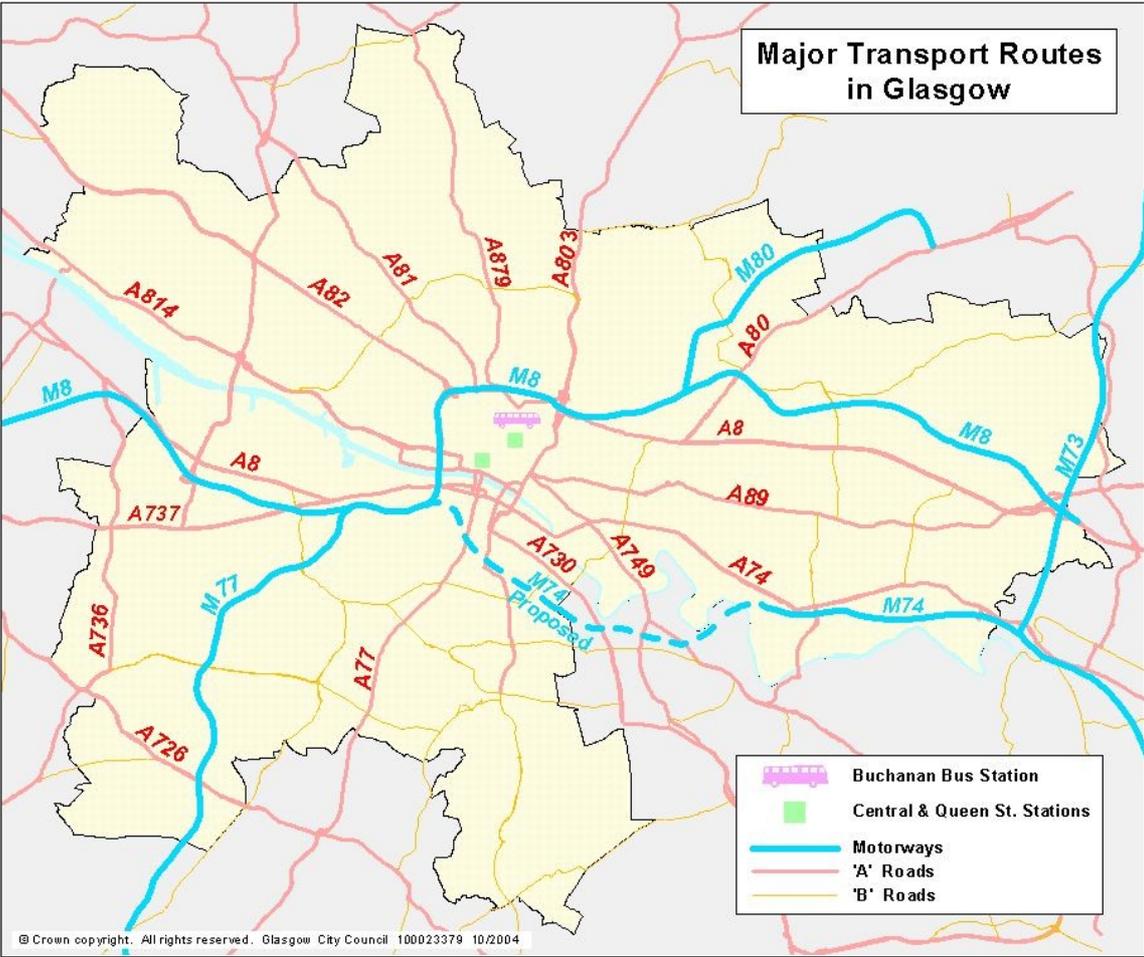
2.4 Transport

In common with other large cities, Glasgow has a requirement to transport people in and out of the city quickly and effectively, whilst also functioning as a major nodal point of the Scottish nodal transport system. Consequently, Glasgow has experienced a continuous increase in road traffic. The city has an extensive road network consisting of some 40 km of motorway and 1700 km of other public roads.

The backbone of the road system is the M8 motorway that runs through the city and continues to Edinburgh (A8/M8) (See Map 2.2). At the Baillieston Interchange, on the eastern outskirts of the city, the M8 links, via the M73, with the M74/A74 route to Carlisle and the south, and with the M73/A80 route to Stirling and the north.

The M77 (Ayr road route) was completed in November 1996 and runs through the south west of the city. It has also been proposed to extend the M74 motorway through the east of Glasgow to converge with the M8 to the south of the city centre. This development and its potential impact on air quality in the city are discussed further later in this report.

Map 2.2 Major Transport Routes in Glasgow



Several other major routes radiate from the city centre. These include the Clydeside Expressway, Great Western Road, Springburn Road, Cumbernauld Road, Edinburgh Road, London Road, Paisley Road West and the M80 Stepps bypass. A large proportion of journeys along these routes are by private cars commuting to the city often from areas outwith the city boundary. As a result there is frequent congestion on routes leading to the city during peak periods.

As well as the road system, a modernised underground railway system and the largest suburban commuter rail network in the United Kingdom outside London also operate in Glasgow. The rail network is used to make 100,000 daily passenger trips in or out of the six central area stations, with almost 20% of this figure accounted for by morning peak hour movements alone. Two major railway stations (Queen Street and Glasgow Central) are sited within Glasgow city centre and link to a further 60 railway stations throughout the city, five of which have park and ride facilities. The SPT Subway (Glasgow Underground) operates on 10.4 km of double track and handles more than

40,000 passengers a day and is estimated to be used by about 10% of city centre travellers.

In addition, a main bus station (Buchanan Bus Station) is also situated within the city centre (See Map 2.2). The scale of equivalent bus movements is such that about 16,000 bus trips are made into or across the central area during the morning peak hour period. Buchanan Bus Station is used by an estimated 35,000 passengers per day. It offers a significant terminal resource for both coach and local bus operators. Glasgow International Airport lies some 10 km west of the city centre, outwith the city boundary.

3.0 Background to Air Quality in Glasgow

3.1 Nitrogen Dioxide - Sources and Health Effects

Oxides of nitrogen (NO_x) is a generic term used to describe a group of highly reactive gases which contain nitrogen and oxygen in varying ratios, and are produced from the reaction of N_2 and O_2 during very high temperature air-fed combustion processes. Examples of such processes include combustion engines (motor vehicles), which represent the primary source of NO_x in the UK, but also incinerators, industrial boilers and non-nuclear power stations. The proportions of different oxides formed are further influenced by various chemical reactions in the atmosphere. The two most prevalent oxides of nitrogen are nitrogen dioxide (NO_2) and nitric oxide (NO), both of which are highly toxic.

NO_x as a whole has been linked to a wide variety of health and environmental impacts because of the various components that are often present in the mixture. NO_2 , which is of particular interest due to its inclusion in the National Air Quality Strategy, is a strong oxidant and corrosive substance that forms nitric and nitrous acids upon contact with water. These properties are largely responsible for many of the symptoms that have been linked to both acute and chronic exposure to NO_2 . These include symptoms that vary from irritation of the skin and eyes from dermal and ocular exposure, to severe damage to the central nervous system and various sections of the respiratory tract.

The onset of symptoms following acute exposure to elevated concentrations of NO_2 may be immediate or delayed by up to 30 h. Those most at risk from acute health effects during episodes of high NO_2 concentration are those with pre-existing respiratory diseases, such as asthma, chronic obstructive pulmonary disease or heart disease, with many studies have demonstrated a link between elevated NO_2 levels and asthmatic symptoms.

The topic of whether long-term exposure to NO_2 causes health effects is less well studied. However, some studies have 'identified' a link between long term exposure to NO_2 and poorer lung function, increased respiratory symptoms, and the presence of asthma.

In addition to the health effects listed above, due to their reactive nature, oxides of nitrogen also contribute to a variety of other environmental problems. These include their contribution to acid rain through the production of nitric and nitrous acids, their involvement in the formation of ground level ozone, eutrophication and contribution to global warming.

3.2 Monitoring and Modelling of NO_2 within Glasgow

Glasgow City Council operates an extensive monitoring programme to measure ambient concentrations of NO_2 across the city, and makes use of both automated chemiluminescent samplers and NO_2 diffusion tubes for the purpose.

NO_x chemiluminescent samplers are currently employed at five sites in Glasgow, three of which form part of Defra's Automatic Urban and Rural Network (AURN) and are located at Hope Street (Glasgow Kerbside), St Enoch Square (Glasgow Centre) and Montrose Street (Glasgow City Chambers). Glasgow City Council also operates two

automatic mobile units, which are located at St Patrick's Primary School (Anderston) on the edge of the M8, and outside the city boundaries at Waulkmillglen reservoir.

In addition, Glasgow City Council also operates an extensive NO₂ diffusion tube network throughout Glasgow, which monitors ambient NO₂ at more than 100 sites. The data obtained from these tubes are used to supplement that acquired from the automatic samplers and provide a wider picture of NO₂ concentrations across the city. NO₂ diffusion tubes are also collocated at all automatic sites to allow comparisons of chemiluminescent and diffusion tube data and subsequent adjustment of the diffusion tube data.

Levels of NO₂ within Glasgow were examined in Glasgow City Council's Stage IV Review and Assessment of Air Quality. In summary, this document examined monitoring data from 2000-2002 and revealed that concentrations of NO₂ within the city centre commonly exceeded the annual mean objective of 40 µg m⁻³, whilst at a few locations, more than the permitted 18 exceedences of the 200 µg m⁻³ 1-hour objective were also observed. Table 3.1 summarises annual concentrations of NO₂ recorded at a number of NO₂ diffusion tube locations within Glasgow's AQMA together with predicted concentrations in 2005 and the reduction in NO_x required to achieve the 2005 annual objective.

Projected concentrations of NO₂ in 2005 based on monitoring results showed a similar trend to those currently observed in Glasgow, with widespread exceedences of the annual objective within the city centre, and exceedences of the 1-hour objective at a few city centre locations.

In addition to data obtained from monitoring, modelling of NO₂ concentrations within Glasgow city centre was also conducted following the construction of an up to date emissions inventory. The results of the modelling study indicated that all areas within the designated AQMA were likely to exceed the annual mean objective for NO₂ and therefore differ from the results of the monitoring study, which suggested that only parts of the city centre would fail to comply. Data from the modelling also indicated that the area of exceedence might be wider than the current boundary of the AQMA.

Table 3.1 Observed and predicted NO₂ and NO_x concentrations on selected Glasgow City Centre streets with estimates of required reductions in road vehicles based NO_x for achievement of objective.

Location	[NO ₂] µg m ⁻³		Equivalent NO _x concentration	% reduction in NO _x required to meet annual objective
	2002	2005 Predicted	2005	2005
George Square	53	49	158	38
Bath Street	68	63	255	61
Castle Street	53	49	158	38
Hope Street (mid)	80	74	347	72
North Hanover Street	57	53	183	46
Saltmarket	41	38	97	0
High Street	52	47	146	32

In conclusion, following consideration of both monitoring and modelled data of NO₂ contained within Glasgow City Council's Stage IV document, it was concluded that the boundary of Glasgow's AQMA is to remain unchanged and continues to be valid for the city centre area, but will be subject to review in future review and assessment documents.

3.3 Primary Sources of NO_x in Glasgow

In the UK, road transport has been recognised as the primary source of NO_x emissions, contributing in the region of 40-50% of total NO_x emissions nationwide (NAEI, pollutant detail). Glasgow City Council's Stage IV Review and Assessment of Air Quality in Glasgow demonstrated a similar picture within Glasgow, with more than 70% of NO_x within Glasgow (Figure 3.1) and the city centre AQMA (Figure 3.2) being attributed to road traffic emissions.

Figure 3.1 Estimated contributions from sources to total NO_x emissions in Glasgow

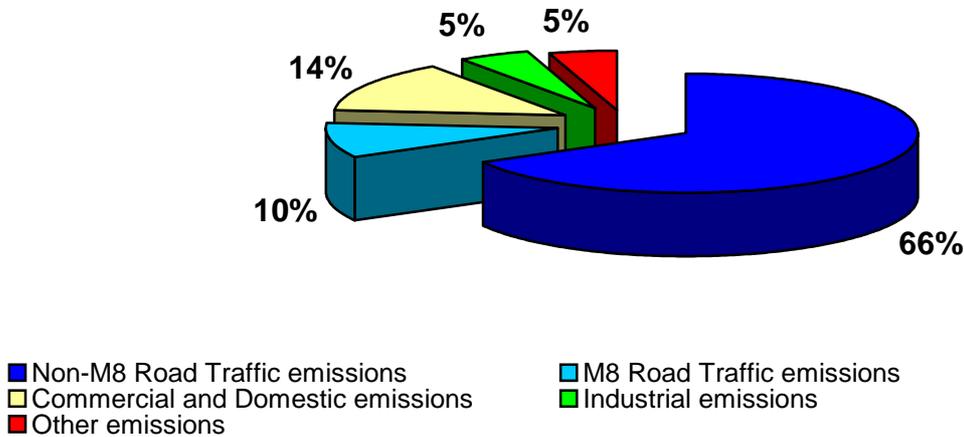
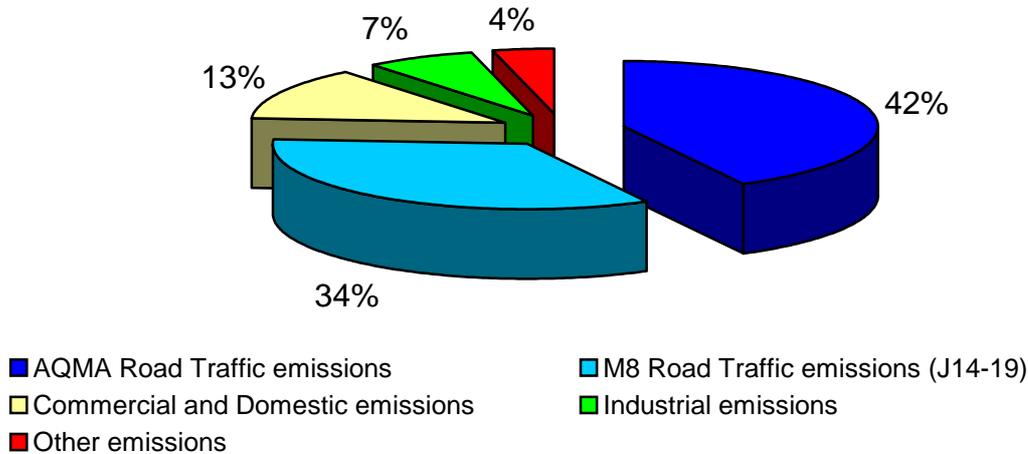


Figure 3.2 Estimated contributions from sources to total NO_x emissions in Glasgow's AQMA

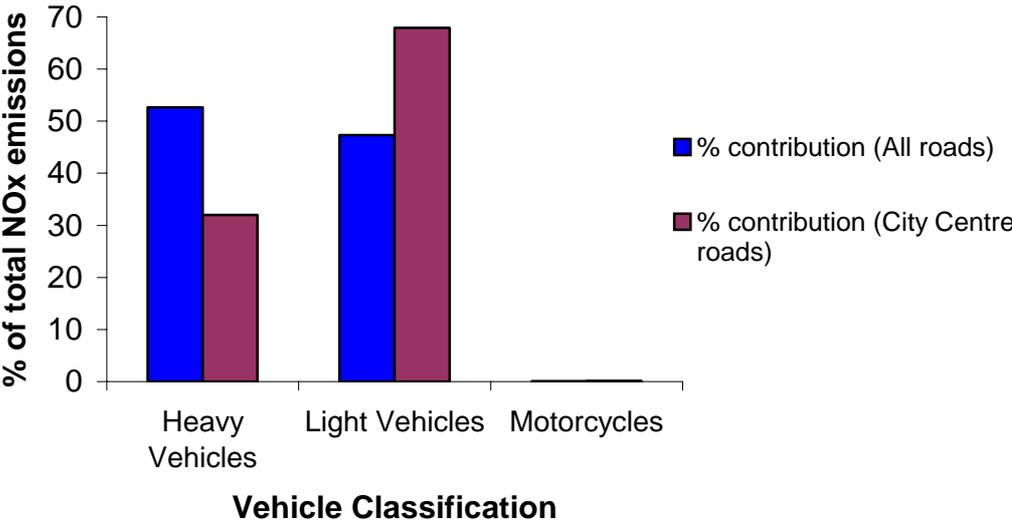


Furthermore, Glasgow City Council's emission's inventory has been used to calculate that approximately 34 % of total NO_x emissions produced within Glasgow's AQMA originate from road traffic travelling between Junctions 14-19 of the M8 motorway.

Consequently, Glasgow City Council recognises that road traffic represents the main sources of NO_x responsible for elevated NO₂ concentrations recorded within the AQMA and therefore must be the main focus of attentions for actions proposed to address the problem.

In terms of contributions from different vehicle categories to road transport sector NO_x emissions, Figure 3.3 demonstrates that when only the city centre roads were assessed, Light Vehicles (Cars, LGVs, taxis) were found to contribute approximately 68% of the NO_x from the road sources, with Heavy Vehicles contributing the majority of the remaining 32%. In comparison, when the M8 and arterial routes were included, the contributions from Light and Heavy Vehicles to Road Source NO_x emission were broadly similar, with approximately 53% being attributed to Heavy Vehicles and the remaining 47% being largely attributed to Light Vehicles. In both scenarios, motorcycles were found to make a negligible contribution (<1%) to total road source NO_x emissions totals

**Fig. 3.3 Road Transport Sector:
Contributions to NO_x emissions from respective vehicle
classifications**



As road traffic has been identified as the overriding source of NO_x emissions within Glasgow, it is obvious that actions implemented in this air quality action plan should concentrate on reducing emissions of NO_x from road traffic. However, some 24 % of the NO_x emissions within Glasgow’s AQMA are attributed to sources other than road traffic (Figure 3.2). Therefore, this Action Plan will also consider actions to reduce NO_x emissions from these non-road based sources.

4.0 Actions

Emissions from road transport make up the bulk of the NO_x emissions in Glasgow and a variety of measures are required to reduce emissions from this source. For each of the general sources listed in Section 1.2, the Action Plan Appraisal Checklist provides a non-exhaustive list of measures to be considered by local authorities as means of reducing emissions of pollutants.

These measures aim to reduce vehicle emissions of NO_x in Glasgow's AQMA by reducing traffic numbers and congestion through modal shift towards public transport, or by reducing emissions from the vehicle fleet. The potential advantages and disadvantages of each measure, together with the potential impact of each scenario are discussed in the following Sections and summarised the Summary of Actions Table on page 81.

In addition, other projects in progress or under consideration within Glasgow that are considered likely to influence road traffic movements and thus air quality within the AQMA have also, where possible, been examined for their potential impact. These include projects such as the proposed M74 extension, and the East End Regeneration Route. Furthermore, the potential impact of scenarios discussed at a National level and/or that have been successfully implemented in other regions have also been assessed.

4.1 Local Transport Management

As a consequence of being a major nodal point in the Scottish transport system and an important economic centre, the city of Glasgow experiences elevated levels of road traffic from people travelling to and from work, for leisure, business and industry. This has resulted in increased congestion, pollution and road accidents. It is therefore recognised that the growing demand for transport cannot be satisfied by private car travel without causing further traffic congestion and damage to the environment. To address these issues, Glasgow City Council has developed a Local Transport Strategy for 2001–2004 and also collaborates with neighbouring council's and public bodies (e.g. Westrans and SPT) to assess methods of improving public transport, supporting economic growth and minimising damage to the environment. Also relevant to these aims are SPT's Strathclyde Passenger Transport Strategy 2000, which sets out the public transport vision and objectives for the Strathclyde area and Westrans'/SPT's joint Transport Strategy, which sets out overall transport aims and projects for the west of Scotland. Measures included in the Glasgow City Council's Local Transport Strategy focus on methods of reducing the use of private cars and encouraging the use of public transport, cycling and walking. The issues these strategies seek to address include:

- Giving priority to public transport
- Providing high quality, reliable and effective public transport alternatives to private vehicles
- Providing a safer and cleaner environment
- Improving conditions for pedestrians and cyclists
- Traffic congestion
- Environmental issues
- Social inclusion

It is clear that the city council cannot achieve all that is required on its own and would wish to engage with appropriate organisations on local transport issues such as encouraging the use of clean technology and a reduction of emissions from heavy goods vehicles and freight transport vehicles and looking at alternative means of freight distribution within the area. In addition, the Glasgow City Council will engage with the Scottish Executive on actions that could be taken concerning the M8 corridor and the M74 extension that will have a positive impact on air quality.

4.1.1 Proposed M74 Extension

Proposals have been prepared for more than 20 years regarding completion of the M74 motorway along a line from the Fullarton Road Junction near Carmyle to the M8 motorway just west of Kingston. In 1989, the then Secretary of State for Scotland approved an update of the Strathclyde Structure Plan, which identified the strategic requirement for a Northern Extension of the M74 from the M73 at Maryville to the M8 at Kingston Bridge. The 4.5 km length of Phase 1 from Maryville to Fullarton Road, was completed in July 1994 at a cost of £60 Million by the then Scottish Office, leaving 7.9km to be completed in Phase 2.

The Scottish Executive, in partnership with Glasgow City Council and South Lanarkshire and Renfrewshire Councils, (the M74 Project Partners), is now seeking to complete Phase 2 linking the end of the existing M74 at Fullarton Road near Cambuslang, South Lanarkshire and the M8 motorway west of the Kingston Bridge in Glasgow. The proposed line of the route is shown in Figure 4.1.

The proposal to complete the M74 supports the strategic aims of the Glasgow and the Clyde Valley Structure Plan by implementing one of its strategic transport schemes and making an important contribution to the economic development strategy set out in the plan.

The proposals require an environmental impact assessment (EIA) under the provisions of *Section 20A of the Roads (Scotland) Act 1984* as amended by Part III of the *Environmental Impact Assessment (Scotland) Regulations 1999*.

Environmental Resources Management Ltd (ERM) have conducted an environmental impact assessment and prepared an Environmental Statement (ES) on behalf of Glasgow City Council to inform the public, the Scottish Ministers and organisations with statutory and non-statutory interests in the environment of the likely environmental effects of the works. The findings of the assessment, including the measures that will be taken to avoid, reduce or remedy adverse impacts are reported in the ES. The potential impact of the proposed M74 extension on air quality in Glasgow's AQMA and therefore relevant to the Air Quality Action Plan are predominantly taken from the conclusions contained within the Environmental Statement.

Action: Feasible

The proposals for the M74 development include:

- Construction of an 8 kilometre (5 mile) section of new motorway, with three lanes in each direction and hard shoulders on each side of the road.

- Development of a connection between the new section of the M74 and the existing M8 and M77 motorways 500m west of Kingston.
- Construction of a junction on the new section of the M74 at Kingston, to allow access between local roads and the motorway.
- The development of full junctions at Polmadie Road, Cambuslang Road and Fullarton Road where the motorway will bridge over the existing roads.
- Construction of bridges to carry the motorway over other roads and railways along the line of the road, apart from at Cathcart Road where the new motorway will pass under the road.
- Minor realignments and changes to other roads including:
 - Conversion of the existing hard shoulders and minor widening of the M77 southbound from the M8 to Junction 1 to create an additional running lane;
 - Conversion of the hard shoulders of the M8 to running lanes by relining of the M8 from Junction 21 to 25;
 - Construction of a new local road connection between Polmadie Road and Aikenhead Road in Polmadie;
 - Realignment of Quay Road in Rutherglen;
 - Realignment of Salkeld Street in Tradeston; and permanent closure of a number of minor side roads including Gloucester Street, Kinning Street, Laidlaw Street and Paterson Street in Tradeston and Francis Street and Mackinlay Street in Eglinton.

Control of this option

Scottish Executive/Glasgow City Council/South Lanarkshire Council/Renfrewshire Council

Potential positive and negative effects on non-air quality issues

The Environmental Statement predicts that the proposed M74 extension have numerous positive and negative effects on non-air quality issues. These include:

- ✓ Stimulation of the economy and regeneration of the corridor.
- ✓ Additional road capacity - relieve the pressure on the congested northern flank of the M8 and strategic local roads.
- ✓ Improved reliability of journeys and significant reductions in travel times (M8).
- ✓ Improved public transport links from regeneration areas to employment, education and health facilities.
- ✓ Benefits to urban public transport operations.

- ✓ Redevelopment of derelict areas
- ✓ Improved links to air, rail, ferry and port facilities.
- ✓ The remediation of areas of derelict land.
- ✓ Potential for positive landscape and visual changes.
- ± Potential for localised reductions and increases in road traffic accidents and noise on roads due to experience lower and higher traffic flows respectively.
- ± Positive and negative effects on the accessibility of routes to pedestrians and cyclists (site and time dependent).
- ± Major impact on the landscape and townscape of the corridor along the proposed route of development.
- × A significant increase in traffic flows on the existing section of the M74 and M73.
- × Loss of land of local nature conservation or landscape value.
- × Direct and indirect impacts to sites of national archaeological importance, four listed buildings of regional importance and five non-listed buildings of importance to industrial archaeology/ social history.
- × Adverse impacts on landscape throughout the scheme corridor during construction.
- × Physical impact of M74 extension may result in slight severance of communities on either side of the scheme due to a perceived barrier effect of the new road corridor.
- × Disruption during construction involving:
 - Localised traffic disruption.
 - Increases in HGV traffic flow on key access routes for import/export of construction materials.
 - Localised increase in noise in proximity to scheme.

In relation to the potential negative impacts of the development, scheme mitigation measures have been designed to minimise disruption during construction and compensate following completion. For example, it is anticipated that the project will be undertaken with minimal disruption to existing traffic on the strategic and local roads network.

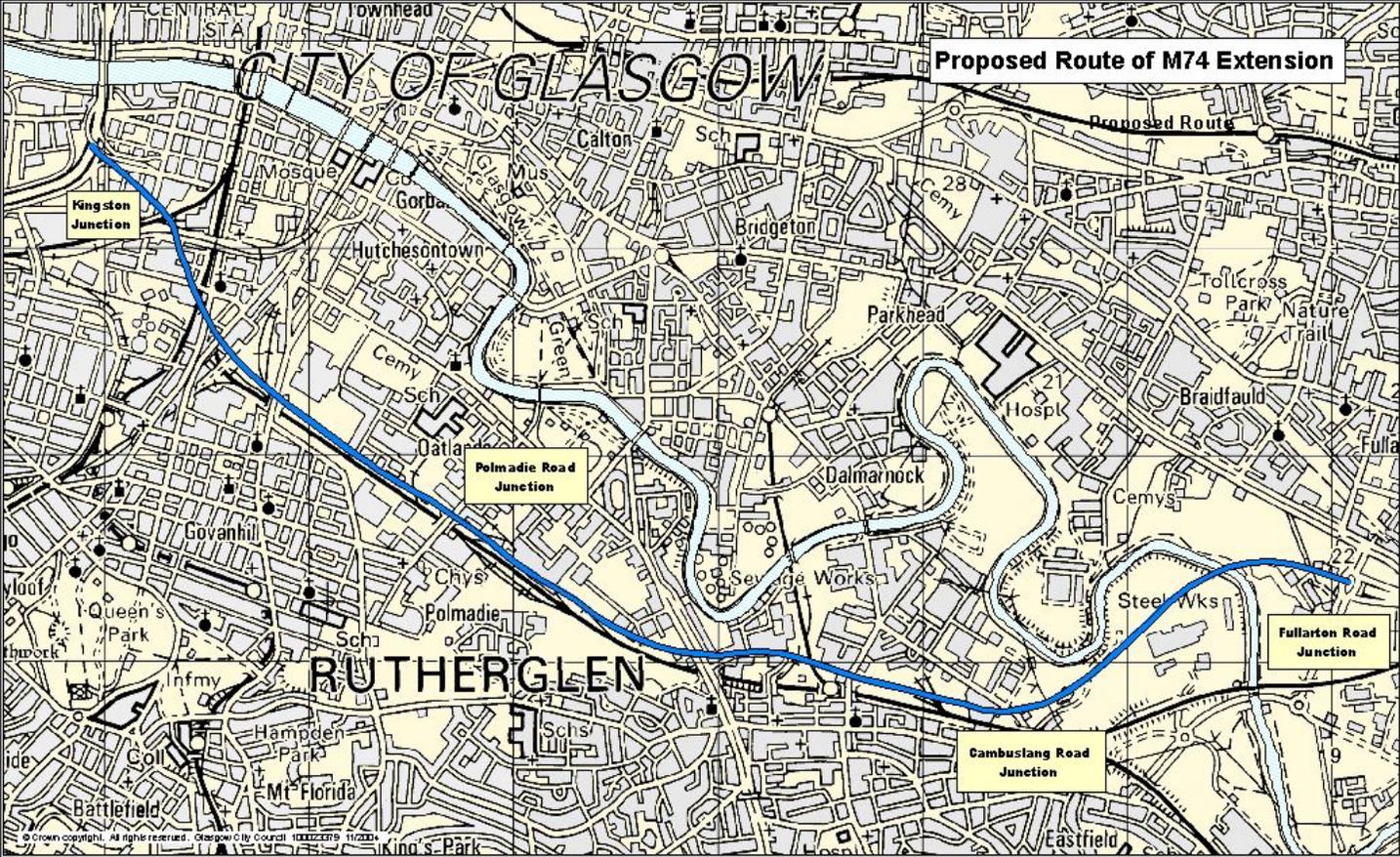
During the planning process, it was recognised that a road development of such scale may have a potentially detrimental effect on local air quality. Subsequent discussions between the appointed agents Environmental Resources Management and the Scottish Executive resulted in the recommendation that additional information on air quality in the vicinity of the proposed route prior to, during, and after construction of the

scheme would be of benefit. This would allow an assessment of the impact of the road on background air quality

Following further discussions between the appointed agents with representatives of Glasgow City Council (Land Services Design), the report *M74 Completion: Air Quality Proposed Monitoring Study (2002)* was prepared, and recommended the pollutants and locations to be monitored together with appropriate methodology. The study recommended monitoring of PM₁₀ particulate matter twice every year (2 weeks during both summer and winter periods) by Glasgow City Council Environmental Protection Services at relevant sites near to the proposed M74 extension. In addition, Land Services are undertaking diffusion tube monitoring of NO₂ at 56 sites and benzene at 4 sites along the proposed route.

Once the construction of the road is complete and it is open to traffic, monitoring results can be analysed to determine the impact of the road on local air quality.

Figure 4.1 Proposed Route of M74 Extension



Cost and feasibility

It is currently estimated that the cost of the scheme at 2008 prices lies between £375 million and £500 million. The proposed development is currently the subject of a public local inquiry to report with respect to objections.

A cost benefit analysis of proposed M74 extension in terms of air quality has not been conducted, as it is recognised that improving air quality was not the primary aim of the proposal.

Timetable

The current timetable for the proposed M74 extension is:

1. Up to Autumn 2004: Statutory Process (Consultation and conclusion on Orders and public local inquiry).
2. Autumn 2004 to Autumn 2005: Implementation (Invite tenders, award contracts and onset of construction).
3. 2008 (end of): Road opens (Construction complete and M74 opens to traffic).

Predicted Impact on air quality (NO_x)

The predicted impact of the M74 project on air quality was investigated in the Environmental Impact Assessment and reported in the Environmental Statement. In terms of Glasgow City Council's Air Quality Action Plan, the proposed M74 development will not have any impact on NO₂ concentrations within the AQMA by 2005, as construction is not due to start until the same year. However, it is predicted that the development will influence air quality following completion and is therefore likely to exert a noticeable effect on air quality in Glasgow by 2010.

In the Environmental Statement it was concluded that as a result of the proposed M74 completion 'a larger number of properties in the wider study area are predicted to experience an improvement in air quality than the number of properties predicted to experience a degradation'. It was stated that some '45% of properties in the wider study area are predicted to experience a reduction in nitrogen dioxide (NO₂) concentrations as a result of the scheme, with 30% expected to experience no change'. The Assessment also predicted that '56% of properties will experience a reduction in particulate matter (PM₁₀) concentrations whilst 1% will experience no change'.

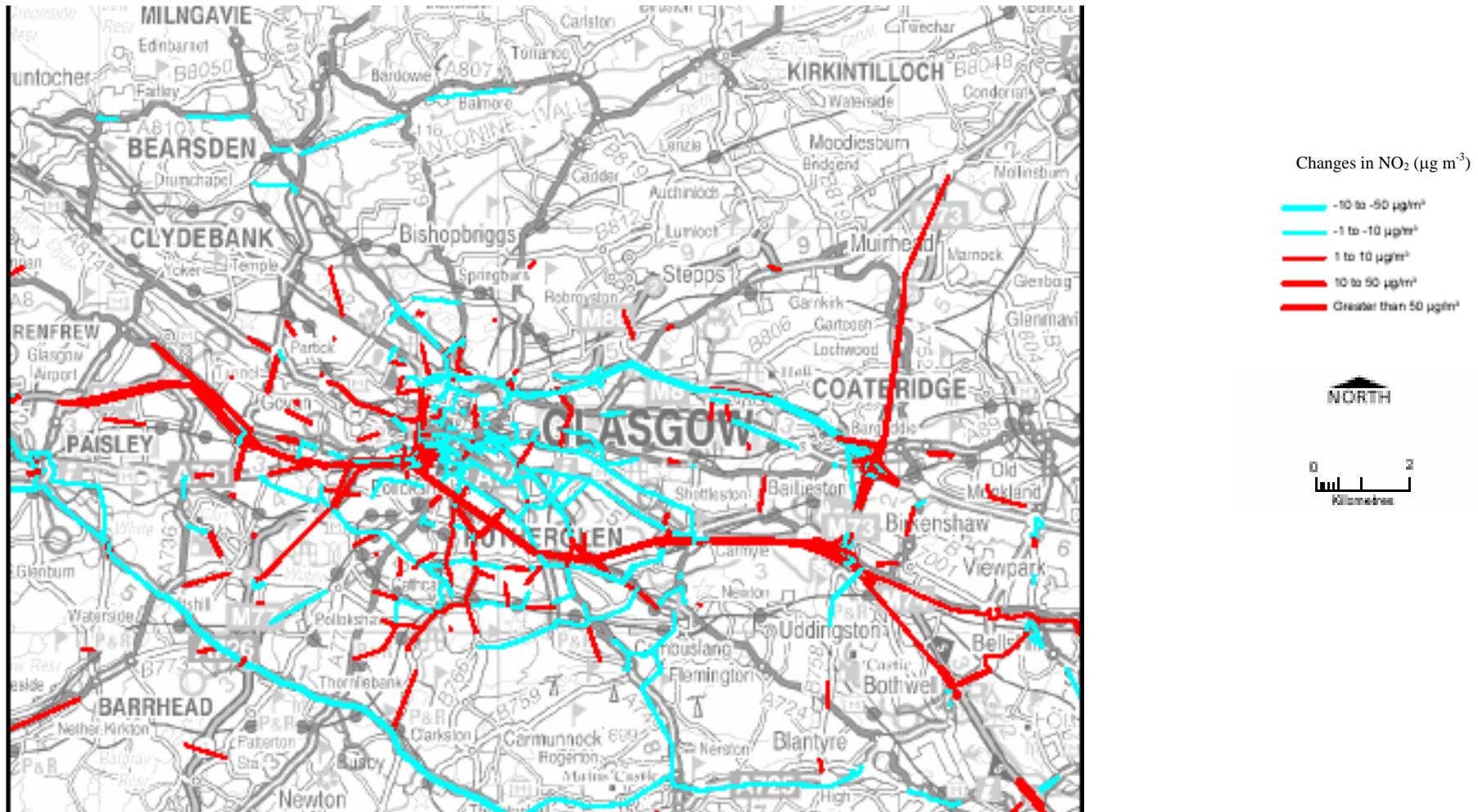
Furthermore, Glasgow City Council's Air Quality Management Area is expected to experience a benefit to air quality as a result of the scheme. This predicted benefit to the AQMA is due to the expected decrease in traffic flow on the M8 and certain strategic roads that will result from the re-routing of traffic onto the M74 extension, bypassing the city centre. Figure 4.2 presents the predicted influence of the M74 on NO₂ concentrations in and around Glasgow in 2010. This indicates that reductions in NO₂ concentration between 1 and 50 µg m⁻³ are expected on several roads and sections of the M8 in the vicinity of the AQMA.

However, the results of detailed air quality modelling also demonstrate that some increases in pollutants including NO_x are predicted at certain roadside locations (Figure 4.2) and close to the new road corridor as would be expected from traffic on a

new road. Whilst the predicted increases in NO₂ concentrations are relatively small, it is recognised that they may result in a marginal exceedence of the air quality objectives.

Overall, completion of the M74 extension is predicted to cause a slight increase in global emissions of NO₂, carbon dioxide and PM₁₀ due to the overall increase in vehicle kilometers travelled on the road network in the year. In terms of the temporary changes in traffic flows on the network as a result of construction traffic, it is predicted that there will be no significant impact on air quality.

Figure 4.2 Predicted changes in Roadside NO₂ (µg m⁻³) concentrations (2010) from M74 completion
 Taken from The M74 Completion: Environmental Statement (2003)



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4.1.2 East End Regeneration Route (EERR)

The successful regeneration of the east end of Glasgow is dependent on providing improved access to the area through upgrading of the transport infrastructure. A road, such as the EERR, was first proposed in the *Highway Plan for Glasgow, 1965*, which also established much of the strategic road network serving Glasgow today. Various bids for funding of the route have been made over the years. However, in 1996 the then Scottish Office announced an urban regeneration policy framework under the Programme for Partnership Initiative (PfP). Glasgow's east end was one of twelve new Priority Partnership Areas (PPA's) designated in Scotland. Plans for this area included the creation of substantial amounts of new industrial floorspace to provide new employment opportunities and an improved environment for business development. Integral to the strategy was the recognition that the EERR was essential in promoting the area as a business location.

The main benefits that a new road, such as the EERR would bring to the area are:

- Relief of traffic congestion on existing roads in the area, leading to reduced NO_x emissions and improvements to NO₂ levels within the AQMA, especially at its eastern boundary
- Improved access for construction traffic to facilitate development
- Improved distribution of traffic from existing and new developments, including Celtic Park

The first element of what is now the EERR, the Parkhead Bypass, was opened in 1988 and runs from the Gallowgate roundabout to the forge roundabout.

The opening of the Parkhead forge in 1988 generated a significant increase in the volume of traffic using the surrounding road network. This resulted in Todd Street, which links Cumbernauld Road, Edinburgh Road and Alexandra Parade with Duke Street and Shettleston Road, carrying excessive non-residential traffic. The construction of the EERR should help to alleviate congestion in this area.

With the Scottish Executive's commitment to construct the M74 Completion Project by 2008, the provision of an intermediate junction on the M74 at Polmadie provided the opportunity to connect the EERR to the strategic road network at both terminal points, i.e. M74 at the southern end and the M8/M80 at the northern end. This enables the EERR to provide improved access and the opportunity to regenerate the large tracts of vacant and derelict land located at the heart of the east end. In recognition of this road's strategic importance, Glasgow City Council allocated funding in the year 2002-2003 for the design phase of the route, with implementation by 2005. Transport Assessment Reports have been carried out for the proposed EERR by consultants MVA, using the Saturn model.

EERR and Public Transport

Although the EERR is being introduced primarily to aid in the regeneration of the east end of Glasgow, it will have the benefit of improving congestion, particularly around Todd Street and will have some benefits for air quality. Although a number of railway stations are located in the vicinity of the EERR, Dalmarnock Station and the proposed

Parkhead Station are directly linked to the new road. Near Dalmarnock Station, a new 400+ space park and ride car park is proposed with direct access to the EERR. The location of Parkhead Station is being specifically considered to ensure that pedestrian movements to and from the station are assisted and not hindered by the new road. Therefore, there is good integration between the new road and adjacent rail services.

In addition to rail, there are proposals for Quality Bus Corridors (QBC's) in the vicinity of the EERR. QBC1, which runs from Faifley to Baillieston, is currently being prepared for implementation. It runs along Gallowgate, past Parkhead Forge to Shettleston and past the proposed Parkhead Station. Three other QBC's have also received funding; QBC5 (Dalmarnock Road/London Road), QBC6 (Edinburgh Road/Alexandra Parade) and QBC8 (Duke Street). All three corridors cross the EERR, providing opportunities to link new bus services on the QBC's with the EERR.

Action: Feasible

Construction of East End Regeneration Route bypass/access road

Control of this Option

Glasgow City Council, Scottish Enterprise and other external agencies

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ EERR will allow development of derelict land
- ✓ Will link in with M74 and M80
- ✓ Will link in with Quality bus corridors and train stations
- ✓ Improve traffic flow around east end of Glasgow
- × Bringing traffic to an area where previously there was none

Cost and Feasibility

No figures available. However, the development is likely to have a high cost of implementation. Currently at planning stage.

Timetable

Potential to be completed in 2008

Predicted Impact on Air Quality

The development is predicted to have a neutral effect on emissions of National Air Quality Strategy Pollutants including NO_x within the AQMA. However, some localised improvements in air quality are predicted due to reduced traffic congestion and the provision of improved public transport facilities.

4.1.3 Variable Message Signs

Following a successful pilot project in the northern area of the city centre to install variable message signing linked to car parks, funding is now in place to extend the scheme to the remaining car parks in the city centre. Support from the Scottish Executive may be sought in the future for variable message signing on the motorway network. Drivers are given up to date information on car park capacity on approach to the city and can choose which car park to use, depending on which have spare capacity. This will lead to less congestion as drivers can avoid trying to get into car parks that are already full, leading to less congestion in the city centre and less emissions of NO_x.

Action: Feasible

Increase in variable message sign network

Control of this Option

Glasgow City Council, Scottish Executive

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Reduced congestion on city centre roads

Cost and Feasibility

Low cost. Feasible if funding secured from the Scottish Executive

Timetable

Not known

Predicted Impact on Air Quality

It is predicted that the proposed scheme will have a low positive impact, reducing emissions of NO_x and other National Air Quality Strategy pollutants by lowering congestion on busy roads.

4.2 Public Transport

The provision of better public transport is widely considered to be an essential means of reducing road traffic. With this in mind, Glasgow City Council's Local Transport Strategy and SPT's Strathclyde Passenger Transport Strategy aim to improve the reliability and accessibility of public transport measures, making public transport options more attractive to the public in an attempt to reduce the use of private cars. Achieving a modal shift from private cars to public transport is also an essential element in improving air quality within the AQMA. As well as the actions and initiatives detailed below, Glasgow City Council would seek input from relevant parties on other related issues, such as more effective regulation of buses and taxis in Glasgow and

greater investment for developing a reliable and convenient public transport infrastructure in the west of Scotland.

4.2.1 Quality Bus Corridors/Bus Information and Signalling System

Improving the efficiency of bus travel through introducing Quality Bus Corridors on existing routes is one important step in achieving the aim of improving public transport.

Funding for this initiative has been secured from the Scottish Executive's Public Transport Fund and will be carried out in partnership with First Glasgow, a main bus operator in Glasgow that has committed to improving services as part of the programme. First Glasgow has agreed to supply a younger than average age profile of vehicles on the Quality Bus Corridor routes. Glasgow City Council is also committed to a high level of enforcement on the QBC's and is investigating options for utilising cameras for this purpose.

It is anticipated that by improving the flow of buses and removing obstacles that impede progress along the road, journey times will be reduced and emissions from buses themselves will be reduced. This is to be partly achieved through bus priority measures:

- Bus gates to allow only buses, taxis and cycles to proceed
- Queue relocation, where additional traffic signals give bus priority, e.g. where two lanes are reduced to one
- Pre-signals, where extra signals are introduced on the approach to a junction to allow buses to proceed to the head of the queue
- Bus activated signals, which receive an electronic signal requesting priority from an approaching bus, if conditions allow

Regular enforcement by the police and Glasgow City Council parking attendants will be essential to prevent obstruction of the Quality Bus Corridors and help to keep them running smoothly. Parking and loading at certain locations can hinder bus movement and provision for this will be taken into account by considering the needs of local businesses and residents, while still trying to achieve the desired level of priority for buses.

The timing of traffic lights can be altered to provide more 'green time' for any approach to a junction in order to give priority to bus services and further reduce bus journey times.

Quality Bus Corridors will also aid enhanced public transport interchange by linking in with connections between bus, rail, underground and taxi, such as the route along Dumbarton Road that takes in the Partick train/underground/bus interchange. The aim is to make public transport more attractive, practical and accessible and reduce dependency on private car use.

The Quality Bus Corridor initiative is intended to support social and economic development as well as the environment, with the main objectives being:

- Giving priority to public transport
- Reducing bus journey times

- Making bus services more reliable
- Providing better passenger information
- Providing a safer environment
- Extending priority to cycles and taxis
- Minimising air and noise pollution
- Improving conditions for businesses

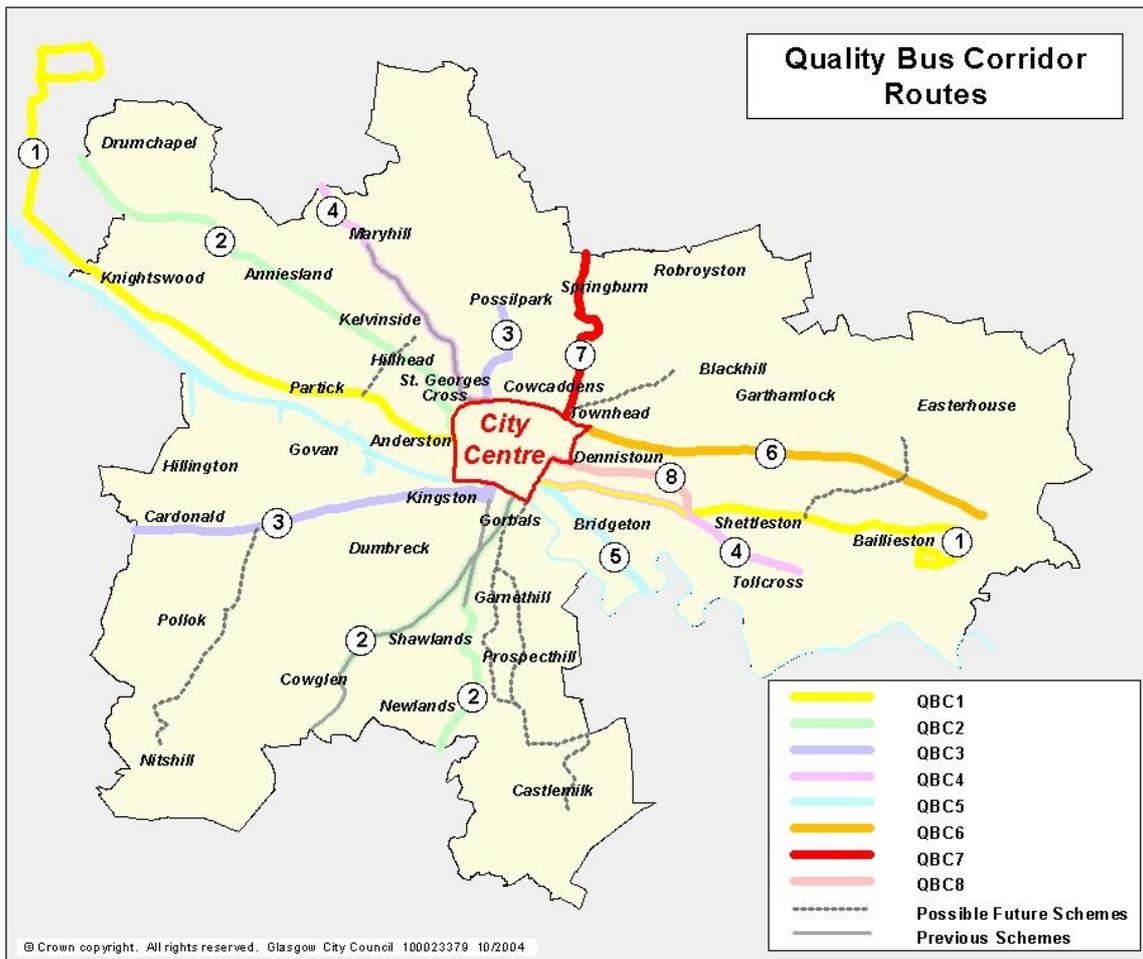
Action: Feasible

The development of eight new Quality Bus Corridors along the routes listed below and presented in Map 4.1 in conjunction with the introduction of a bus information and signalling system.

Table 4.1 QBC Routes

QBC	Route
QBC1	Faifley to Baillieston
QBC2	Great Western Road to Clarkston Road
QBC3	Paisley Road West to Balmore Road
QBC4	Maryhill Road to Tollcross Road
QBC5	Dalmarnock Road/ London Road
QBC6	Edinburgh Road/ Alexandra Parade
QBC7	Springburn Road
QBC8	Duke Street

Map 4.1 QBC Routes



In addition to introduction of bus lanes, bus shelters and bus stops will be upgraded on each route to make the experience of waiting for a bus more comfortable. Parking and servicing opportunities for businesses will also be improved where possible, and safer pedestrian crossings will be provided where required.

Furthermore, the introduction of a Bus Information and Signalling System (BIAS) is an important part of the Council's Quality Bus Corridor solution to traffic congestion issues within the city.

The BIAS system consists of two computer control systems. The first of these systems is an Urban Traffic Control (BIAS-UTC) Computer System that will provide public transport vehicles with progression through the city's traffic signals on the Quality Bus Corridors. This will allow buses equipped with the system to traverse the traffic signal intersections, enabling them to keep to their timetables without being held up. The BIAS-UTC system uses a vehicle actuated traffic control system called SCOOT (Split, Cycle, Offset, Optimisation Techniques), which was initially developed in Glasgow and is now in use throughout the world. The second computer control system tracks the progress of buses using a satellite based Global Positioning System (GPS) and provides the travelling public with up to the minute information on the arrival of buses at stops along the routes.

It is hoped that the introduction of the new QBCs, the use of which is limited to buses, taxis, cycles and emergency services will lead to an increase in the use of buses by the public, and subsequently lead to a reduction in private vehicles using the routes and thus vehicle emissions. The introduction of a similar QBC scheme in Dublin, Ireland has resulted in significantly reduced bus journey times and an 11% increase in morning peak passenger numbers, 25% of which are estimated to be new passengers transferring from cars. Furthermore, a change in modal split has been noted with car share decreasing by 6% to 33% at the cordon. It is hoped that the QBCs being introduced in Glasgow will have a similar impact.

Control of this Option

Glasgow City Council in partnership with West Dumbartonshire Council, South Lanarkshire Council, SPT and First Glasgow (Buses).

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Improvements in the image of bus usage, and the provision of information and facilities for bus users
- ✓ Improvements in bus service reliability
- ✓ Reduced travel time to and from the city by bus, taxi and cycle
- ✓ Improved conditions and access for cyclists and pedestrians including mobility impaired
- ✓ Potential reduction in volume of car traffic along corridors
- ✓ Likely to improved safety along routes
- ✓ Improve conditions for businesses
- × Potential for small increase in traffic/congestion on surrounding streets

Cost and Feasibility

A cost assessment for the QBCs/BIAS initiative was conducted by Glasgow City Council and the scheme has since received government approval. The total cost of the scheme has been estimated at £30,753,000, with the sources of funding being outlined in Table 4.2. A detailed cost benefit analysis of Glasgow City Council's Quality Bus Corridor proposals in terms of air quality has not been conducted, as it is recognised that improving air quality was not the primary aim of the proposal.

Table 4.2 Funding Sources for Glasgow City Council QBC schemes

Finance Source	Total (£) 1999-2006
Public Transport Fund Award*	22,588,000
GCC Contributions	4,100,000
First Contributions	4,065,000
Total	30,753,000

*West Dumbartonshire Council obtained part of the PFT award for the respective section of the QBC route

Timetable

The first BIAS installations are due to be operational early in 2004. A detailed timetable for the implementation of new QBC routes is presented in Table 4.3.

Table 4.3 Timetable of Quality Bus Corridor Implementation dates

CORRIDOR	SECTION	IMPLEMENTATION
Faifley to Baillieston	West Dunbartonshire Dumbarton Road (Yoker to Sawmill)	9/2004 – 12/2004* 01/2004 – 04/2004
	Dumbarton Road (Sawmill to Blantyre) Argyle Street (Blantyre to Elderslie)	6/2004 – 9/2004* 9/2003 – 1/2004
	City Centre Shettleston Road (Ross St to Old Shettleston)	Late 2004 / 2005 1/2004 – 4/2004
	Shettleston Road (Old Shettleston to Academy)	Completion Certificate 25/08/03
	Shettleston Road (Academy to Dodside)	Completion certificate 16/05/03
	Glasgow Road Baillieston Loop	7/2004 – 10/2004 * Completed 10/2002
	Great Western Rd to Clarkston Rd	Great Western Rd (west)
Great Western Road (east) Woodlands Road		9/2004 – 12/2004* 01/2004 – 03/2004
Clarkston Road		10/2004 – 01/2004*
Pollokshaws Road (junctions)		01/2004 – 03/2004
Paisley Road West to Balmore Road	Paisley Road West (west)	10/2004 – 01/2005*
	Paisley Road West (east) Possil Road	10/2004 – 01/2005* 04/2004 – 05/2004*
	Balmore Road	11/2004 – 02/2005*
Maryhill Road to Tollcross Road	Maryhill Road	08/2004 – 10/2004*
	Garscube / Dobbies Loan	04/2003 – 10/2003
	Maryhill / Queen Margaret Dr Tollcross Road	08/2003 – 11/2003 08/2004 – 10/2004*
Dalmarnock Road	Dalmarnock Road	Late 2004/2005*
Edinburgh Road	Edinburgh Road	Late 2004/2005*
Springburn Road	Springburn Road	Late 2004/2005*
Duke Street	Duke Street	Late 2004/2005*

*dependent on the outcome of the statutory consultation process

Predicted Impact on Air Quality

It is not considered feasible to accurately model the impact of the corridors on air quality, as the main benefit from the schemes will be dependent upon uptake of the improved services by the public, and the corresponding reduction in private vehicles going into the city. However, basic scenario testing of the impact of the eight new QBC's on NO_x emissions has predicted a slight reduction in NO_x emissions within the Air Quality Management Area. It should be noted that air quality was not the prime

consideration for the Quality Bus Corridor proposals and as such a great improvement in air quality was not expected. However, the developments aim to improve and thus encourage the use of public transport to the detriment of private vehicles and thus will aid the goal of improving air quality. Consequently, Glasgow City Council will introduce a series of new NO₂ monitoring locations in the vicinity of the new QBCs as in order to assess the actual impact of the schemes. The precise location of the new sites cannot be given at this time, but will be in locations relevant to human exposure in and around the routes.

4.2.2 Park and Ride

Provision of park and ride facilities is an important element in the drive to achieve a reduction in car dependency while improving access to work, services and facilities at a local level. At present, as outlined in Glasgow City Council's City Plan, park and ride facilities are provided at several rail and underground stations in and around the city to encourage the use of public transport. However, the plan states that there exists the potential to expand provision at some of these sites, at additional stations, and to create bus based park and ride where a high quality link can be provided to the city centre on a non-rail corridor.

Consequently, in 2003/2004 Glasgow City Council submitted a project bid to the Public Transport Fund seeking funding to support the expansion of park and ride facilities at Shields Road Underground Station Car Park together with improving sustainable links to the station. The primary aim of the proposals is to encourage greater use of public transport and in particular, the Underground, for accessing the city centre thus supporting the objective of developing a sustainable and integrated transport system, whilst helping to reduce road traffic congestion and thus improve air quality by reducing emissions. The proposal has since been successful in obtaining Public Transport Fund support.

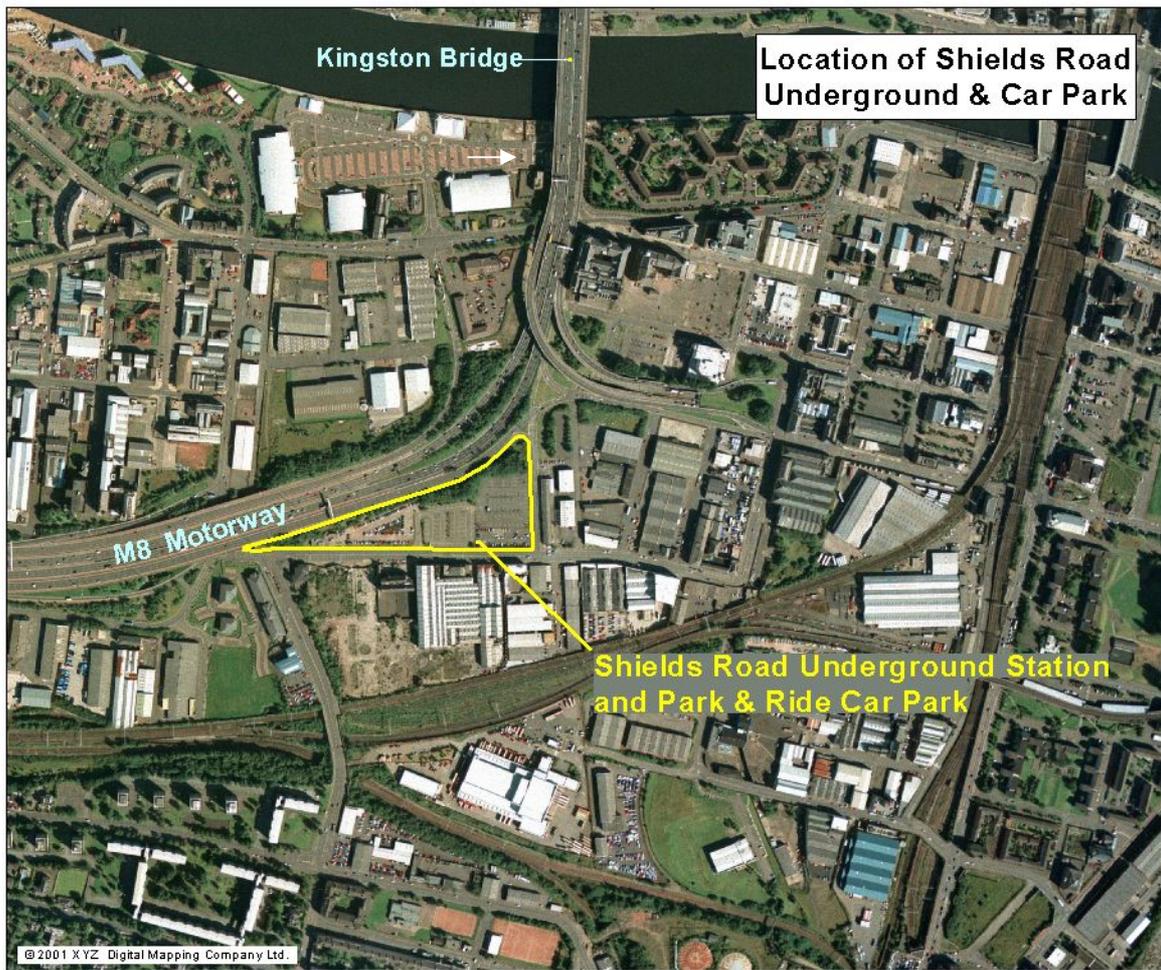
Action: Feasible

Proposed expansion of the Park and Ride facility at Shields Road Underground Station with the provision of an additional 300 car parking spaces, together with Variable Message signs. In addition, to further enhance the accessing of Shields Road Underground by sustainable forms of transport, it is also proposed to extend cycle lane links to the station and improve cycle facilities.

Shields Road Underground Car Park is popular, well patronised park and ride facility located on the inner urban fringe (see Figure 4.3) outside Glasgow's Air Quality Management Area and adjacent to the M8 motorway (Junction 21). The car park has 465 spaces, and is commonly nearly full to capacity from the AM peak and throughout most of the day. Consequently, there is negligible space to accommodate additional demand for the park and ride facilities at the site, while during the off peak period there is adequate spare capacity on the underground.

It is therefore proposed that expansion of the parking facilities at Shields Road would exploit the evident demand for this facility without causing problems on the surrounding road network.

Figure 4.3 Location of Shields Road Underground Car Park



Control of this Option

Glasgow City Council

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Improved access to public transport
- ✓ Improved public information on the availability of parking spaces
- ✓ Reduced congestion on the M8 and city centre roads
- ✓ Reduced vehicle operating costs and travel time for commuters
- ✓ Improved conditions and access for cyclists and the mobility impaired
- ✓ Likely to improve safety at facility and along the roads influenced
- ✓ Improved conditions for businesses and aid regeneration of the area
- ✓ Replacement of parking spaces that may be lost during M74 development
- × Potential for increased congestion on streets surrounding the facility
- × Potential increase in noise and vibration in the vicinity of the facility

Cost and Feasibility

A cost assessment for the proposed expansion of the Shields Road Park and Ride was conducted by Glasgow City Council and submitted as part of the Public Transport Fund bid 2003/2004. The project is feasible and likely to progress in the near future.

The total cost of the scheme were originally estimated at £3,015,000, with Glasgow City Council endeavouring to provide funding for approximately 10% of the total overall costs i.e. £300,000 and bidding for the Public Transport Fund to supply the remaining 2,715,000. However, it is now estimated that the project will cost £ 4.6 million to complete. Confirmation of further funding from the Scottish Executive, GCC and SPT is awaited to enable the project to progress.

A cost benefit analysis of Glasgow City Council's Shields Road Park and Ride proposals in terms of air quality has not been conducted, as it is recognised that improving air quality was not the primary aim of the proposal.

Timetable

Subject to confirmation of additional funding, the construction of the car park expansion and associated works is projected for completion by autumn 2005.

Predicted Impact on Air Quality

Scenario testing of the impact of the Shield Road Park and Ride expansion on air quality in Glasgow has predicted a low positive impact on emissions of NO_x and PM₁₀. In terms of NO_x emissions within the Air Quality Management Area it is predicted that the Shields Road Park and Ride project will reduce emissions by less than 1% by 2005.

However, in order to quantify the perceived impact of the Shields Road Park and Ride expansion on local air quality more accurately, Glasgow City Council intends to expand the current NO₂-monitoring programme to include sites between Shields Road and the city centre.

It should be noted that as for the Quality Bus Corridor proposals, air quality was not the prime consideration of the Park and Ride expansion and as such a great improvement in air quality was not expected. However, the developments aim to improve and thus encourage the use of public transport to the detriment of private vehicles and thus will aid the goal of improving air quality.

Other Park and Ride Schemes

SPT has been involved with South Lanarkshire Council in providing enhanced park and ride facilities at Newton station near Cambuslang and Blantyre station near Hamilton. The number of spaces at Blantyre has been increased from 13 to 51, while at Newton, which had no park and ride spaces, a total of 200 have been created.

Work at Blantyre has been completed, while facilities at Newton are due to be completed in May 2004. Both of these stations are on rail links into Glasgow and increasing the number of park and ride spaces at train stations increases the attractiveness of public transport and helps to reduce the number of car journeys made

Control of this option

SPT, Local Authorities

Potential positive and negative effects on non-air quality issues

- ✓ Increased use of public transport, less congestion

Cost and feasibility

Medium cost. Feasible.

Timetable

Work ongoing or completed

Predicted Impact on air quality

It is predicted that the listed actions will have a low positive impact on emissions of NO_x and other National Air Quality Strategy pollutants within Glasgow's AQMA.

4.2.3 The Larkhall – Milngavie Rail Link

The benefits of the Larkhall-Milngavie rail project have been recognised since the early 1980s. The line will provide rail links to four local communities, providing a real alternative to using the car for growing communities along the full route from Larkhall to Milngavie. The rail link will create new opportunities for people to access work in other areas, assist with the regeneration of Larkhall and make new commercial and residential developments an attractive possibility. The new rail link will provide an alternative to the car for these communities and will lead to fewer journeys in and out of Glasgow by car, thereby reducing emissions of NO_x and other pollutants.

Work began on-site in February 2004, with a half-hourly service between Hamilton and Anderston due to start in 2005, and the full link operational by late 2005. The £35million project will see a 4.7km track extending southeast from near Hamilton to Larkhall, together with a 1.6km extension of the northern suburban line, joining Anniesland to Maryhill. Four new stations will be opened at Larkhall, Merryton, Chatelherault in South Lanarkshire, and Dawsholm in Glasgow.

SPT is leading the planning and delivery of the scheme, in partnership with the Scottish Executive, South Lanarkshire Council and Network Rail to complete the project to timescale and budget and ensure its phased delivery.

The total budget for the project is approximately £35million. The Scottish Executive is providing £25m, SPT £9.1m and South Lanarkshire Council £0.4m SPT and South Lanarkshire Council are each funding one station, and South Lanarkshire Council will accept ownership of the two refurbished and renewed rail bridges on the Larkhall line when the work is completed by Network Rail. The delivery of the long-awaited Larkhall-Milngavie project will have real benefits for Larkhall and the surrounding areas, offering an alternative to the car. The new stations and frequent services will promote economic regeneration, improving access to leisure, education and training opportunities and make new commercial and residential developments more attractive.

The first benefits to commuters will be felt from December 2004 when the service increases will be introduced between Hamilton and central Glasgow. Services to Larkhall are scheduled to begin in late 2005.

Control of this option

SPT, Scottish Executive, South Lanarkshire council

Potential positive and negative effects on non-air quality issues

- ✓ Increased use of public transport, less congestion
- ✓ Economic regeneration, improved access to leisure, education and training opportunities

Cost and feasibility

£35 million. Feasible.

Timetable

Scheduled for completion in 2005

Predicted Impact on air quality

It is predicted that the measure will have a low positive impact on emissions of NO_x and other National Air Quality Strategy pollutants within the AQMA.

4.2.4 Cycling and Walking Strategies

National Planning Policy Guidelines (NPPG) identify walking and cycling as being the modes of transport to which the highest priority should be given in the promotion of sustainable travel. The council is keen to ensure that that the needs of pedestrians and cyclists are catered for on the existing road network, in off-road locations and in new developments.

Glasgow is the hub of the National Cycle Network in Scotland, with the Glasgow-Carlisle, Glasgow-Inverness and Glasgow-Edinburgh routes meeting at the northern end of Bells Bridge by the River Clyde. In order to increase the level of cycling within the city, the council has approved the development of a 375 km network of cycle routes, much of this being on existing roads or on purpose built cycle ways. This

should be completed in the next 10 years and the idea is to allow safe and direct access to city destinations.

Wherever possible, sections of the cycle network and links to the network will be developed through planning consents. Development proposals located beside or on proposed cycle routes will be expected to incorporate sections of the cycle network or links to it as part of the development. The City Plan states the council's policy on what is expected from developers, to ensure that new developments are designed to facilitate cycling and walking.

Glasgow City Council has a Walking and Cycling Unit based in Land Services that promotes walking and cycling in Glasgow and beyond. The Unit's main aim is to provide a network of cycle routes across the city and to encourage its use. The Unit co-ordinates council policy as set out in the Local Transport Strategy 2001- 2004, the Parks and Open Spaces Strategy and 20 – 20 Vision. The importance of cycling and walking as an aid to fitness is recognised and the Unit seeks to promote partnership between relevant bodies, e.g. through the joint 'Fit for Life' project, which is a joint partnership between the Council, the Health Authority and Strathclyde Passenger Transport to promote fitness through essential daily journeys.

A number of documents and leaflets have been produced by Glasgow City Council, either on its own, or in collaboration with other organisations. These provide detailed information on numerous walking and cycling routes around the city and beyond and include route maps and information on destinations along these routes. These include leaflets on pathways from Glasgow to Loch Lomond, Cumbernauld, Paisley and the Clyde Coast.

Control of this option

Glasgow City Council, Scottish Executive, NHS Greater Glasgow, Scottish Enterprise Glasgow, Strathclyde Passenger Transport, neighbouring local authorities, British Waterways, Scottish Natural Heritage

Potential positive and negative effects on non-air quality issues

- ✓ Improved public health by encouraging exercise

Cost and feasibility

The proposal is feasible and Capital funding is currently available from a range of external sources for investment in new paths.

Timetable

Project is ongoing, with a third of the path network in place. Remainder of paths due to be in place over next 10 years.

Predicted Impact on air quality

The action is predicted to have a low positive impact on air quality.

4.2.5 School Travel Plans

The number of children travelling to school by car has almost doubled over the last 20 years, yet many children live within walking distance of their school (*Travelling to School: a good practice guide, 2003*). The 'school run' affects local transport patterns and can cause localised congestion and associated air pollution around schools, particularly around school starting and finishing times. Reversing this trend and reducing the number of journeys made by car will provide benefits to local air quality through the reduction of emissions. A number of reasons have been cited for this increase in car use for travel to and from school, including:

- Safety fears, e.g. road safety for cycling, personal safety
- Schools lacking necessary facilities, e.g. secure storage for cycles
- Lack of suitable bus services

There is also an increased dependence on cars in general, with their door-to-door convenience. However, with cars spending so much time on congested roads it may on many occasions actually be quicker to either walk or cycle to school. A report carried out by the Scottish Executive (*Review of Research on School Travel, 2002*) outlines the areas of concern:

"The proportion of children in Scotland being driven to school by car is increasing rapidly and reached 20% of journeys to school in 2000. This trend is having a negative effect on many transport, health, safety and environmental factors, and is impacting on the wider economy through growing road congestion particularly in the morning and peak period."

In 2003 the Department for Transport and the Department for Education and Skills introduced *Travelling to School: a good practice guide* and *Travelling to School: an action plan* with the aim of bringing about a change in school travel patterns to reduce congestion and pollution levels around schools. These documents highlight good practice from around the country in terms of what schools, local authorities and transport operators have been doing to promote the use of walking, cycling and public transport for school travel. Walking and cycling to school provides children with a regular opportunity for exercise, particularly at a time when there are growing concerns about sedentary lifestyles and obesity. It is also hoped that pupils will carry on these practices into adult life and will be more aware of the different transport options available to them and will be more inclined to use an alternative to the car.

In response to this and in line with Scottish Executive policy, Glasgow City Council's Land Services has appointed a team of School Travel Plan Co-ordinators to help schools within Glasgow develop their own School Travel Plans to address local needs and issues. School Travel Plans can be used to implement ideas for finding alternative ways of travelling to school. The aims of a School Travel Plan are as follows:

- To promote healthy active travel choices for children on their school journey
- To reduce car travel by pupils, staff and parents
- To demonstrate school's commitment to environmental and community issues, by helping to ease traffic congestion and pollution
- To provide links for studying aspects of school travel within the 5–14 curriculum

- To give pupils a better understanding of the health, environmental and social benefits of more walking, cycling or public transport use during their school years, so that active travel continues into their adult lives
- To improve the road awareness skills of pupils

It is hoped that as well as improving the health and well-being of pupils and staff, the use of alternative modes of transport to the car will lead to improvements in congestion, air quality and noise around schools. The team developed a Travel Plan Strategy for Glasgow and launched the scheme in spring 2004. The team will speak to teachers, pupils, parents and the wider community in order to encourage more sustainable travel in school journeys.

In local authorities and schools where School Travel Plans have been successfully implemented, dramatic reductions in car journeys to and from school have been achieved – by more than 50% in some cases (*Travelling to School: a good practice guide, 2003*).

Control of this option

Glasgow City Council, Schools, Parents

Potential positive and negative effects on non-air quality issues

- ✓ Improve public health by encouraging exercise and adoption of a healthier lifestyle
- ✓ Less traffic congestion at peak times due to less cars on the 'school run'
- ✓ Increased safety for children travelling to and from school

Cost and feasibility

Scottish Executive has provided funding for local authorities to employ school travel plan co-ordinators. School Travel Co-ordinators in place within Land Services of Glasgow City Council

Timetable

Ongoing

Predicted Impact on air quality

The actual impact of school travels plans on air quality will be dependent upon the willingness of parents, staff and pupils to use more sustainable forms of transport when travelling to and from school. It is predicted that the action will have a low positive impact on emissions of NO_x and other National Air Quality Strategy pollutants within the AQMA, with the potential to have a medium impact in the future. In order to quantify the actual impact of school travel plans on local air quality, Glasgow City Council will where necessary, expand the local NO₂ monitoring network to include areas close to schools within the AQMA.

4.3 Parking and Fiscal Measures

Parking and fiscal measures are seen as important issues for encouraging the modal shift from private cars to public transport. It would be considered positive for the city council to have the option of introducing a workplace parking charge scheme as a means of discouraging the use of the private motorcar for commuting in and out of the city centre.

Vehicle emissions testing and enforcement work is seen as an important action in raising awareness of the need to properly maintain vehicles and ensure they are meeting exhaust emissions standards. However, despite NO_x causing most of the pollution problems in Glasgow, there is no standard for NO_x emissions within the MOT test. The city council will lobby for NO_x to be included in the emissions standard for the MOT test to ensure that this key pollutant is not overlooked.

4.3.1 Vehicle Emissions Testing/Idling Vehicles

The Scottish Executive recently introduced the Road Traffic (Vehicle Emission) (Fixed Penalty) (Scotland) Regulations 2003, made under Section 88 of The Environment Act 1995. They enable local authorities to check vehicles at the roadside to ensure that they are not exceeding prescribed exhaust emission limits, as prescribed in Regulation 61 of the Road Vehicles (Construction and Use) Regulations 1986, as amended. The emissions test is essentially the same as that used in the MOT test.

Glasgow City Council has adopted the powers contained in these Regulations and has received funding from the Scottish Executive to assist in the implementation of the scheme and associated publicity campaign. Emissions testing and enforcement work commenced in March 2004. The aims of the scheme are to:

- Reduce the number of polluting vehicles on the road
- Raise awareness with the general public on the importance of vehicle maintenance to reduce emissions levels

The Regulations allow the issuing of a £60 Fixed Penalty Notice to those drivers whose vehicles that fail the test (increasing to £90 if not paid within 28 days). It should be noted that the driver is issued with the fixed penalty notice, rather than the owner of the vehicle. The local authority must use trained personnel and approved equipment to carry out these roadside checks. Only the police have the power to stop a vehicle at the roadside and emissions testing must therefore be carried out in conjunction with the police.

The Fixed Penalty Notice can be waived completely where a motorist can show that the vehicle had passed an MOT emissions test within the year preceding the date on which the vehicle was stopped and the emissions defect has been rectified within 14 days. In order to confirm this, the motorist must present both MOT certificates to the address shown on the Fixed Penalty Notice. The main thrust of the testing is to identify vehicles that are failing to meet the required standard, so that they are taken off the road and repaired and are no longer creating unnecessary pollution. It is important that vehicle drivers are given the option of repairing their vehicle, rather than simply paying the fine. In practice, most do opt to repair their vehicles and this means pollution is

being reduced rather than the campaign being a revenue raising exercise. Ensuring polluting vehicles are repaired will help to reduce emissions, not only within the AQMA, but also across the city as a whole. Benefits should also be seen for a number of pollutants, since poorly maintained vehicles can also emit higher levels of particulate matter and CO as well as NO₂.

The regulations recognise that older vehicles may have difficulty achieving the same stringent emission levels as modern cars. After 1992, all cars were required to be fitted with a catalytic converter. Therefore, it is a fact that older cars will emit a higher level of pollutants.

Every vehicle must comply with limits based on its date of first registration. However, un-maintained vehicles have the same potential to emit high levels of pollutants in their emissions regardless of the age of the vehicle.

In practice, the emissions test is carried out with the minimum of delay, with all vehicles subject to a quick diagnostic test. If the vehicle passes this initial test, the driver of the vehicle is advised of this and is sent on his way within minutes. If the vehicle fails the initial test, a full test, as undertaken as part of the MOT test, will be carried out using VOSA approved equipment. On completion of the full test, the driver is informed of the outcome and given a print out of the result.

Figure 4.4 Vehicle emissions testing enforcement work



Emissions testing has been undertaken at a number of locations within the city and in general, drivers have been supportive of the campaign. It should be noted that all road vehicles can be tested under this scheme and all vehicle types have been targeted. Any vehicle type or age may be required to undergo a test. Specific vehicle types are

targeted from time to time, such as older vehicles, buses and taxis. Table 4.4 provides some basic statistics on the numbers of vehicles tested at the time of writing and the outcome of the tests. More detailed statistics will be produced at a later date.

Table 4.4 Numbers of Vehicles Tested

	Petrol	Diesel	LPG
Total	1968	805	5
Pass	1952 (99.2%)	767 (95.3%)	5
Fail	16 (0.8%)	38 (4.7%)	0

An ongoing programme of testing the council’s own fleet of vehicles is being carried out to ensure that polluting vehicles are not being used for council business. Glasgow City Council is committed to improving its own environmental performance and to reduce the environmental impact of its staff and their activities. As a large fleet operator, it is imperative that the Council’s own vehicles are properly serviced, maintained and operated to ensure that exhaust emissions are within the limits laid down in the MOT test. This will ensure that NO_x and other emissions are reduced as far as possible and that the City Council is setting an example to other organisations, fleet operators and private vehicle owners. Testing of Council vehicles will continue to ensure that this aim is met.

Voluntary vehicle emission testing is also being offered to the public at weekends in supermarket car parks etc. This is to give people the opportunity to have their vehicles tested free of charge and without receiving a fixed penalty notice should the vehicle fail the test. Organisations with large vehicle fleets are also being approached and offered free emissions testing of their vehicle fleet. A number of organisations have taken up this offer and work is ongoing in this area.

In addition to the powers detailed above, Local Authorities have been given the ability to tackle emissions from stationary idling vehicles, by requiring drivers to switch off engines when parked. Vehicles idling unnecessarily are producing pollution and getting the message across that drivers should switch engines off whenever possible will help to reduce emissions within the AQMA and the city as a whole. Authorised Local Authority Officers can instruct drivers to switch off their engines while parked and to issue fixed Penalty notices of £20 to those who do not co-operate. The idea is not to target drivers whose vehicles are idling for a short time, but to target more serious offenders who leave engines idling for longer periods of time while parked. It is anticipated that advice would be given to drivers in the majority of cases and that few Fixed Penalty Notices will be issued. These duties have been carried out in conjunction with the police and no fixed penalty notices have had to be issued to date. Drivers either comply with the request to turn their vehicle engines off, or move on. As with emissions testing, all vehicle types are included in the scheme and officers regularly talk to drivers of cars, buses, taxis, commercial vehicles, etc.

Strathclyde Passenger Transport have also highlighted that they attempt to restrict unnecessary idling of buses at SPT licensed bus stations, such as Buchanan Bus Station within the AQMA.

Figure 4.5 Idling Vehicle Enforcement Work



A wide ranging publicity campaign began prior to the council applying these new powers to raise awareness with the general public on these issues and to ensure that the schemes are understood and accepted by motorists. Adverts have appeared in a number of media, including television, billboards, radio and local and regional newspapers. Below are examples of the type of material used for both vehicle emissions and idling vehicles.

Figure 4.6 Idling Vehicle Publicity

It's time to clear the air

If you run your engine unnecessarily while your vehicle is stopped at the roadside you could be fined **£20**.

**Stop your car .
Stop your engine .**

cleanglasgow
driving for a cleaner city

Figure 4.7 Vehicle Emissions Publicity



Control of this Option

Glasgow City Council

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Increases awareness on the importance of vehicle maintenance to reduce emissions
- ✓ Potential improvement in safety due to removal of older vehicles from roads

Cost and feasibility

Grant of £200,000 received from the Scottish Executive for 2003/04 for the implementation and operation of the emissions testing and idling vehicle enforcement operation, including the extensive publicity campaign. A further grant to continue the scheme in 2004/05 has also been received.

Timetable

Publicity campaign and enforcement work commenced in March 2004

Predicted Impact on air quality

It is considered that relatively small improvements in air quality will be brought about by enforcement work, given that a small proportion of the total number of vehicles on the road are actually tested. However, the main improvement will come from the deterrent effect and the publicity campaign that will lead to improvements in vehicle maintenance by their owners. Overall, it is considered that a medium improvement in air quality is feasible in the future.

4.4 Other Air Quality Enforcement Work

Glasgow City Council has various statutory obligations relating to the enforcement of air quality legislation. The council will continue to fulfil its obligations in this respect and will pay particular attention to issues that have a detrimental effect on air quality and NO_x levels within the AQMA.

4.4.1 Smoke Control and Clean Air Act 1993

The whole of the Glasgow area has been designated a Smoke Control Area, including the city centre AQMA. This means that it is an offence to emit smoke from a chimney of a building, from a furnace or from any fixed boiler in the smoke control area. It is also an offence to acquire an unauthorised fuel for use within a smoke control area unless it is used in an exempt appliance. The Council will continue to actively enforce this legislation and to educate offenders as to the reasons and importance of complying with smoke control requirements. Although the main aim of smoke control legislation is not aimed at reducing NO_x levels, it is anticipated that improvements in compliance with these requirements will ultimately help to reduce emissions of NO_x.

4.4.2 Statutory Nuisance and Environmental Protection Act 1990

The Council's Environmental Protection Services receives regular complaints from the public regarding smoke nuisance from bonfires and the burning of waste. Such complaints are actively investigated and appropriate action taken to resolve them. Those creating nuisances are also educated as to the problems the smoke emissions cause and are advised on alternative methods of disposing of waste. The Council will continue to proactively enforce legislation relating to smoke control, with strong emphasis on education. As above, the main aim of this is not to reduce NO_x emissions, but it is anticipated that improvements in compliance with these requirements will ultimately help to reduce these emissions.

Control of these Options

Glasgow City Council

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Increases public knowledge on environmental issues

Cost and feasibility

Work in this area is ongoing and is part of Environmental Protection Services' budget

Timetable

Ongoing

Predicted Impact on air quality

It is predicted that the actions with have a low overall impact on air quality within the AQMA

4.5 Non-Transport Based Emissions Sources

In Section 4.3 Glasgow City Council's source apportionment exercise identified that approximately 76% of the NO_x emissions within Glasgow's AQMA originated from road traffic sources, with the remaining 24% coming from Commercial and Domestic premises (13%), industrial processes (7%) and 'other' sources (4%).

The previous sections included details of scenarios that Glasgow City Council have considered to address NO_x emissions from road sources in and around Glasgow. This section aims to outline actions considered by Glasgow City Council to address emissions of NO_x from Commercial and Domestic sources and Industrial sources.

4.5.1 Commercial and Domestic Sources

Commercial and domestic sources have been estimated to contribute approximately 13% of NO_x emissions within Glasgow's AQMA, originating from the heating systems of local authority premises, businesses and private homes. Although representing a much smaller contribution to NO_x within Glasgow's AQMA than road sources, the introduction of measures to address their contribution represents a possible mechanism of achieving the national air quality objective for NO₂.

The sources of commercial and domestic NO_x emissions within Glasgow include older oil and solid fuel boilers as well as gas boilers. Although the majority of larger buildings within Glasgow are believed to be gas fired, oil or solid fuel boilers may still be used to heat a few large buildings. This includes boilers that commonly run on gas but can also run on oil or solid fuel under certain conditions.

Burning fossil fuels produces large amounts of gaseous emissions that contribute to global warming, as well as having an impact on local air quality and NO_x levels. Reducing the use of fossil fuels and replacing them with low or no emission, renewable sources of energy plays a key role in tackling climate change.

Glasgow City Council takes these issues very seriously and the Council's Environmental Regeneration teams have a remit to promote energy management across the Council through:

- Renewable Energy
- Energy Efficiency
- Energy Management

The Home Energy Conservation Act 1995 (HECA) gave local authorities an obligation as 'energy conservation authorities' to produce reports detailing how they could bring about savings in domestic energy consumption across their housing stock, including both public and private tenures. A target of a 30% reduction over 10 years was set for all local authorities. The Council's work as an energy conservation authority means it plays a key role in tackling fuel poverty, which is a major concern in the city.

Although aimed primarily at reducing CO₂ emissions and tackling global warming, the benefit of having more energy efficient homes and buildings is that other emissions, such as NO_x, will also be reduced.

Glasgow City Council has produced a number of reports and the first four years of the strategy saw a 9.5% reduction in household energy use and a reduction of 11% on CO₂ emissions. Although no data are available, NO_x emissions will also have been reduced over the same period.

Strathclyde and Central Energy Efficiency Advice Centres provide free, independent and impartial energy advice to households and businesses throughout West Central Scotland, supported by Glasgow City Council and other local authorities. This is done together with government funding through the Energy Savings Trust, and a variety of other sources. As well as providing energy advice, they also administer two small grants schemes on behalf of Glasgow City Council:

- Energy Efficiency Loans Scheme
- Heatcare

Both schemes are directed at providing efficient heating systems and insulation to householders in Glasgow through a scheme of grants and interest free loans. A number of initiatives have been put in place since the inception of HECA to assist in improving energy efficiency in homes and to alleviate fuel poverty, which is one of the Scottish Executive's main housing policies.

The Scottish Executive launched the Warm Deal on 1 July 1999. Under this scheme, eligible households can receive grants for:

- cavity wall insulation
- loft insulation
- hot and cold tank and pipe insulation
- draught-proofing
- low energy lightbulbs
- energy advice

The grant is available to people on a range of state benefits and can be worth up to £500. A number of other organisations are able to provide information and assistance in relation to energy conservation and include:

- Energy Saving Trust (EST)
- Scottish Energy Efficiency Office
- Scottish Community and Householder Renewables Initiative (SCHRI)
- Department of Trade and Industry's Energy Group
- The Carbon Trust
- Scottish Energy Efficiency Office

In relation to emissions of gaseous pollutants, Glasgow City Council has recently become involved with the Cities for Climate Protection (CCP), which is run by the International Council for Local Environmental Initiatives (ICLEI), of which Glasgow City Council is a member. The CCP is a performance-orientated campaign that offers a framework for local governments to develop a strategic agenda to reduce global warming and air pollution emissions, with the benefit of improving community liveability. Once a local authority has become a member of the CCP campaign, it is obliged to undertake and complete five performance milestones. These are:

- Conduct an energy and emissions inventory and forecast
- Establish an emission target
- Develop and obtain approval for a Local Action Plan
- Implement policies and measures
- Monitor and verify results

The key point of the CCP programme is to give local authorities an understanding of how municipal decisions influence energy use and how their decisions can be used to mitigate climate change while improving quality of life.

Glasgow City Council has implemented or is in the process of implementing numerous actions that aim to reduce emissions from commercial and domestic sources. Due to their common nature these are considered together and summarised below.

Action: Feasible

Glasgow City Council will continue to comply with its obligations as an energy conservation authority and will work to improve energy efficiency of commercial and domestic properties within its area, with the primary aim of reducing CO₂ emissions, but with the added benefit of also reducing NO_x emissions and other pollutants of significance to local air quality.

In terms of actions targeting emissions from commercial and domestic sources, Glasgow City Council aims to:

- Reduce energy use in Council departments by encouraging energy efficient working practices and by increasing the Council's use of renewable energy sources.
- Work with the Energy Management Forum to conduct a survey of large (Council) buildings within the city to identify and encourage any still using oil/solid-fuel boilers to switch to gas.
- Continue to work with Government and other external organisations to promote energy efficiency to local businesses and the general public.
- Reduce the contribution of buildings to air pollution by encouraging the construction of energy efficient developments.
- Undertake and complete the five performance milestones required by the CCP.

- Continue to respond to statutory nuisances pertaining to air quality (e.g. smoke) from commercial and domestic properties and enforce local and national regulations.
- Promote the development of renewable energy across the city.
- Tackle fuel poverty through the council's HECA commitments.

Control of this Action

Glasgow City Council, Scottish Executive, UK Government and other external organisations

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Reduce amount of fossil fuels used
- ✓ Better insulated buildings
- ✓ Reduction in global warming
- ✓ Potential long-term savings for Council, local businesses and public.
- ✓ Contribution to environmental conservation.
- ✓ Action to address fuel poverty
- × Initial costs of replacing solid fuel/ oil-fired boilers.

Cost and Feasibility

Often low cost involved in improving energy efficiency. Can be achieved through turning down thermostats, improving insulation standards or draught proofing. Feasible through provision of grants from various organisations, with many initiatives already in operation.

Timescale

Work ongoing, but increased energy efficiency in all domestic and commercial properties is a long-term project.

Predicted Impact on air quality (NO_x)

It is predicted that each of the initiatives proposed by Glasgow City Council to reduce atmospheric emissions from commercial and domestic properties will have a low impact on reducing emissions of NO_x within Glasgow's AQMA. However, the cumulative effect of such actions may result in a medium impact of NO_x emissions.

4.5.2 Industrial Sources

The Scottish Environment Protection Agency (SEPA) has responsibility over prescribed processes in Scotland. SEPA authorise Part A and B processes and set conditions that limit emissions from them and places them under an obligation to use 'the best available techniques' to prevent or minimise pollution.

Of the Part A authorised processes currently operational within Glasgow, only Allied Distillers is considered to produce significant quantities of NO_x close to the AQMA. However, an assessment of NO₂ emissions from the distillery has been carried out by

consultants on behalf of Allied Distillers as detailed in Glasgow City Council's Stage III Review and Assessment Report produced in 2001. This confirms that predicted concentrations of NO₂ from the distillery are very low and far below the Air Quality Strategy for England, Scotland, Wales and Northern Ireland objective values. Slightly higher concentration impacts are predicted at the top of the nearest block of flats. These, however, are still well below the Strategy objectives for NO₂ and it is noted that, in fact, levels of pollutant concentration at ground level from traffic will be significantly higher than levels impacting residents at the top of the flats.

Glasgow City Council has some control over emissions from non-prescribed industrial premises in terms of the Clean Air Act 1993 and Statutory Nuisance legislation contained within the Environmental Protection Act 1990.

Action: Feasible

Glasgow City Council will continue to actively enforce legislation relating to the control of emissions from industrial sources in terms of the Clean Air Act 1993 and the Environmental Protection Act 1990.

Control of this Option

Glasgow City Council's Environmental Protection Services

Cost and Feasibility

Costs met from existing budgets

Timetable

Work is ongoing in this area

Predicted Impact on air Quality

It is predicted that the action will have a low impact on air quality within the AQMA

4.6 Glasgow City Council Leading by Example

4.6.1 Vehicle Emissions Testing of Council Fleet

Emissions testing has been carried out on the Council's own fleet of vehicles prior to the scheme being introduced to the public.

Glasgow City Council is committed to improving its own environmental performance and to reduce the environmental impact of its staff and their activities. As a large fleet operator, it is imperative that the council's own vehicles are properly serviced, maintained and operated to ensure that exhaust emissions are within the limits laid down in the MOT test and to minimise the effects of the council fleet on NO₂ levels within the AQMA. Vehicles that fail the test are repaired as soon as practicable to ensure that polluting vehicles are not being used for council business. This will ensure

that NO_x and other emissions are reduced as far as possible and that the city council is setting an example to other organisations, fleet operators and private vehicle owners. Testing of council vehicles will continue to ensure that this aim is met.

4.6.2 Alternative Fuels

Glasgow City Council will lobby for a clearer commitment to alternative fuels and for the Government to provide a long-term strategy on tax incentives for these fuels. This will give fleet operators and individuals more confidence in adopting alternative and potentially cleaner fuels and associated technology.

The city council also sees the importance of a national strategy to discourage the use of older, more polluting vehicles among the private fleet and change to newer cleaner vehicles.

Glasgow City Council is a large fleet operator and has a commitment to lead by example in cleaning up emissions from its fleet. A number of alternative fuels are commercially available and some others are still in development. The Council has considered the use of these fuels for its fleet, taking into account environmental improvement, cost and availability of alternative fuels and cost of buying, converting and running alternative fuelled vehicles.

A number of local authorities have begun using alternative fuels in recent years, most usually Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), electric vehicles and hybrid electric vehicles. However, recent technological advancements in diesel and petrol engines have seen improvements in exhaust emissions from vehicles using these fuels. This means that even upgrading older vehicles to new ones running on petrol and diesel will result in air quality benefits.

It is therefore important that when buying new vehicles for its fleet, a local authority undertakes a whole life cost evaluation before committing to a particular type of vehicle and the fuel it uses. When going through the tendering process for new vehicles, tenders are evaluated on the vehicle's suitability for the job first, then its environmental impact and lastly, cost.

Part of the Council's fleet of articulated tractor units and 18 tonne winter maintenance vehicles have been fitted with clean-air technology developed by Adastral Exhaust Systems. This involves the use of an exhaust filter that traps particulates from the combustion process. An on-board dosing system adds a chemical catalyst to the diesel fuel to ensure that sooty particulates trapped in the filter are burned off at intervals. The complete system prevents particulates from being released into the atmosphere, and disposes of them in a safe and efficient manner. NO_x emissions are also reduced by this system.

32 vehicles are fitted with the Adastral system. These are a mix of Foden vehicles – C12 Caterpillar powered tractor units, which are used to transport waste to landfill, and 18 tonnes Alpha units on gritters and other winter road maintenance duties.

Detailed below are some of the alternative fuels available today and some of the pros and cons associated with these fuels:

Liquid Petroleum Gas (LPG) - Many local authorities already use LPG powered vehicles, including Glasgow City Council. Exhaust emissions from vehicles using LPG are still cleaner than either petrol or diesel. Historically, gas vehicles have offered reduced emissions of key air pollutants such as particulates and oxides of nitrogen compared to conventional petrol and diesel vehicles. However, over the past few years the progressively tougher EU emission standards have made new petrol and diesel vehicles increasingly clean, thereby reducing the margin of air quality benefits of gas. For example, compared to petrol cars meeting the latest Euro IV standards, even the cleanest LPG and natural gas vehicles offer relatively small air quality benefits (Road Fuel Gases and their Contribution to Clean Low-Carbon Transport – Department of Transport). There does, however, remain an air quality advantage from using gas vehicles in place of diesels, particularly in urban areas where air quality tends to be poor. So using LPG or natural gas to replace urban delivery vans, trucks or buses continues to offer useful air quality benefits. However, there has been widespread concern that the Chancellor will no longer continue to provide the tax breaks on these fuels in the medium to long term, thus making it difficult for fleet operators to take the plunge and invest in vehicles capable of utilising LPG and CNG technology.

The Department of Transport has produced a consultation paper on the use of gases as a vehicle fuel entitled 'Road Fuel Gases and their Contribution to Clean Low-Carbon Transport'. It seeks views that will help to determine future levels of Government support for these fuels in terms of fiscal incentives, such as lower tax on these fuels and the continuing provision of grants to convert vehicles to run on these fuels through Transport Energy and Powershift grants. They need to see that these alternative fuels are continuing to provide environmental and air quality benefits over conventional fuels, such as petrol and diesel. The Government aims to use environmental taxation as an incentive to bring about environmental benefits. The relative benefits from different fuels may change over time as a result of developments in fuel and vehicle technology. The air quality benefits of LPG are being reduced over time as technological advancements and tighter regulations mean that conventionally fuelled vehicles become cleaner.

Compressed Natural Gas (CNG) – Glasgow City Council currently has one refuse collection vehicle using this fuel. Although emissions may be improved over a conventional diesel engine there are a number of practical problems that limit the value of using CNG:

- Refuelling takes up to eight hours
- Lack of after sales repair facilities resulting in costlier repairs, often involving collection/delivery charges
- Poor availability of parts
- Lack of CNG filling stations
- Reduced payload on some vehicles

- Low siting of gas tanks limits some vehicles' ability to tip at landfill sites

Electric Vehicles – Land Services within Glasgow City Council currently has electrically powered two-wheeled vehicles within its fleet. However, more widespread use of this technology is not feasible due to high initial cost and limited mileage range. However, should the technology improve, electric vehicles could become viable for use and with zero emissions, would have benefits for air quality. Although exhaust emissions are zero, the energy source for the electricity has to be taken into account, e.g. power stations.

Hybrid Electric Vehicles – these vehicles have excellent fuel economy and produce low levels of exhaust emissions. The council currently has no hybrid vehicles.

Biodiesel – Biodiesel can be manufactured from either oil derived from crops, such as rapeseed, or from used cooking oils recovered from food outlets and industry. By using the latter, not only is an environmentally friendly fuel being produced, but used cooking oils are being diverted from landfill. The Government has also offered incentives to other, more environmentally friendly fuels. For example, a duty incentive for biodiesel - introduced in July 2002 - has resulted in nearly one million litres of biodiesel now being sold every month from over 100 filling stations, including trials at some supermarket petrol stations. Furthermore, a significant amount of investment is now being made in this sector, for example a plant in Scotland due to open in spring 2004 will produce 50 million litres of biodiesel every year. The council does not use biodiesel at the present time.

Hydrogen Fuel Cells – a fuel cell works by combining a hydrogen rich fuel, such as methanol, with oxygen from the air to produce electricity, which powers the vehicle. It is anticipated that such vehicles will become commercially available from 2004. Fuel cells are cleaner and more efficient than conventional internal combustion engines and have the potential to provide benefits for air quality, climate change and noise emissions.

Land Services have provided the Faculty of Electrical Engineering at the University of Strathclyde with one of their vehicles for use in a project on hydrogen fuel cells. The vehicle is being converted to run on a fuel cell and Land Services are providing some financial assistance to the project.

Actions: Feasible

Glasgow City Council will continue to utilise alternative fuel technology for its vehicle fleet where appropriate in order to reduce emissions of NO_x across the city, as well as within the AQMA.

Control of this option

Glasgow City Council, Energy Savings Trust

Cost and feasibility

Energy Saving's Trust fund provides 75% and the other 25% is paid for through the lease charges, however this is recovered by the reduced road fund licence for running lower emissions vehicles. Filter traps used on both petrol and diesel vehicle. Systems used: include Emonox, Aadastra, Pertec and Dinex

Potential positive and negative effects on non-air quality issues

- ✓ Reduced noise, e.g. from electric vehicles

Timetable

Ongoing

Predicted Impact on air quality (NO_x)

It is predicted that the actions will have a low positive impact on air quality

4.6.3 Green Travel Plans

Green Travel Plans are designed to provide practical alternatives for staff to the motorcar, or indeed, to reduce the need to travel at all for work. By reducing the number of journeys made by car or council vehicle by employees, emissions can be reduced and NO_x levels reduced within the AQMA. Some of the issues to be considered in their implementation are:

- Carry out study/survey of council staff to determine how they travel to and from work and how they travel carrying out council business
- Budget/funding for implementation
- Use of bicycles, loans for bicycles, showers/changing facilities for those cycling
- Car share scheme/database for employees
- Flexible working/home working – staff that undertake suitable work could perhaps utilise a home working system, thereby reducing pollution and congestion from road travel. May need some investment in laptop computers, etc. and some form of management supervision to ensure system is not abused.

Green Travel Plans and other issues related to Glasgow City Council leading by example are interlinked with work already ongoing by the council on Sustainable development and Local Agenda 21. The Local Government in Scotland Act 2003 places a duty on Local Authorities to secure best value and states that: "The local authority shall discharge its duties in a way which contributes to the achievement of sustainable development."

The council must consider what preparations are needed to ensure that it can demonstrate that it is making progress on sustainability issues. There is a growing need for the council to act on issues of sustainable development and to introduce sustainability issues in the day-to-day management of the council. Therefore, a priority

for the council is to introduce a programme of sustainability indicators to assist in this process. A Senior Officers group on Sustainability has been set up to progress this issue and is looking at drawing up indicators under the two main headings of:

- Quality of life indicators
- Glasgow City Council as a sustainable organisation indicators

It is important that the Council considers the impact of its own activities on sustainability. This will aid in Glasgow City Council in its need to lead by example and work related travel and green travel plans are being considered by this group to help in the progression of this aim.

4.7 Education and Awareness Raising

Glasgow City Council aims to raise the profile of air pollution problems within the city and to encourage the public to participate in improving the situation. The publicity campaign for vehicle emissions and idling vehicles enforcement has helped to bring air quality to a wider audience and encourages people to ensure their vehicles are maintained properly to reduce emissions and improve NO_x levels within the AQMA.

4.7.1 Glasgow City Council Website

Glasgow City Council has launched an updated version of its website and includes information on air quality in Glasgow. The aim is to allow people to find out more about air quality within the Glasgow area and to highlight what the sources of pollution are and what is being done to improve air quality. It is intended to further expand these web pages on air quality to include the provision of access to real time air quality monitoring data. The website will be updated as more information becomes available.

4.7.2 Walk to School Week

International Walk to School Week is held each May to encourage children and their parents to adopt a healthier lifestyle by walking to school instead of using the car. Each May the Council raises awareness of the benefits of walking to school by inviting all primary schools to participate in Walk to School Week. Parents and guardians can improve their health and teach road safety simply by walking their child to school.

4.7.3 Car Free Day

Car Free Day is organised as part of European Mobility Week and is being supported in more than 990 cities and towns across Europe, including Glasgow. The aim is to encourage people to think about how they travel and to try other forms of transport, in the hope they will be persuaded to use them more often, thus reducing emissions of NO_x. Promotional initiatives and events organised in Glasgow for 2004 are as follows:

- Thursday 16th September saw the launch of the inaugural 'Hands up for Glasgow Great School Travel Tally' - All schools in Glasgow were invited to take part in a hands-up survey to ascertain how children have travelled to school on this day. This will become an annual event for European Mobility Week.

- Friday 17th & Saturday 18th September: The Council's School Travel Plan team were present at the Eco-Day Science Fair that took place at the Glasgow Science Centre. The event was organised by the Glasgow STEM (Science and Technology in Education) group and was aimed at children aged 5-18. The team had a display that informed pupils and parents of the Safer Routes to School Initiative and School Travel Plans, promoting the health, environmental and social benefits of more walking, cycling or public transport use and encouraging both children and parents to think about how they travel to school.
- Sunday 19th September: Pedal for Scotland charity cycle ride between Glasgow and Edinburgh. Starting in George Square, Glasgow. The event was organised by Cycling Scotland and supported by Glasgow City Council.
- Monday 20th September: Launch of the first tranche of the TWELAS (TWEnty Limits Around Schools) scheme outside a participating school. Flashing warning signs outside schools will alert drivers to the 20mph speed limit during peak times. These part-time mandatory 20mph speed limits will gradually be introduced around all primary, secondary and special needs schools in Glasgow.
- Tuesday 21st September: Launch of Safety on the Net website by Greater Glasgow Health Board NHS Health Promotion.
- Wednesday 22nd September: South Frederick Street, in front of the City Chambers, was closed to traffic between 7am and 6pm, to promote the benefits of a traffic free environment. The road was open to pedestrians to take the opportunity to visit the road safety unit that was there for the day and access information about public transport routes.
- The council has also written to 130 major employers in the city asking them to alert their workforce to car free day and highlight the health benefits of walking or taking public transport to work. The letter also encourages car users to consider car sharing to help reduce pollution and congestion.
- A double decker bus was also parked in George Square where staff from First Glasgow, Glasgow's largest bus operator, was available to deal with timetable enquiries and provide people with all the information they needed to know on how to get about by bus.
- And the council put its best foot forward, encouraging folk to walk, by organising a lunchtime health walk to Glasgow Green.

4.8 Air Quality Monitoring

As outlined in Chapter 1.0, Glasgow City Council is obliged to conduct regular reviews of air quality within its boundaries. Consequently, Glasgow City Council operates an extensive programme of air quality monitoring, and also conducts air quality modelling. In order to improve the knowledge and understanding of air quality issues within the city centre and assist these issues to be tackled more proactively, Glasgow City

Council continuously reviews its monitoring and assessment procedures. Currently, Glasgow City Council is implementing or considering the implementation of numerous measures aimed at improving the monitoring programme, the modelling of air quality within Glasgow and the provision of information to the public (awareness raising). It is hoped that the actions listed below will assist Glasgow City Council to reduce NO_x emissions within the AQMA by improving the knowledge of air quality issues that require further attention, e.g. local sources and by increasing public awareness of air quality issues.

Actions: Feasible

- Introduce automatic air quality monitoring software with the aim of improving monitoring efficiency and the provision of real time information to the public via Glasgow City Council's Website (See Section 10.1).
- Activate further traffic counters on city centre roads to allow correlation of traffic flows with air quality.
- Review and expand the NO₂ diffusion tube network and ensure the locating of tubes in locations relevant to the National Air Quality Objectives.
- Review and update Glasgow's emissions inventory (improve air quality modelling accuracy).
- Locate a weather station close to Glasgow's AQMA to improve air quality modelling accuracy.
- Prepare annual reports of air quality within Glasgow.

Control of this option

Glasgow City Council

Cost and feasibility

The listed actions are considered to be feasible with many already implemented or due to be in place within the coming year. The costs of the actions are categorised as 'low'.

Potential positive and negative effects on non-air quality issues

- ✓ Improved local authority understanding of factors influencing local air quality issues.
- ✓ Improved public access to air quality information.
- ✓ Potential for improved public knowledge of local and national air quality issues.

Timetable

The listed actions have either already been implemented or will be in place within the coming year.

Predicted Impact on air quality (NOx)

The listed actions are predicted to have a low impact on NOx emissions within the AQMA in the short-term, but are considered to have greater potential for the future.

5.0 Actions Still Under Consideration

5.1 M8 Motorway

Road traffic is considered to be the primary source of NO_x emissions within the Air Quality Management Area. The M8 motorway, which passes through the northern part of the AQMA, is estimated to contribute 34 % of the total NO_x emissions within the AQMA (between junctions 14–19). The M8 is a trunk road of national significance and is under the management of the Scottish Executive. Glasgow City Council has had preliminary discussions with the Scottish Executive on measures and proposals to reduce emissions from the M8. Options for regulating traffic flows on the M8 will require to be considered in order to reduce emissions. The council intends to identify actions it would like to see implemented that would lead to a drop in emissions from M8 traffic. It is important that any potential actions do not adversely affect development and investment along the M8 corridor. It is also vital that any actions do not give rise to increased traffic levels or congestion on city roads, thereby leading to further rises in pollution levels within the city.

Interdepartmental meetings within the council are to be used to allow officers from different Services to meet and discuss potential actions. When potential actions have been identified, detailed discussions can then take place with the Scottish Executive and any other relevant parties to progress the actions.

Other local authorities across the country, particularly England, have similar motorways or trunk roads traversing their areas, resulting in pollution problems similar to that of Glasgow. These authorities have approached the Highways Agency for assistance in reducing emissions from these roads. One of the main options being considered by such authorities is a reduction in the speed limit for vehicles using these roads from 70 miles per hour to 50 miles per hour. This is due to the fact that vehicle engines run more efficiently at these speeds, resulting in more efficient fuel combustion and improved emissions. However, such an option is not available in Glasgow, due to the fact that a 50 miles per hour speed limit is already in force on the motorway.

Future developments, such as the Glasgow Airport Rail Link and Crossrail (both beyond 2005), may help to reduce congestion on the M8.

It should be noted that the quality of Glasgow's transport infrastructure is critical to the continued economic health of the City and the conurbation as a whole. The strategic road network, for example, has an important influence on industrial and business location with some 70% of land developed for these uses, in recent years, being located adjacent or close to the network. The continued success of such development is vital to the city's wider regeneration efforts and also to the Executive's aim of seeking to promote a strong, diverse and competitive economy. There is a need, therefore, to ensure that any future measures introduced also continue to support the strategic functions served by routes such as the M8.

Action: Still under consideration

Control of this Option

Scottish Executive, Glasgow City Council

Cost and Feasibility

Will depend upon options chosen

Potential Positive and Negative Effects on Non-Air Quality Issues

Will depend upon options chosen

Timetable

Not known

Predicted Impact on Air Quality

Potential high impact due to large contribution of M8 to NO_x levels within AQMA

5.2 Clyde Corridor Transport Study

The river Clyde has an impressive industrial history through shipbuilding and the numerous shipyards along the banks of the Clyde provided employment for many people in Glasgow and beyond. However, the decline in this and associated industries over the course of the 20th century saw much of the riverside becoming derelict and unused.

There has been recognition that the river Clyde can be a major asset to Glasgow and beyond and there are plans to redevelop the banks of the Clyde to provide commercial, retail and residential developments and make the area a destination for residents and tourists. Redevelopment began in the 1980's with the construction of the Scottish Exhibition and Conference Centre. The Broomielaw has already seen successful development as a financial district. Further development is planned for Glasgow Harbour to the west of the SECC, a project estimated to take around ten years to complete. The futuristic Glasgow Harbour regeneration project was launched in 2001. Sited on 120 acres of land, until recently redundant shipyard and dockland, the project will create a new district, incorporating residential, commercial, retail and leisure space in one integrated location. The aim is to bring people back to live and work in the city once more, and encourage tourism. The first of the scheduled 2,500 residential apartments will be occupied in 2004. It has been recognised that integrated public transport is essential to the success of these new developments.

The Clyde Corridor Transport Study forms part of Glasgow City Council's vision for the regeneration of the river Clyde corridor. The study was initiated by the City Council with funding from the Scottish Executive to coordinate work with other partner organisations (Strathclyde Passenger Transport, the Scottish Executive, Scottish Enterprise, Clydeport, Renfrewshire and West Dunbartonshire Councils) in developing

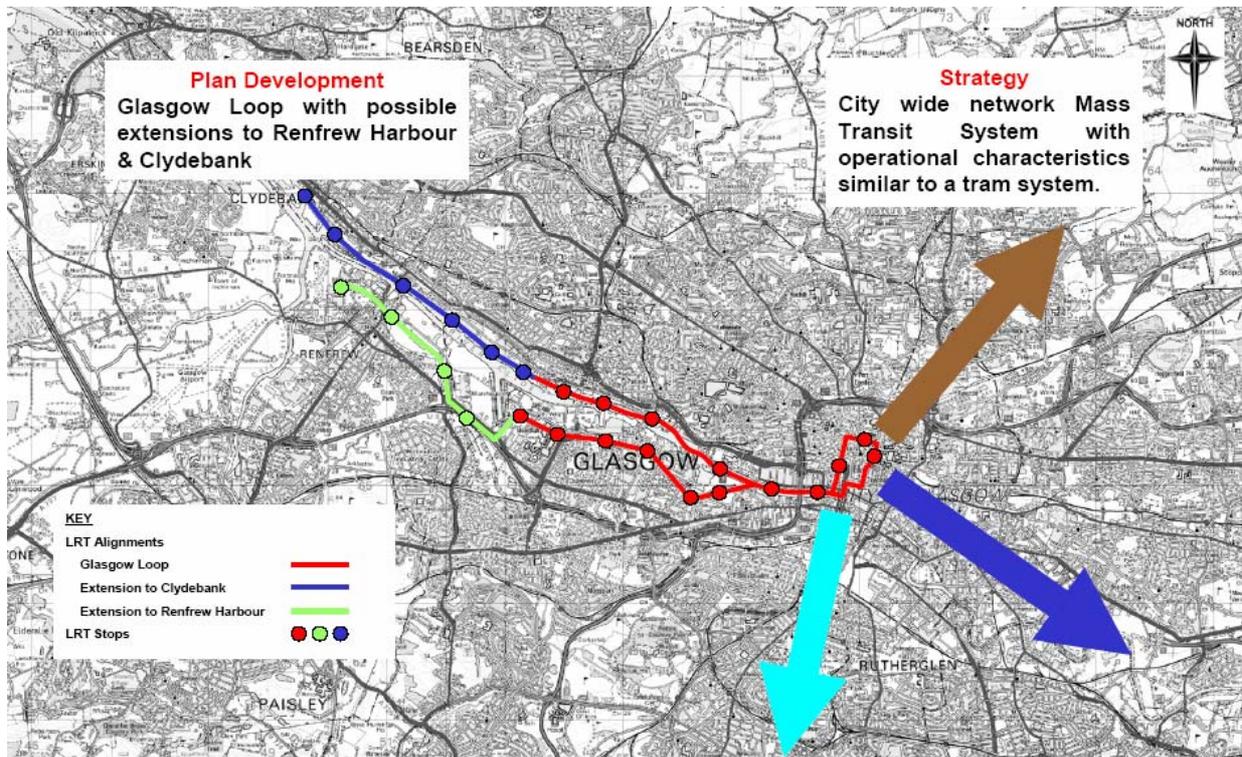
an option for a sustainable transport strategy linking Glasgow City Centre to the developments to the west, which lay on or adjacent to the River Clyde.

The Study, which reported in December 2003, considered that the transport needs of the Corridor would be best met by introducing:

- (1) a tram based system
- (2) a core network comprising the Glasgow Loop:
- (3) a route along the north bank of the River Clyde from the City Centre to Glasgow Harbour
- (4) a route along the south bank of the River Clyde from the City Centre to the Southern General Hospital
- (5) a City Centre Loop

The core network including possible river crossing points together with potential extensions to Renfrew Harbour and Clydebank are demonstrated in Figure 5.1.

Figure 5.1 Proposed Routes of Corridor



The Study also recommended that:

- (i) Funding should be sought to progress the core network to a sufficiently detailed stage of development whereby appropriate powers for construction can be sought (at present a Private Parliamentary Bill).
- (ii) Possible extensions to Renfrew and Clydebank would substantially weaken the overall economic case for delivery of the core network. It was considered that these extensions should not be proposed for development at this time but included as an integral part of a wider Light Rail Transport Strategy that the Study recognised required to be developed for the Glasgow conurbation.

(iii) A long term strategy for a city-wide LRT network radiating from the city centre should be developed.

In addition it has been noted that the differing characteristics of the core network routes require to be taken into account in order to consider how these might influence possible delivery and timescale options.

North Bank Section of the Core Network

The north bank section of the core network is largely focused on regeneration as it will provide access to major new development initiatives including the SECC and Glasgow Harbour. As the success of these developments is regarded as being essential to the continued regeneration of the River Clyde, it is crucial that a new public transport system is operational along the north bank in a timescale that matches the delivery of these developments.

City Centre and South Bank Part of the Core Network

The city centre and south bank sections of the core network will primarily address regeneration, accessibility and social inclusion, as it is aimed at improving access from the city centre to Tradeston, Pacific Quay, Govan and the Southern General Hospital.

The majority of the route will be 'on road', with the intention to provide a dedicated lane for the tram to ensure the efficient operation of the system. It is anticipated the city centre and south bank sections of the core network will present particular challenges including the limitation of disruption, the management of displaced traffic and the introduction of a tram system in established historic townscapes.

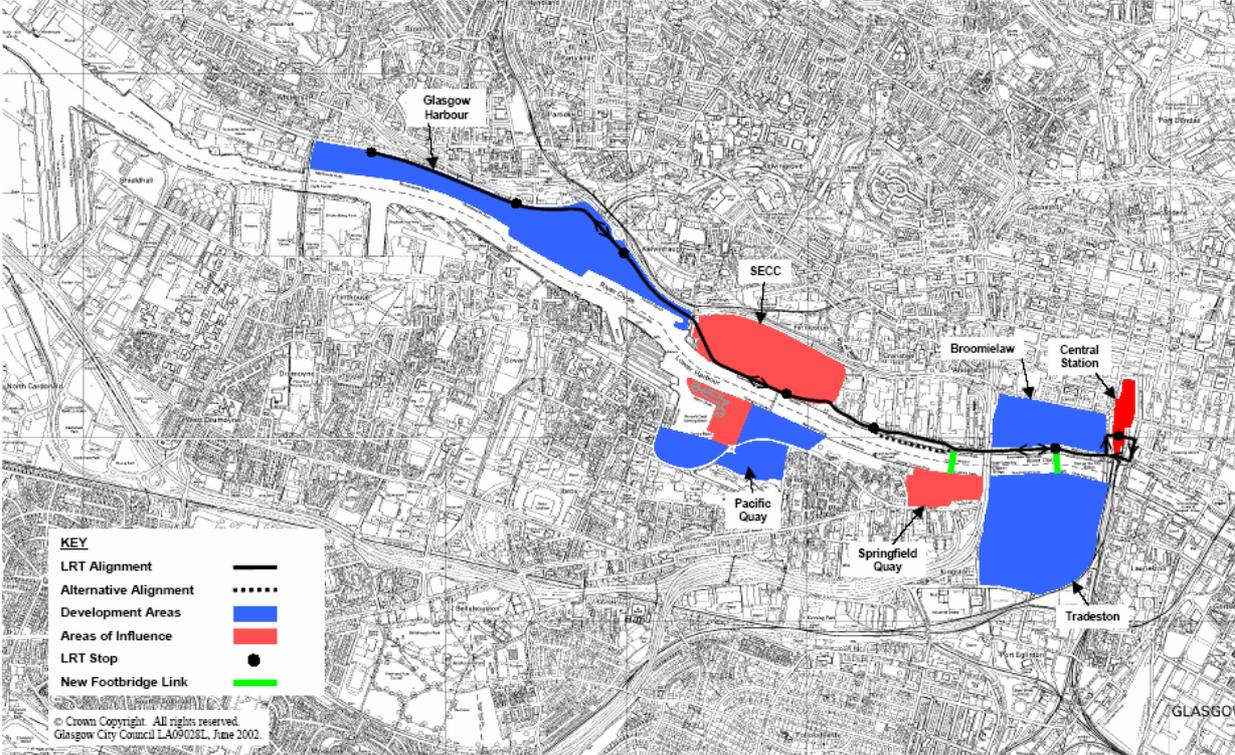
A traffic and air quality impact assessment has been carried out for the scheme in Glasgow by consultants MVA. Of the 63 road links they assessed along the tram routes, it was considered that there would be potentially significant changes of 10% or more on 13 road links, all of which are within the Air Quality Management Area. Minor increases in NO₂ and PM₁₀ were predicted for the 13 roads with a potential significant increase in traffic. No residential properties are located within 200m of these roads. It was considered that the residential properties are at too great a distance from these roads to experience any negative air quality impacts.

SPT intend to seek funding to conduct a study into the requirements for a wider LRT network for the conurbation which would include the north bank, south bank and city centre routes, forming the core of the network. Such study work and follow on implementation would obviously have longer term associated timescales, with delivery being post 2010 at the earliest.

However, SPT and Glasgow City Council recognise the unique regeneration opportunities and development pressures on the north bank route and note that there is a requirement to address the short term demand for a high quality, speedy and reliable public transport system to serve this area. To meet this need SPT have indicated that they would wish to work in partnership with Glasgow City Council to develop a pre LRT strategy for the north bank route.

A typical pre LRT strategy for the north bank route may take the form of an ultra modern bus based system that would run on a dedicated roadway and follow the route shown on Figure 5.2.

Figure 5.2 Proposed route of pre LRT strategy for North Bank



It is expected that a 6-minute service frequency would be provided along the route, with a total journey time of approximately 6 minutes from Glasgow Central Station to Glasgow Harbour. In excess of 1.7 million passengers per annum could be expected to be carried on this route.

Action: Still under consideration

Development of a tram system along Clyde Corridor

Control of this Option

SPT and Glasgow City Council

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Improved public transport
- ✓ Enhanced regeneration and social inclusion
- × Potential for small increase in traffic/congestion on surrounding streets

Cost and Feasibility

It is estimated that a sum of £2.5m would be required to fund the development costs associated with the north bank route. Further funding would be required to contribute to supervision, construction and operation of the scheme.

Timetable

It is anticipated that a pre LRT scheme could be fully operational by late 2007. Further developments could be completed by 2010.

Predicted Impact on Air Quality

It is predicted that the proposal will have a low positive impact on emissions of National Air Quality Strategy pollutants within the AQMA.

5.3 Crossrail Technical Feasibility Study

Crossrail is a strategic rail project, which closes a critical gap in the Scottish rail network by enabling new rail connections between the south and southwest parts of west central Scotland and the northwest of the region. It provides additional capacity that facilitates and makes more attractive rail connections from the entire national rail network to the east and north of Glasgow. Although a nationally significant scheme, the required new track construction is minimal and the costs and timescales for delivery are favourable in comparison with many other rail projects.

In October 2003, SPT submitted a bid to the Scottish Executive to seek funding to bring the Crossrail project to a detailed stage of development so that the costs can be fully reviewed and the appropriate powers for construction can be sought. SPT was awarded £500,000 from the Scottish Executive and will contribute £100,000 from its own capital budget. SPT will progress the work during 2004/05.

The Glasgow Crossrail proposal has a lengthy history dating back to the "Clyderail proposals" of the mid-1970s. The Crossrail scheme being investigated comprises the High Street Curve, the City Union Line upgrade, the Strathbungo Link, the Yorkhill/Kelvinhaugh Turnback and new station options at West Street, Glasgow Cross and Gorbals. Crossrail will connect the lines on the south and south west of Glasgow with the north side, providing the long-awaited cross-city rail links.

- Links the north and south Glasgow rail networks and increases accessibility to the city, especially south of the Clyde
- Electrification of rail services with resultant reliability and environmental improvement
- Improving national connectivity
- Developing the connectivity and flexibility of the trans-urban rail network
- Key to enabling Airdrie-Bathgate & Cumbernauld/ Falkirk/ Stirling enhancements
- Improving utilisation of Queen St Low Level station

- Increasing integration with the Subway system at West Street station
- Improving accessibility by the provision of new stations
- Increasing social inclusion, particularly around the Gorbals area of Glasgow
- Reducing the level of car use particularly by providing credible alternatives for cross-city trips by car.

The Glasgow Crossrail project is cost effective and can be delivered in the short term. It brings significant rail service improvements across Scotland. It could be in place by 2009, one year after the Glasgow airport rail link. The project would allow rail journeys between the south and southwest of west central Scotland and the northwest of the region. It would provide additional capacity and new possible connections that would have benefits nationwide.

Crossrail is important to the delivery of other rail projects prioritised by the Scottish Executive. The Crossrail project will enable the Airdrie to Bathgate and Cumbernauld to Falkirk and Stirling rail enhancements, together with the potential for direct travel to Glasgow and Glasgow Prestwick airports from other parts of the country.

5.4 Emissions from other Transport Sources

Glasgow City Council has assessed emissions of National Air Quality Strategy pollutants from non-road transport sources as part of Local Air Quality Management Review and Assessment procedures. The most recent review and assessment document conducted within Glasgow (Update and Screening Assessment, 2003) considered emissions of National Air Quality Strategy pollutants from aircraft and trains within the city.

Glasgow City Council's USA (2003) recognised that commercial aircraft can represent a major source of NO_x and may contribute significantly to ground-level concentrations when operating at a height below 200 m. With this in mind, the report concluded that as Glasgow International Airport is located outwith the City boundary, emissions of NO_x and other pollutants from aircraft would not have a significant effect on air quality within Glasgow. Consequently, it has not been considered necessary to address emissions from aircraft any further within the air quality action plan.

Emissions from diesel trains were also addressed within the USA (2003). By following guidance provided within *Local Air Quality Management: Technical Guidance LAQMA.TG (03)*, the report concluded that although engines may idle occasionally in depots and stations such as Glasgow Queen Street, relevant human exposure at these locations is unlikely to be significant and thus further assessment was not required. However, Glasgow City Council will endeavour to gather further information to assess concentrations of NO_x (and possibly PM₁₀) at locations relevant for public exposure within both Glasgow Central and Queen Street stations.

6.0 Actions Not Considered Feasible At This Time

6.1 Low Emission Zone

Over the past 12 years, the introduction of European legislation (Euro Categories) designed to address vehicle emissions has led to a significant reduction in the quantities of air pollutants produced by individual road vehicles. Consequently, air quality has improved as newer cleaner vehicles have gradually replaced the older vehicles in the fleet. The impact of this legislation on local air quality is likely to continue in future years with the introduction of the new Euro IV standard due for introduction in 2006. However, the rate of vehicle replacement is currently insufficient to meet the national air quality objectives for NO₂ in 2005. In an attempt to enhance this trend Glasgow City Council and numerous other authorities have considered the introduction of Low Emission Zones.

Low Emission Zones (LEZ's) are defined areas that can only be entered by vehicles meeting certain emissions criteria or standards. The objective of such LEZ's is to accelerate the introduction of cleaner vehicles and reduce the number of older more polluting vehicles in order to improve local air quality. Such zones have been successfully operated in Sweden for several years. In reference to the potential introduction of an LEZ in London the '*London Low Emission Zone feasibility study: A summary of the phase 2 report to the London Low Emission Zone Steering Group (2003)*' was conducted to assess the effects of implementing such a zone.

Action: Not Feasible in Near Future

The implementation of a Low Emission Zone on roads contained within Glasgow's AQMA (with the exception of sections of the M8) targeting the exclusion of Heavy Vehicles introduced before 1996 (Pre Euro II). This scheme follows the recommendations laid down in the London Low Emission Zone Feasibility Study: Phase 2 that suggested the initial targeting of heavy vehicles, which produce disproportionately higher emissions of NO_x per vehicle and offer the greatest potential reduction in emissions for the least cost.

Control of this option

Glasgow City Council

Cost and feasibility

The potential costs of implementing a Low Emission Zone in Glasgow vary depending on the size and nature of the proposed scheme. It is estimated that the set up of a manually enforced zone within the AQMA would cost in the region of £1.0-2.5 million to set up, and with annual running costs of £2-3 million. The costs of implementing an automated scheme are likely to be considerably higher. However, the actual costs of implementing a LEZ are likely to vary depending upon the potential date of implementation. In addition to the costs of introducing and operating a LEZ in Glasgow, the introduction of a zone would have significant cost to vehicle operators.

At this stage it is not considered feasible to implement a Low Emission Zone in Glasgow in the near future.

Potential positive and negative effects on non-air quality issues

- ✓ Reduced noise levels around effected roads.
- ✓ Benefits to health issues.
- ✓ More attractive environment for companies/ public.
- ✓ Safety benefits of newer vehicles.
- × Potential cost of implementation and running.
- × Potential cost to vehicle operators and businesses.
- × May result on increased localised congestion on roads outwith the zone.
- × Potential increase in social exclusion.
- × Influence of zone is temporal declining with time.
- × Potential to have a detrimental impact on public transport buses.

Timetable

There are currently no plans for the introduction of a Low Emission Zone in Glasgow, but due to the current trends of air quality in the area, it may be necessary to re-evaluate the possible introduction of a city centre LEZ in the future. However, such a zone is unlikely to be in place prior to 2010.

Predicted Impact on air quality (NO_x)

In terms of assessing the potential impact of a city centre LEZ on air quality, scenario testing assessed the influence of implementing an enforced zone that would allow access to cars of all ages, but restrict the access of heavy vehicles (Buses, Coaches and Heavy Goods Vehicles) allowing only Heavy Vehicles produced after 1996 (Euro IV or better) to access the area. This scenario took into consideration that the introduction of a Glasgow City Centre Zone is unlikely to be operational prior to 2010, at which stage current policies predict that approximately 55% of all vehicles will be registered as Euro IV. It is recognised that other vehicle technologies (e.g. Natural Gas) offer further improvements in NO_x emissions (See Alternative Fuels Section), however, in the current climate it was not considered feasible to consider the widespread introduction of these technologies within the next 5-6 years.

The scenario testing predicted that the introduction of a city centre LEZ excluding pre Euro IV could potentially reduce NO_x emissions within the AQMA by approximately 3.63 % when compared to do nothing 2010.

As outlined in the London Low Emission Zone Study: Phase 2, emissions of NO_x are likely to be reduced by the introduction of an LEZ, but not as much as emissions of PM₁₀. However, the predicted reduction in NO_x is dependent upon stringent enforcement of the zone.

In terms of cost benefit to air quality, it is therefore predicted that the introduction of the outlined LEZ in Glasgow could have a medium impact on air quality but at a relatively high cost to implement and operate.

6.2 Road User Charging (Congestion Charging)

Road user charging is a concept that allows local authorities to require certain groups of road users to pay for the privilege of using highly congested roads with the aim of encouraging them to look at all the transport options available to them and to seek out the most practical and cost effective method of travelling. Although the main aim of such schemes is to reduce congestion, the overall effect should be that less vehicles use the roads that are affected by the charge, leading to fewer emissions and improved air quality. The idea of road user charging is highly controversial.

The Scottish Executive introduced the Transport (Scotland) Act 2001 which gave local authorities the power to introduce road user charging schemes by order. The legislation is sufficiently flexible to allow neighbouring authorities to collaborate on schemes where there are common areas of interest. It is for the authorities concerned to come up with the nature and scope of the scheme to be introduced. Any local authority proposing to introduce a road user charging scheme must have a local transport strategy and be able to demonstrate that a charging scheme is necessary to achieve the aims of the transport strategy. It is not to be used merely as a means of raising extra revenue for the authority. The funds raised through any road user charging scheme are to be used to improve public transport and transport in general and any authority implementing such a scheme must state prior to its introduction where the money will be targeted.

A road user charging scheme was introduced in central London in February 2003 and at the date of writing, is the only scheme in place within the UK. The main aims of this scheme are to reduce levels of congestion in central London and to raise revenue for use in improving transport in London more generally. A report produced by Transport for London 6 months after the introduction of the charges has stated that the scheme would appear to have had the desired effect in reducing congestion and has encouraged commuters to look at alternative methods of transport to the motor car. It is estimated that the scheme will raise between £80 million and £100 million per year for spending on transport improvements.

There are exemptions or discounts for certain groups of vehicles from the charging scheme in London, such as vehicles that are less polluting. Vehicles powered by electricity and LPG and motorcycles would come into this category.

It is unclear at this stage whether this scheme has had a positive impact on air quality within the congestion charging zone, or in London generally. The summer of 2003 saw unusually hot weather, which led to higher than normal levels of pollution being recorded. It may take some time before longer term trends can be examined to reveal the true relationship between road user charging in London and air quality. Given that there is less congestion and fewer vehicles on the road, the assumption would be that air quality should improve. Transport for London has produced a first annual report on the impacts of congestion charging in London, which also includes some relevant

information on the effects that congestion charging has had on air quality in the area. The charging scheme has affected the volumes and patterns of traffic within and around the charging zone and these changes are likely to have had some effect on environmental factors, such as air quality and noise.

However, the report considers that the relationship between the reduction in traffic volume and the reduction in air pollution is not directly proportional, i.e. a 20% reduction in traffic will not lead to a 20% reduction in NO₂. Indeed, the report expects that reductions in local pollutant concentrations are likely to be in the region of one or two percent from a predicted reduction in traffic levels of fifteen to twenty percent.

A number of reasons are put forward to explain the modest reduction in air pollution, such as other sources of pollution being unaffected by congestion charging, meteorological conditions, congestion charging only operates for around a third of the year and charging only affects cars, which produce less pollution per vehicle-kilometre compared to buses and lorries. The summer of 2003 saw unusually warm and dry weather, with record temperatures in some areas. This unusual weather in turn had an effect on the dispersal of air pollution in the atmosphere and led to several air pollution episodes across the country. Therefore, it could be considered that 2003 is not a typical year and consequently, it is difficult to compare monitored results of pollution from 2003 with previous years in order to determine the impact of congestion charging on air quality in London. It may take several years before a true picture emerges of the effects.

The Transport (Scotland) Act 2001 only allows for local authorities to apply a road user charging scheme to roads over which they have control. This means that in Glasgow, road users could not be charged by the council for using trunk roads and motorways traversing the council area, such as the M8, M80, M74 (and M74 extension) and the M77. These roads act as strategic routes for regional and national traffic, as well as collector–distributor roads for local traffic. The M8 is perhaps unique due to its close junction spacing and having on and off ramps linking with city centre roads. It is anticipated that any local road charging scheme whose boundary crossed the motorway, would result in drivers transferring from local roads to the motorway to avoid the charge and would therefore be impractical. It is also considered that a road user charge would not be compatible with the council's existing policies concerning public car parking charges, since motorists travelling into the city centre and parking in a public car parking space would effectively be charged twice.

Control of this Option

Glasgow City Council would be responsible for introducing a charging scheme by submitting an Order to the Scottish Ministers for approval under the Transport (Scotland) Act 2001.

The Scottish Executive has responsibility for trunk roads in Scotland, a number of which pass through Glasgow. Any form of road user charging scheme would require assistance or additional legislation to allow the charging scheme to be extended to trunk roads, such as the M8 motorway.

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Increased pedestrian safety due to less traffic
- ✓ Less road traffic noise
- ✓ Less congestion and improved journey times
- ✓ Revenue can be invested in public transport improvements
- × Considered to be unpopular with the general public and businesses
- × Difficulties with trunk roads outwith the local authority's control

Cost and Feasibility

No cost assessment for this option has been carried out by Glasgow City Council. However, Edinburgh City Council are currently looking to implement a road user charging scheme in their Air Quality Management Area and have considered that the implementation of the scheme would cost in the region of £23 million, with a technology refresh after 10 years costing £7 million. The operating costs of the scheme are considered to be £20 million. It could be assumed that similar levels of expenditure would be required to set up such a scheme in Glasgow.

In terms of feasibility, there are the difficulties with trunk roads outwith the Council's control, as described previously. It is also considered that a road user charge would not be compatible with the council's existing policies concerning public car parking charges, since motorists travelling into the city centre and parking in a public car parking space would effectively be charged twice.

Timetable

No assessment has been carried out by Glasgow City Council as to how much time would be required to implement a road user charging scheme. However, the scheme implemented in London and the proposed scheme for Edinburgh would suggest that upward of 3 years would be required from inception to implementation, since a number of complex technical issues would need to be addressed and a period of public consultation undertaken.

Predicted Impact on Air Quality

No detailed studies have been carried out on this option for the Glasgow Air Quality Management Area. However, Transport for London's first annual report on the impacts of congestion charging in London considers that the charging scheme has affected the volumes and patterns of traffic within and around the charging zone and these changes are likely to have had some effect on air quality. The report expects that reductions in local pollutant concentrations are likely to be in the region of one or two percent from a predicted reduction in traffic levels of fifteen to twenty percent.

It could be considered that there is not sufficient justification for the introduction of a road user charging scheme purely for air quality reasons.

6.3 Workplace Parking Charges

The concept behind workplace parking charges is to charge employees who park their cars in parking places provided at their place of work, in order to discourage private car use and make public transport a more viable and attractive option for those working in the city. This is a controversial option in a similar vein to road user charging, although it could prove to be a useful tool for improving congestion by reducing the number of vehicles being used for commuting in and out of the city centre and therefore, improving air quality within the Air Quality Management Area and the city as a whole.

Glasgow City Council has long recognised the need to control excessive road traffic in the city, especially cars commuting in and out of the city centre at peak times. A central part of the strategy for controlling this has been the use of parking policies. On-street parking controls were first introduced in the 1960's and the central on-road parking zone has been extended several times since 1982. Glasgow City Council has been able to use its position as operator of the majority of public car parking spaces to set parking charges at a level that does not penalise short and medium term shopping trips, but discourages all day commuter parking. The level of these charges is reviewed annually by the council to ensure these aims are being met and increased where necessary.

While the council has control over public car parking spaces, it currently has very little control over private parking spaces within the city. It is estimated that there are around 18,000 private workplace parking places associated with business and commerce. Workplace parking charges would allow parking levies to be applied to these premises and would extend the influence the council has long had over public parking, to those parking spaces not available to the general public, thereby having the means to further discourage all day commuter parking. However, there are concerns as to how the application of such charges would affect the economic and social aspects of city development.

It was unclear what impact workplace charging would have on the economic and social development of the city. Therefore, a consultant was engaged by Land Services in May 2000 to undertake a scoping study to investigate these issues. An appraisal was made of how a scheme would impact on traffic congestion, business, the public sector and transport investment.

The consultant returned a final report in January 2001, which concluded that:

" Overall it is concluded that a workplace parking levy scheme could be implemented within Glasgow city centre within six years, and it would be likely to provide useful traffic reduction and decongestion benefits. A levy would also provide a significant revenue stream which could enable a wide range of transport schemes to be implemented.

Current concerns regarding enforcement of schemes will be addressed on a national basis, as experience is gained elsewhere in the UK. Other issues relating to political, business and community acceptance can be overcome with the right package of scheme concessions, travel improvements, effective communication and genuine consultation."

The Transport (Scotland) Bill received Royal Assent on 25 January 2001, and is now known as the Transport (Scotland) Act 2001. During stage 2 of the Scottish Parliament's consideration of the Bill, provisions enabling the introduction of workplace parking levies were withdrawn from the Bill. Glasgow City Council has therefore been forced to postpone consideration of a workplace parking levy, until such time as enabling legislation is re-introduced.

A report to the Land Services Committee on 1st May 2001 detailing the main provisions of The Transport (Scotland) Act notes that the proposed legislation on The Workplace Parking Levy has been dropped.

Control of this Option

The Transport (Scotland) Act 2001 does not contain any provision for local authorities to introduce workplace charging schemes. Legislation from the Scottish Parliament would be required to allow such a scheme to be implemented.

Potential Positive and Negative Effects on Non-Air Quality Issues

- ✓ Complements existing Glasgow City Council policy on parking
- ✓ Increased pedestrian safety due to less traffic
- ✓ Less road traffic noise
- ✓ Less congestion and improved journey times
- ✓ Revenue can be invested in public transport improvements
- × Considered to be unpopular with the general public and businesses

Cost and Feasibility

Feasible only if legislation introduced. High cost for implementation.

Timetable

It is estimated that the action would take at least 6 years to implement.

Predicted Impact on Air Quality

If implemented, it is predicted that the action could have a medium impact on air quality.

7.0 Summary of Actions Table

CONFIRMED ACTIONS

Action Category	Action	Regulatory	Control of Action	Estimated Cost	Timescale	Predicted air quality impact
Local Transport Management	Proposed M74 Extension		Scottish Executive, Glasgow, Renfrewshire and South Lanarkshire Councils	High cost. Feasible, subject to public local inquiry	Construction complete by end of 2008	Reductions in NO ₂ of between 1 and 50µg m ⁻³ on several roads and sections of the M8 within the AQMA
	East End Regeneration Route		Glasgow City Council, Scottish Enterprise and others	High cost. Project feasible, though not by 2005	Potential to be completed by 2008	Low localised reductions in NO _x
	Variable Message Signs		Glasgow City Council, Scottish Executive	Low cost. Feasible if funding acquired	Not known	Low impact on air quality
Public Transport	Quality bus Corridors/Bus Information & Signalling System		Glasgow, West Dunbartonshire and South Lanarkshire Councils and First Glasgow	Total cost of scheme estimated at over £30 million. Feasible and work ongoing	Some routes operational by 2005	Low reduction of NO _x within AQMA
	Park & Ride Schemes		Glasgow City Council, SPT, other local authorities	Total estimated cost £4.6 million. Feasible when additional funds secured.	Project due to be completed by autumn 2005.	Low reduction of NO _x within the AQMA
	Larkhall to Milngavie Rail Link		SPT, Scottish Executive, South Lanarkshire Council	Estimated cost £35 million. Feasible	Due to be completed by 2005	Low reduction of NO _x within the AQMA
	Cycling and Walking Strategies		Glasgow City Council and others	Overall cost not known. Feasible	Work ongoing, due to be over next 10 years	Low reduction of NO _x within the AQMA
	School Travel Plans		Glasgow City Council, Schools, Parents	Overall cost not known. Feasible	Ongoing project	Low reduction of NO _x within the AQMA
Parking and Fiscal Measures	Vehicle Emissions Testing/Idling Vehicles	√	Glasgow City Council, Scottish Executive	Initial grant of around £200,000 per annum (2003-2005). Feasible	Work ongoing	Low reduction of NO _x within the AQMA
Other Air Quality Enforcement Work	Smoke control and Clean Air Act 1993	√	Glasgow City Council	Included in Council's budget. Feasible	Work ongoing	Low reduction of NO _x within the AQMA
	Statutory Nuisance and Environmental Protection Act 1990	√	Glasgow City Council	Included in Council's budget. Feasible	Work ongoing	Low reduction of NO _x within the AQMA
Non-Road Based Emissions Sources	Commercial & Domestic Sources	√	Glasgow City Council and others	Low cost. Feasible through grants	Work ongoing	Low reduction of NO _x within the AQMA
	Industrial Sources	√	SEPA, Glasgow City Council	Low cost. Feasible	Work ongoing	Low reduction of NO _x within the AQMA
Glasgow City Council Leading by Example	Vehicle Emissions Testing of Council Fleet		Glasgow City Council	Low cost. Feasible	Work ongoing	Low reduction of NO _x within the AQMA
	Alternative Fuels		Glasgow City Council	Feasible through grants	Work ongoing	Low reduction of NO _x within the AQMA
	Green Travel Plans		Glasgow City Council	Cost not known. Feasible	Work ongoing	Low reduction of NO _x within the AQMA
Education and Awareness Raising	Glasgow City Council Website		Glasgow City Council	Cost not known. Feasible	Work ongoing	
	Walk to School Week		Glasgow City Council	Cost not known. Feasible	Work ongoing	Low reduction of NO _x within the AQMA
	Car Free Day		Glasgow City Council	Cost not known. Feasible	Work ongoing	
Air Quality Monitoring	Air Quality Monitoring	√	Glasgow City Council	Feasible utilising existing equipment and through grants for new equipment	Work ongoing	

ACTIONS STILL UNDER CONSIDERATION

Action Category	Action	Regulatory	Control of Action	Estimated Cost	Timescale	Predicted air quality impact
Local Transport Management	M8 Motorway	√	Scottish Executive	Cost not known	No action feasible at the present time	No action feasible at the present time
	Clyde Corridor Transport Study		Glasgow City Council and SPT	Cost estimated at £156 million at 1998 prices. Feasible if funding acquired	Potential to be completed by 2010	Neutral effect on air quality
Public Transport	Crossrail Technical Feasibility Study		SPT and others	Overall cost not known. Feasible if funding secured	Potential to be in place by 2009	Low reduction of NO _x within the AQMA

ACTIONS NOT CONSIDERED FEASIBLE AT THIS TIME

Action Category	Action	Regulatory	Control of Action	Estimated Cost	Timescale	Predicted air quality impact
Local Transport Management	Low Emission Zone	√	Glasgow City Council	Estimated to cost £1-2.5 million to set up, with annual running costs of £2-3 million.	No action feasible at the present time	Potential reduction in NO _x emissions of 3.63% (Medium impact)
Parking and Fiscal Measures	Road User Charging	√	Glasgow City Council, Scottish Executive	Cost not known.	No action feasible at the present time	Potential low to medium impact on air quality
	Workplace Parking Charges	√	Scottish Executive, Glasgow City Council	Cost not known	No action feasible at the present time	Potential medium impact on air quality

8.0 Conclusions

This Air Quality Action Plan has outlined and assessed current and future initiatives and actions that have been considered by Glasgow City Council as a means of reducing emissions of Oxides of Nitrogen (NO_x) from within the declared Air Quality Management Area. Actions were assessed in terms of their feasibility, timescale, cost, as well as the predicted air quality impact.

The actions identified relate to local transport management, public transport, parking and fiscal measures, air quality enforcement work, non-road based emissions sources, Glasgow City Council leading by example and education and awareness raising.

It is estimated that a reduction of up to 70 % in NO_x emissions will be required to meet the NO₂ annual objective in some locations within the AQMA by 2005. Although, as this includes numerous Kerbside locations, it is predicted that a lower reduction in NO_x emissions would be required to achieve the objective at most locations that are relevant for public exposure.

Glasgow City Council's Air Quality Action Plan has indicated that the actions in place by 2005 will potentially reduce NO_x emissions within Glasgow's AQMA by up to 11 %. This is in addition to the 12 % reduction in NO_x emissions that is predicted to occur without any intervention by 2005. Consequently, these figures indicate that although a significant improvement in local air quality is expected, Glasgow is unlikely to achieve the National Air Quality Strategy Objectives for NO₂ at all locations across the AQMA by 2005. This is in line with the situation in many large urban areas elsewhere in Scotland and throughout the UK.

In addition to actions that will be implemented by 2005, Glasgow City Council's Air Quality Action Plan also lists actions that are due to be implemented in the near future and others that require further consideration. These include major developments such as the proposed M74 extension and actions that target air quality improvements more directly. It is predicted that the implementation of such actions would make a more significant contribution to reducing NO₂ concentrations within the AQMA and aid the achievement of the Air Quality Strategy Objectives for NO₂ in future years.

Following a public consultation exercise on the Draft Air Quality Action Plan, a number of issues were identified as being significant and which warranted further work and consideration as a means of progressing the Action Plan agenda and bringing about further improvements in air quality within Glasgow and the AQMA. The City Council would wish more detailed and wider consideration of a number of issues including:

- The development of partnership working to achieve objectives;
- Workplace Parking Charges;
- Encouraging greater use of public transport;
- Lobbying to include NO_x in the MOT test;
- Petitioning for tighter regulation of buses;
- Lobbying for tighter regulation of taxis and their emissions;
- Engagement with the Scottish Executive on actions concerning the M8 and M74 that will have a positive impact on air quality without harming investment in Glasgow;

- Encouraging clean technology and a reduction of emissions from heavy goods vehicles;
- Encouraging the UK Government to provide a clearer message on the use of alternative fuels, e.g. long term tax incentives;
- Encouraging investment in public transport infrastructure in the west of Scotland to encourage a modal shift from cars to public transport;
- National action to change from older, polluting vehicles to newer, cleaner vehicles within the private fleet.

Development of partnership - Glasgow City Council intends to engage with key partners to assist in driving forward the process of improving air quality across Glasgow as a whole, as well as in the AQMA. Improving public transport and speeding up the modal shift from private to public transport will be a central issue. Getting people to use public transport instead of their cars will help to reduce NO_x emissions. However, it is also important to ensure that public transport is as un-polluting as possible and uses up-to-date technology to reduce emissions. In terms of achieving modal shift, the message from the public is that public transport must be convenient, safe, secure and reliable. At present, the car is often more attractive. Expansion of park & ride facilities in areas further out from Glasgow itself is also a key issue and must tie in with bus routes, e.g. QBC's, as well as train stations.

Direct contact between relevant Council Services and external agencies, such as SPT, Westrains and the Scottish Executive will assist with this agenda. It is too early to specify a detailed programme for any discussions and subsequent action, but this could be expanded upon in any follow up reports to this initial Air Quality Action Plan.

As outlined in earlier sections of this Action Plan, regular meetings and liaison has taken place between relevant Council Services in order to formulate the Plan. From time to time, other relevant external agencies were involved in the process. This process of co-operation and collaboration will continue, but will be extended to ensure closer working with relevant parties to achieve the future objectives identified above. Glasgow City Council will also continue to lead by example, for in order to secure effective partnership, the Council must be seen to be doing all it can itself.

Glasgow already has an extensive network of equipment for measuring and monitoring of air quality. However, this situation is constantly under review and more equipment will be acquired as necessary to assist with this process. Glasgow City Council applies for capital consent funding from the Scottish Executive to assist in the purchase of new monitoring equipment. Already in 2004, extra NO₂ diffusion tubes have been located in relevant locations in the city to assess levels in known problem areas. In addition, a new compact roadside unit, containing real time analysers for NO_x and PM₁₀, is due to be purchased that will further aid this process. This equipment will not only help to assess problem areas within the city, it will also help in assessing any improvements in air quality brought about as a result of the actions contained within this Plan, and any further actions that are implemented in the future.

Another theme to be developed in the future involves taking air quality into account in the planning process, to ensure that new developments do not significantly lead to adverse air quality effects within the AQMA. The Council intends to examine which developments are significant in terms of increased air pollution and what mitigating

measures can be included in consent for new developments. More weight may need to be given to air quality considerations where a development would have a significant, adverse impact on air quality within the Air Quality Management Area than where the air quality effects of the development are likely to be minimal. All applications for development within the AQMA should include sufficient information to allow a full consideration of their likely impact on local air quality. Therefore, it is important that developers are aware of the AQMA in the city centre. We will also investigate whether in some circumstances the developer could fund mitigating measures elsewhere inside the AQMA to offset any increase in local emissions as a consequence of the proposed development, or to pay for the purchase of monitoring equipment. These measures could be introduced through Section 75 agreements.

It is also vital to further develop the education and awareness theme. The public consultation exercise for the Action Plan helped to raise the profile of air quality issues in Glasgow. This is in addition to the publicity campaign for vehicle emissions testing and enforcement of legislation relating to idling vehicles. It is necessary to build on this and take the message to as wide an audience as possible to engage with the public and get across the importance and health benefits associated with improving air quality within Glasgow. After all, this process is not just about complying with Government objectives, it is about improving and protecting public health and providing a safe environment for the people who visit, work and reside in Glasgow.

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Appendix 1: Summaries of Existing Plans and Policies

Glasgow City Council's Air Quality Action Plan does not exist in isolation but supports and includes existing and forthcoming policies proposed by the Council and other statutory bodies. The documents listed below contain information of projects likely to influence air quality in Glasgow directly or indirectly. These documents provide additional support to Glasgow City Council's Action Plan.

- New Deal for Transport: Better for Everyone (1998)
- Travel Choices for Scotland (1998)
- National Planning Policy Guidance (NPPG17): Transport and Planning (1999)
- 'Route map' for Future of Transport in Scotland (2002)
- Glasgow and Clyde Valley Joint Structure Plan (2000)
- Strathclyde Passenger Transport's Strathclyde Public Transport Strategy: 'Getting People Places' (2000)
- Local Transport Strategy 2001 to 2004 – Keep Glasgow Moving
- Glasgow City Plan (2003)
- Park and Ride In Scotland (1999)
- Transport in the Urban Environment (1997)
- City Centre Millennium Plan (1995)
- Glasgow Access and Walking Strategy (2004)

1.1 A New Deal for Transport: Better for Everyone (1998)

The UK Transport White Paper: A New Deal for Transport: Better for Everyone (1998) outlines the government's current transport plans and strategies, with a primary aim being to provide a transport system that is safe, efficient, clean and fair. The White Paper sets out the Government's transport policy and it has been followed by the publication of a number of related papers consulting on a variety of transport issues, leading to the publication of the Integrated Transport Bill in February 2000.

It set out a new approach to transport policy that has relevance throughout the United Kingdom, and it embodied modern thinking on integrating transport with other aspects of Government policy. It recognised that different parts of the UK have differing transport needs. Scotland, Wales and Northern Ireland were able to consider their own transport priorities. The Scottish Office consequently published a Transport White Paper for Scotland, "Travel Choices for Scotland", alongside the main White Paper.

1.2 Travel Choices for Scotland (1998)

The White Paper: Travel Choices for Scotland (1998) outlines the Scottish Executive's national transport strategy for Scotland. This document outlines how the national transport policy can be applied to Scotland, and establishes the policy framework for transport in Scotland within which local authorities will need to operate. The document outlines an integrated transport policy that includes:

- A balanced package of measures to develop a sustainable, effective transport system appropriate for the needs of the Scotland's population, economy and environment
- Local solutions to local problems, involving partnerships between local communities, business and transport operators, and where appropriate, neighbouring authorities.
- Integration within and between different modes of transport, enabling people and goods to move easily between them and thus ensuring that each contributes to its full potential.
- Integration of transport with the environment – so that transport choices support environmental improvement
- Cooperation between transport and land-use planning at national and local levels, to support sustainable travel choices and reduce the need to travel
- Integration of transport and policies for education, health and wealth-creation to make a fairer, more inclusive society

1.3 National Planning Policy Guidance (NPPG17): Transport and Planning (1999)

The National Planning Policy Guidance (NPPG17) is intended to develop the integrated land use and transport planning elements of the White Paper policy package and is accompanied by a Planning Advice Note (PAN 57 Transport and Planning). The

document illustrates that the Government's commitment to putting sustainable development at the heart of policy making, and consequently, the NPPG document promotes an integrated approach to land use, economic development, transport and the environment.

For local authorities, the document implies the need for policy coordination between departments to enable issues to be dealt with corporately. The policy therefore raises the challenge to provide an improving transport system to support economic growth, whilst ensuring better protection of the environment and improving the quality of life. The document outlines numerous issues and guidelines pertaining to sustainable development and primarily aims for:

- Better integration between different modes of transport; and
- Consideration of transport, economic development and land use to enhance the quality of urban life and the viability of town centres

Therefore, NPPG17 recognises the need to consider both land use and transport policies together, as issues that are crucially linked in a society that makes increasing demands for mobility.

Environmental issues (e.g. local air quality and climate change) are also a key consideration within NPPG17 and have an important influence on transport policy. Particularly relevant to Glasgow's City Council's Action Plan, the document states that 'When preparing development plans and considering planning applications, authorities should have regard to the statutory air quality objectives, together with the results of air quality reviews and assessments and any Air Quality Management Area Action Plans.

1.4 'Route map' for Future of Transport in Scotland (2002)

The 'Route map' for future of transport in Scotland (2002) was published in March 2002 with the aim of tackling congestion, improving public transport services and completing vital missing links. The document states that Scotland's overriding transport challenge was seen to be the need to tackle congestion in and around Scotland's major metropolitan areas.

The Executive stated that 'congestion is hampering our economy and damaging our environment.....costing both time and money, causing stress, increasing emissions and reducing the quality of life of millions of Scots daily'.

The document further notes that public transport systems cannot cater effectively for the travel requirements of the population of Scotland.

1.5 Glasgow and Clyde Valley Joint Structure Plan (2000)

The Glasgow and Clyde Valley Joint Structure Plan 2000, provides the context for the City Plan transport aims. Glasgow is at the centre of a broad corridor of growth proposed along the central transport corridor from Greenock to Newhouse. The corridor of growth is central to the Metropolitan Development Strategy that seeks to

achieve sustainable development. In support of the strategy the Joint Structure Plan seeks to promote:

- The strategic management of travel demands, which relates to the selection of sustainable locations for development, the management of movement along the strategic transport corridors and the preparation of town centre action plan.
- The investment in the strategic transport network, which relates to key priorities for walking, cycling, road and public transport.

The policies included in the Joint Structure Plan also reflect the need for sustainable transport such as improved access between work and home and an increase in the proportion of goods moved by rail.

1.6 SPT's Strathclyde Public Transport Strategy 2000

The Strathclyde Public Transport Strategy 2000 document is aimed at supporting sustainable transport policy and states that it is important to maximise the interchange between public transport and other modes of travelling such as foot, cycle and car. Furthermore, the document emphasises the importance of selecting suitable locations for park and ride facilities in order to provide conveniently located parking for motorists and thus aid the transition to public transport services.

The documents 'New Deal for Transport', 'Travel Choices for Scotland' and the National Planning and Policy Guidance (NPPG17) on Transport and Planning all state the need to consider both land use and transport policies as one. This is particularly relevant when considering the long-term implications of transport within a society making increasing demands for mobility.

1.7 Local Transport Strategy 2001 to 2004 – Keep Glasgow Moving

Glasgow City Council's Local Transport Strategy (2001-2004) outlines the Council's transportation policies and their links to other social, economic, health, education and environmental policies. The strategy aims to meet the challenge of providing a sustainable transport system that will enhance the economic, environmental and social success of the city.

The strategy recognises Glasgow's central position in Scotland's transport corridor and aims to balance the need to support economic growth and the increasing demand for travel, whilst protecting the future quality of life and health of its citizens. Key proposals include:

- The Millennium Plan for Glasgow City Centre
- Quality Bus Corridors
- Car Parking levies to reduce long stay commuter traffic
- Road Safety and Education
- Encouragement of sustainable modes of transport e.g. cycling, walking and public transport
- Use of Intelligent Transport Systems

The Local Transport Strategy has been developed to reflect European and Government legislation as well as liaison with other organisations and local authorities.

In July 1998 the government's White Papers '**A New Deal for Transport**' and '**Travel Choices for Scotland**' were published. The Scottish Executive provided a new draft National Planning Policy Guidance (NPPG) on Transport and Planning recognising the important linkages and the need to consider both land-use and transport policies as one when considering long-term strategic implications of transport within a society with increasing demands for mobility.

The Scottish Executive encouraged each Local Authority to develop a Local Transport Strategy, a comprehensive document which looks forward 20 years and is prepared with an input from all Council services and Council partners. The strategy developed has to set out priorities for development of integrated policy that is consistent with the Government's overall sustainable development objectives. The document provides policies and measures that will be carried forward for the period 2001-2004 with anticipated development along the same policy direction to 2005-2010. The strategy is a long term one, which it is envisaged, will carry Council policies forward to 2020.

In 1998, following extensive public consultation, Glasgow City Council produced '**Keep Glasgow Moving**' which detailed the transport strategy. This listed the policies to carry forward the strategy of restraining car commuting and promoting sustainable transport modes for the benefit of all Glasgow citizens and visitors. This visionary document was produced prior to Government guidance requesting a Local Transport Strategy, hence '**Keep Glasgow Moving**' was reviewed and updated during 1999 and submitted to the Scottish Executive in July 1999 as the Interim Local Transport Strategy.

In developing Glasgow's strategy it is necessary to be aware of the general aims and objectives of the UK and Scottish Parliaments and the various policy documents and guidance notes produced by them. At the European level, directives and other papers such as Local Agenda 21 are also recognised.

The Local Transport Strategy establishes Glasgow's transport policies to carry the city through the beginnings of this new millennium. Transport issues over the past 40 years have been dominated by the increases in personal mobility, the growth in car use, the love affair with the car and the ever-lasting struggle to build our way out of congestion. Latterly, issues of sustainability have come to the fore, as it is no longer possible to accommodate the increase in car use and the resultant problems of pollution, congestion and road safety.

The vision is to provide a sustainable transport strategy for Glasgow that will enhance the economic, environmental and social success of the city to give people a choice of travel mode; a place where people can walk safely and freely and with pedestrian areas developed to their full potential; a city where travel choice information is readily available and that which is accessible for business, shoppers, residents and tourists.

The issues the strategy aims to address are sustainability, health, social inclusion, integration between land use and planning, education and economic development.

The key objectives of the transport strategy can be broken into three categories: Management, Maintenance and Development.

Management of the network is a key area where delivery of the sustainable transport vision will take place. The strategy aims to promote and encourage sustainable modes of transport, restrain the demand for travel by private cars for commuting, encourage public transport operators to provide high standard service, reduce accidents and provide advanced transport and travel choice information - **aims:**

- Hierarchy in place that makes best use of existing roads for all users.
- Managed road network that gives priority to all passengers and freight movements.
- Improve safety on the road network and reduce the number of accidents.
- Demand restraint measures mean commuting by private cars is a last resort rather than first choice.
- Public transport, walking and cycling are the modes used by commuters in the future.
- A high standard integrated public transport network that is used instead of the car for the majority of journeys.
- Provision of advanced traffic control and related traveller information systems that allow the existing road network to be managed efficiently and provide relevant information, permitting road users to make informed travel choices.

Maintenance is an essential on-going task. The local road network is a resource to be looked after and further developed and enhanced. The strategy aim is to ensure the general fabric of the network; lighting and structures are kept in a safe condition and to provide effective winter maintenance for the safety of all users. Of course, key issues with regards to delivery of the vision over the next 10 to 20 years will be funding and the issue of how Trunk roads are managed by the Scottish Executive - **aims:**

- Network maintenance work is required much less frequently than at present and, when required, is carried out with minimal disruption to vehicles.
- Structures, including bridges, are able to carry the loads required.
- Effective winter maintenance is provided for the safety of users.
- Street lighting is maintained to allow for safe movement after dark.
- Signs and road markings are in place to facilitate safe movement of all users.

Development of the network entails a strategy which promotes sustainable transport, improves the road network where necessary to support public transport services, economic and social development, and improves the pedestrian environment and facilities to encourage more activity on foot - **aims:**

- A road network in place that supports sustainable economic and social development.
- Goods are moved efficiently thus contributing to a vibrant commercial city.
- People travel safely, efficiently and happily on an effective, integrated public transport network using road, rail and water with good links between modes and to the national network.

- Cycling is regarded as a serious means for commuting as well as for short journeys with citizens and visitors enjoying leisure time on the city's extensive cycle network.
- Glasgow has a high quality environment in which people shop, work and spend their leisure time.
- Funding from external sources and through partnerships is maximised.
- All new developments are sustained in transport terms.
- Transport needs of all sectors are catered for, including mobility impaired.
- The design of works meet all appropriate standards.
- Emergency situations are responded to effectively.

The main aims of this transport strategy are to make Glasgow a more pleasant, vibrant, safe and healthy city in which to live, work and visit and to encourage sustainable economic growth in both the local and international setting.

1.8 Glasgow City Plan (2003)

The Council's planning framework for reinforcing Glasgow's place in the national and regional economy is delivered through the Development Plan, comprising the Glasgow and the Clyde Valley Joint Structure Plan (the Joint Structure Plan) and the City Plan. The Joint Structure Plan sets out the strategic framework for development in eight contiguous local authorities. More detailed guidance on the shape, form and direction of development in Glasgow is delivered through the City Plan. The City Plan also provides the context for protecting and enhancing the built and natural environment, identifying planning action in the first five years and specifying appropriate locations for development, over 20 years, to 2021. The Plan is a vital element of the City's response to the challenges and opportunities that will emerge over the coming years. Its policies and proposals set the context for:

- securing positive change;
- encouraging creative development;
- providing certainty and continuity; and
- promoting confidence

In striving to achieve these aims, the Plan will be unconstrained by population and employment projections that are based on past performance. Targets have, therefore, been set that are aspirational but realistic.

The City Plan provides a focus for private sector investment and aspires to facilitate the convergence of all public sector programmes for physical change in the coming years. In relation to transport issues, the plan aims to address issues vital to economic development, social inclusion and land use.

More specifically, the Plan aims to maintain the vitality and attractiveness of the City Centre as a dynamic business, visitor, cultural and residential location by:

- i.) Promoting the City Centre as a competitive international business and commercial location.

- ii.) Sustaining the City Centre as the strategic focus for Glasgow, the Clyde Valley and the West of Scotland; and
- iii.) Enhancing the rich architectural heritage and physical environment of the City Centre.

It seeks to do this within the context of Scottish Planning Policy guidance and the other strategic documents of the Council and partner organisations.

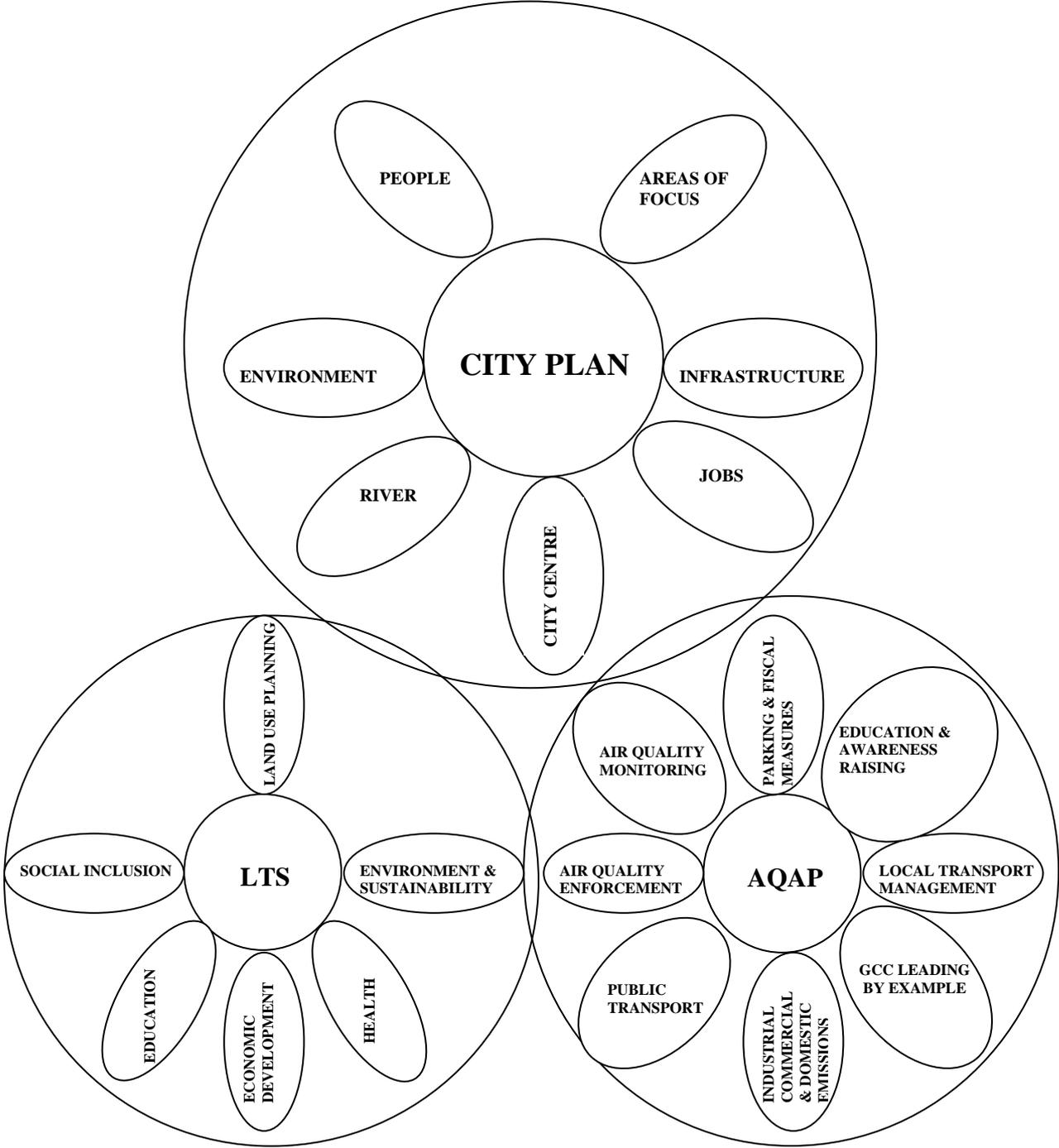
The City Centre's ability to generate further investment (more employment and higher income), however, can only be sustained if it is maintained and developed as a major transport and communications hub and if high environmental standards are achieved. Qualities which require constant attention if Glasgow is to maintain its position in the face of global competition for business and financial investment.

The Council, public agencies and the private sector each have a crucial role to play in supporting and assisting this process. To this end, the City Plan seeks to improve the City's transport infrastructure by supporting a range of proposals including new rail stations, quality bus corridors, the M74 completion, the East End Regeneration Route, walkways and cycle-ways.

Measures that seek to remediate issues such as air quality, therefore also have an important role to play within the delivery of this strategy. This is recognised within the recent guidance from the Scottish Executive 'Air Quality and Land Use Planning' (2004) which looks at some of the main ways that land use planning can help deliver air quality objectives. To this end, the City Plan will seek to impact positively on air quality issues through a range of policies and proposals which include green travel plans, transport assessments, parking controls and accessibility analysis.

As outlined above (Sections A1.7 and A1.8) and in the following illustration, Glasgow's Air Quality Action Plan is inextricably linked with both the City Plan and the Local Transport Strategy (LTS). Both the City Plan and the LTS target improvements in environmental conditions within their remits, whilst the Air Quality Action Plan is primarily aimed at addressing issues that will lead to improvements in environmental conditions and public health. In addition, all three documents cover several common elements such as infrastructure and economics. Consequently, Glasgow City Council's Air Quality Action Plan has taken into consideration and included all factors and developments that are integral to both the City Plan and the Local Transport Strategy within its remit. There is thus significant overlap between the City Plan, the Local Transport Strategy and the Air Quality Action Plan.

Illustration: The influence of Glasgow’s City Plan, the Local Transport Strategy (LTS) and the Air Quality Action Plan (AQAP)



1.9 Park and Ride in Scotland (1999)

The Research Paper 'Park and Ride In Scotland' produced by the Central Research Unit of The Scottish Executive in 1999 defined Park and Ride as a traffic management tool involving the provision of parking spaces on the outskirts of an urban area or in the vicinity of a trip generator for use by motorists as an alternative to driving into a town/ city centre to park. The motorist then travels between the park and ride site and the associated centre by public transport, therefore improving accessibility to the centre.

The paper lists the 'carrot and the stick' as the biggest influence on the success of park and ride schemes. The 'stick' can be regarded as direct action taken to deter car use, or may be the result of an accumulation of indirect factors such as the lack of parking spaces or increased road congestion which encourage car users to find alternative means of making the trip. In contrast, the 'carrot' would be the authorities using their powers to make sustainable forms of transport more accessible and attractive.

1.10 Transport in the Urban Environment (1997)

The document 'Transport in the Urban Environment' produced by the Institute of Highways and Transportation (1997) stated the following as measures for successful park and ride schemes:

- Close to an interchange with a major highway to provide easy and safe access to car users
- Near the edge of a built-up area and beyond the usual limits of congestion
- Capable of offering a direct bus, tram, LRT or train service to the city centre, with priority segregation where necessary
- Accessible by regular bus, tram, LRT, or train services if special park and ride services are not operated all day
- Of compact layout, to limit the walking distance from parked cars to the public transport stop
- Furnished with relevant, up-to-date information, attractively displayed
- Equipped with good lighting and surfacing
- Designed to provide a high degree of personal and vehicle security

1.11 City Centre Millennium Plan (1995)

The vision of this plan, published in 1995, includes a comprehensive Public Realm Strategy dealing with the treatment of streets, precincts and other public and major private spaces within the city centre. The concept was to allocate more space within the city centre to pedestrians. Studies carried out in the early 1980's suggested that in order to attract new businesses to the city centre, its environment would have to be dramatically improved.

The Millennium Plan therefore aims to reduce the impact of traffic by removing unnecessary through movement within the City Centre, enabling measures to be implemented, such as major environmental improvements to the public realm in the main retail and pedestrian streets and squares, the creation of bus priority and the development of cycle routes. Other public transport proposals in the Millennium Plan include the implementation of Crossrail, (linking the north and south electric rail networks), the improvement of Buchanan Bus Station (complete), making existing rail stations more accessible, the expansion of park-and-ride and the introduction of the Strathclyde Tram.

The City Centre Millennium Plan also recognised that a range of traffic and transport related issues had to be tackled to help the city centre to flourish: traffic on some routes conflict with the needs of pedestrians leading to high accident levels, poor air quality and a generally unpleasant environment:

- inadequate footway widths at busy pedestrian locations, with insufficient priority given to pedestrians at road crossings
- a quality of streetscape below desirable standards in many places
- a lack of measures to assist cyclists
- a need for increased promotion of park and ride, walking and cycling as alternatives to car use
- conflicts between heavy traffic flows and main bus movements through the city centre
- car drivers adding to general congestion by driving around the city centre looking for parking spaces
- a need for better access by public transport to certain areas within the city centre

The Millennium Plan therefore had the intention of providing easy access to the city centre in a way that will support the effective functioning of existing and potential business and creating a sustainable environment. In terms of transport, this means a heavy reliance on the use of public transport, rather than the car. The Millennium Plan targets were to:

- extend pedestrian priority areas by at least 50%
- develop a 20km network of walkways
- improve bus journey times by at least 30%
- reduce accidents associated with bus travel by at least 50%
- provide 12km of signed cycle routes through the city centre linking to the suburbs

- provide secure cycle storage
- reduce traffic in the core by at least 30%
- reduce fatal and serious accidents by at least 60%
- achieve, or better, EU standards for noise and air pollution
- increase the vitality and security of city centre streets by day and night
- improve the visual and physical quality of the streetscape, including lighting

The Plan aimed to deliver these targets through providing a better deal for pedestrians and cyclists, promoting public transport and accommodating essential vehicle access. Table 1.1 summarises the actions intended to implement these aims.

The Millennium Plan has made considerable progress in the improvement of the environment in the principal retail streets, the introduction of traffic management measures and the provision of bus priority. These programmes will continue with the introduction of further bus measures, including a traffic control system that will favour buses at junctions. Progress on the other aspects of the Millennium Plan, however, has been slow. Parliamentary Commissioners rejected the Strathclyde Tram light rail proposal and Strathclyde Passenger Transport (SPT) is in the process of considering alternative proposals. Crossrail is now being assessed against a more expensive option to link the north and south networks via a deep-bored tunnel and the outcome of studies into this and the light rail proposals is awaited.

Table 1.1 Summary of Actions for Millennium Plan

Action for Pedestrians & Cyclists	Action for Promoting Public Transport	Action for Vehicular Access
Wider footways	Rationalise bus routes, bus & taxi stances	Minimise long stay and maximise short stay parking
Extended pedestrian priority areas	Promote bus priority through the city centre	Discourage commuter parking by extending parking controls
Narrowing roads at crossing points	Development of driver and passenger information systems	Review resident parking needs
More 'green man' opportunities	Encourage park & ride	Introduce variable message signing of available parking spaces
Enhanced footway surfaces	Make existing railway stations more accessible	Discourage unnecessary travel within and through the city centre
Signposting of tourist attractions	Introduce Strathclyde Tram	Ensure access for servicing commercial, retail and residential properties
Improving street security with CCTV and improved lighting	Provide better information on routes and timings of public transport	Rationalise use of existing river crossings and review future needs
Traffic calming and 20mph zones	Introduce Crossrail connecting north & south suburban railways	Allow for current proposals and expansion of Strathclyde Tram network
Development of pedestrian & cycle routes for commuters & tourists	Improve Buchanan Bus Station	Provide flexible use of streets at different times
Provision of secure parking for cyclists		
Provision for cyclists at junctions		

1.12 Glasgow Access and Walking Strategy (2004)

The Aim of the Access Strategy: 'to provide a safe path network within Glasgow, to connect communities; and to enhance the quality of life for all residents and visitors.'

Legislation on land reform has recently been passed by the Scottish Parliament. When enacted in 2004, this will impose upon local authorities' access duties to plan path networks; publicise the Scottish Outdoor Access Code; and establish Access Forums. The aim of the legislation is to give the right of responsible non-motorised access over uncultivated urban and rural land and water.

The Access Strategy for Glasgow is based on a comprehensive audit, which identified locations that could benefit from improved links or new routes for walkers, cyclists and horse riders. It will in effect, also include the walking strategy for Glasgow, in conjunction with the City Council's Local Transport Strategy. The Strategy will also seek to improve access to water for non-motorised activities including rowing, canoeing and sailing where this can be provided safely without prejudice to other uses. The role of promoting responsible, safe access to water will be of particular importance.

Better paths will not only benefit people who wish to walk but will also benefit parents with buggies, people with disabilities, and those involved in recreational activities, such as riding, cycling, roller-blading or skateboarding. The Strategy, therefore, aims to:

- Reflect the views of the public;
- Pay particular attention to routes linking green spaces and watercourses;
- Guide and inform sustainable public access and accessible path networks;
- Identify and plan effective path routes in and around Glasgow;
- Examine user requirements and which type of use is acceptable; and
- Provide a plan for action.

In achieving all of the above, the strategy will promote the integration of social, health, educational, leisure and transport policies. It will also conform to, and promote Glasgow's Wildlife and Nature Conservation Policy and Local Biodiversity Action Plan.

Successful partnership working will be crucial in implementing the Strategy, and this will be achieved in conjunction with the work of the Access Forum, which has already been formed. The Forum comprises user groups, interest organisations, the health sector, the farming community, and land owning bodies. The Strategy details key themes, and guiding principals, identifies pilot study areas, and outlines a plan of action for the next five years.

Within the city itself there are 69 formal parks and many other areas of open spaces walkways and cycleways. Indeed, Glasgow is unique as it has so many picturesque long distance walkways and cycleways that make it possible to traverse the city in many directions without having to resort to travelling on the busy city streets. The access strategy will allow these unique facilities to be increased and improved. Access means many things to different people. It is access to the countryside. It is access from one district to another to allow people to interact and families to keep in touch. It is access to shops, workplaces either in the city centre or in suburban areas. It is also

access for people with mobility difficulties to allow them to travel around the city in a safe and accessible manner.

The Access & Walking Strategy develops four themes. The first **Building Healthy Communities**, examines the opportunities for active living through improvements to the path networks for walking, cycling and horse riding. The involvement of communities in planning path networks will support improvement of not just health but other factors affecting quality of life.

The second **A Safe and Attractive Glasgow**, examines the link between the public's perception of safety on the path network and their willingness to walk or cycle as part of their daily lives. The need to create a network that provides attractive connections between places that people want or need to visit is also recognised.

The third **Accessible and Active Urban Locations**, looks at the importance of providing good networks particularly within local communities that serve the needs of the widest range of users including those with disabilities, runners, horse riders, people with children and pushchairs. Within the city centre there is an opportunity to build upon improvements to the public realm and provide better connections for walking and cycling.

The final theme **Regeneration and Development**, proposes that by integrating access with new developments opportunities to benefit both existing communities and the future occupiers of the buildings can be exploited. This will require partnerships with other organisations from both the public and private sectors, and will be particularly important in large developments. This Access & Walking Strategy will contribute to the future development of the city, delivering the high quality of life that the people of Glasgow deserve.

Appendix 2: Consultation on the Draft Air Quality Action Plan

On the 1st July 2004, Glasgow City Council undertook an extensive 6-week consultation exercise whereby complete copies of the Draft Air Quality Action Plan and summaries together with questionnaires were distributed to external organisations and the general public.

During this period, complete versions of the Action Plan were distributed to statutory consultees. Consultation leaflets with freepost return envelopes were posted to addresses within Glasgow's AQMA, to community councils and also made available on the Council's Website, from Council offices and from libraries throughout the city.

Public awareness of the Air Quality Action Plan was raised through a series of radio advertisements and through displays that were set up in city centre libraries. In addition, Glasgow City Council conducted an Action Plan workshop to gain further feedback on the plan. The workshop was attended by numerous individuals and organisations with an interest in air quality within Glasgow including the Scottish Executive and SEPA. A summary of the workshop is presented on page 115.

Figure 2.1 Consultation Leaflet



2.2 Draft Air Quality Action Plan: Consultation Report

The following report summarises responses to the Draft Air Quality Action Plan that were received from the general public and representatives of various organisations during the official 6-week consultation period. In addition, Glasgow City Council received comments from the Scottish Executive, SEPA, SPT and the AA.

Consultation Questionnaire

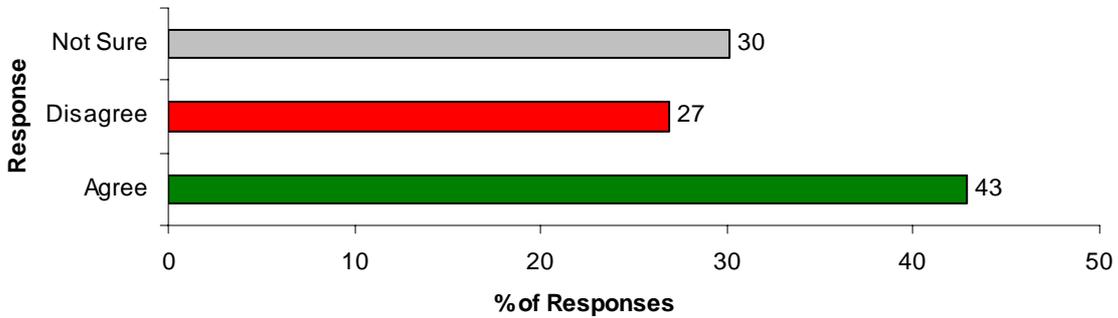
The Leaflet/ Questionnaire distributed during the consultation period outlined the main air quality problems currently encountered in Glasgow City Centre (AQMA), the sources of NO_x and the 15 main actions Glasgow City Council and other agencies intend to implement before the end of 2005 in order to improve air quality within the city. The Questionnaire sought opinions on each of the 15 actions (listed below), on whether the Action Plan identified all the actions needed to improve air quality in Glasgow; and comments on other actions that merited further investigation.

Actions

- Quality Bus Corridors
- Bus information and Signalling
- Variable Message Signs
- Expansion of Shields Road park and Ride
- Larkhall to Milngavie Rail Link
- Vehicle Emissions Testing
- Idling Vehicles
- Cycling and Walking Strategies
- School Travel Plans
- Air Quality Enforcement
- Commercial & Domestic Sources
- Industrial Sources
- Glasgow City Council Leading by Example
- Education and Awareness Raising
- Air Quality Monitoring

During the official consultation period, Glasgow City Council received 460 responses to the Air Quality Action Plan via post, email and phone. In general, the Action Plan was well received, with more than 40 % of the responses agreeing that the Action Plan identified all the actions needed to improve air quality within Glasgow (Fig. 1). **All values have been rounded up or down to the nearest whole percent; therefore addition of all responses may not total exactly 100 %.**

Figure 1. Response to Question: Do you think the Air Quality Action Plan has identified all the actions needed to improve air quality within Glasgow?

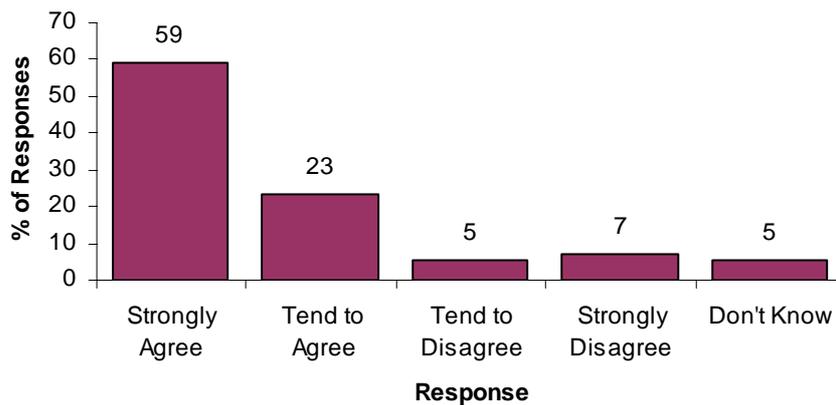


Responses to each of the 15 actions outlined in the action plan were more favourable and are outlined in Figures 2-16 below.

Quality Bus Corridors:

82 % of the responses strongly agreed or tended to agree that planned improvements of Glasgow’s Quality Bus Corridor network would assist in reducing emissions of NO_x within the AQMA. Only 12 % of responses disagreed that the QBC proposals would assist air quality improvements, and a further 5 % did not know.

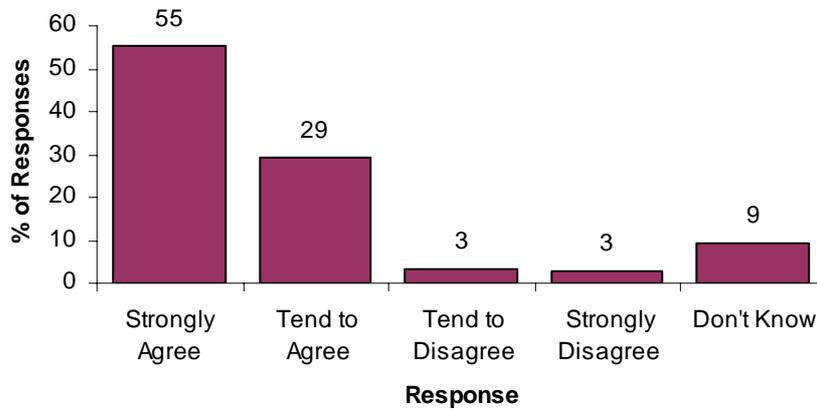
Figure 2. Response to Quality Bus Corridor Proposals



Bus Information and Signalling System (BIAS):

84 % of the responses strongly agreed, or tended to agree that the introduction of a Bus Information and Signalling System would assist in reducing emissions of NO_x within Glasgow’s AQMA. Only 6 % disagreed with the proposals and a further 9 % did not know.

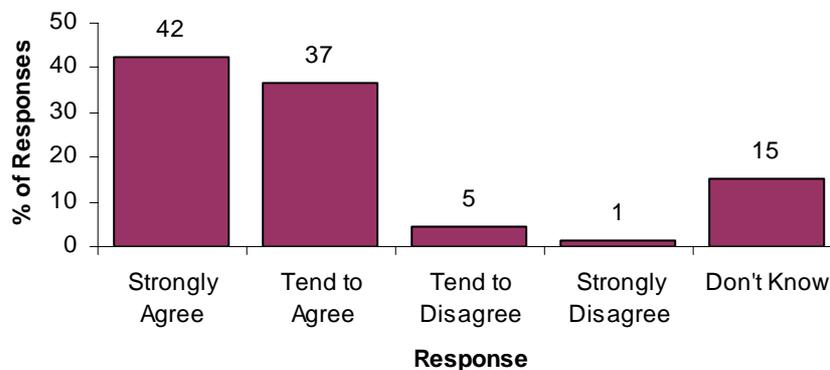
Figure 3. Response to BIAS Proposals



Variable Message Signs:

79 % of the responses strongly agreed, or tended to agree that the expansion of the variable message sign network linked to car parking space availability would assist in reducing emissions of NO_x within Glasgow's AQMA. Only 6 % disagreed that the proposal would have the desired impact and a further 15 % did not know.

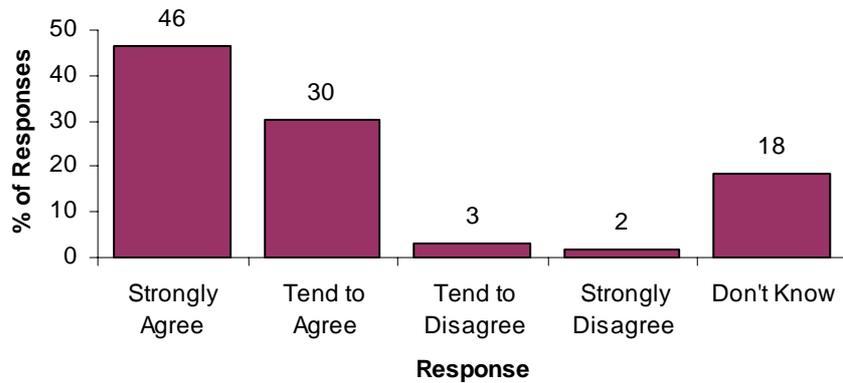
Figure 4. Response to Variable Message Sign Proposals



Expansion of Shields Road Park and Ride Facilities:

76 % of the responses strongly agreed, or tended to agree that the proposed expansion of the Shields Road Park and Ride facilities would assist to reduce emissions of NO_x within Glasgow's AQMA. Only 5 % disagreed that the proposal would have the desired effect and a further 18 % did not know.

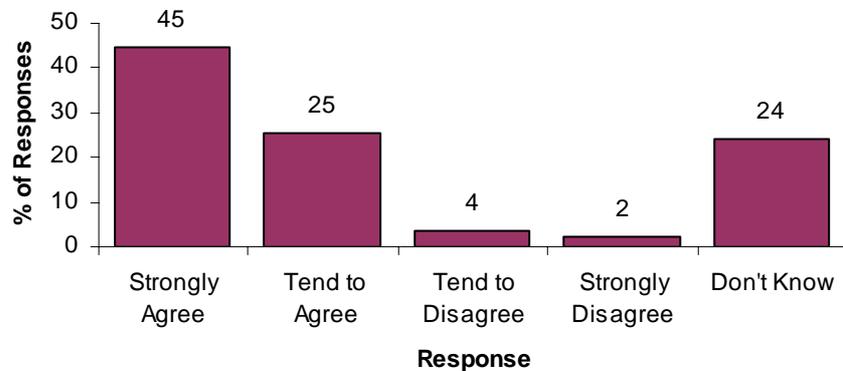
Figure 5. Response to Proposed Expansion of Shields Road Park and Ride



Larkhall to Milngavie Rail Link:

79 % of the responses strongly agreed, or tended to agree that the proposed Larkhall to Milngavie Rail Link would assist in reducing emissions of NO_x within Glasgow’s AQMA. Only 6 % disagreed that the proposal would assist in improving air quality and a further 24 % did not know.

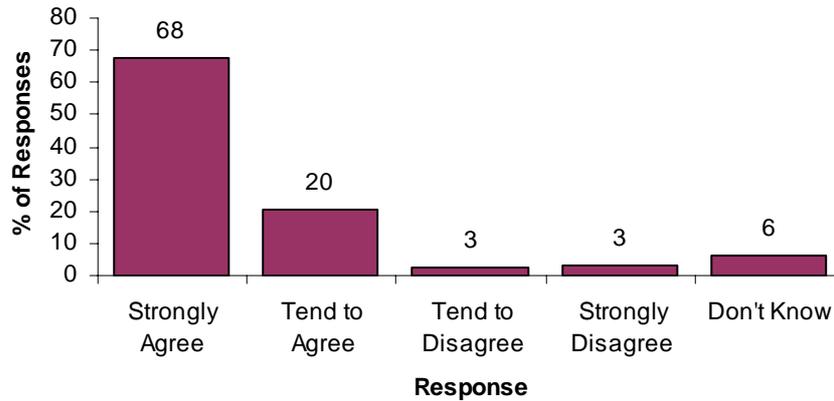
Figure 6. Response to Proposed Larkhall to Milngavie Rail Link



Vehicle Emissions Testing:

88 % of the responses strongly agreed, or tended to agree that Vehicle Emissions Testing would assist in reducing emissions of NO_x within Glasgow’s AQMA. Only 6 % disagreed that the measure would assist in improving air quality and a further 6 % did not know.

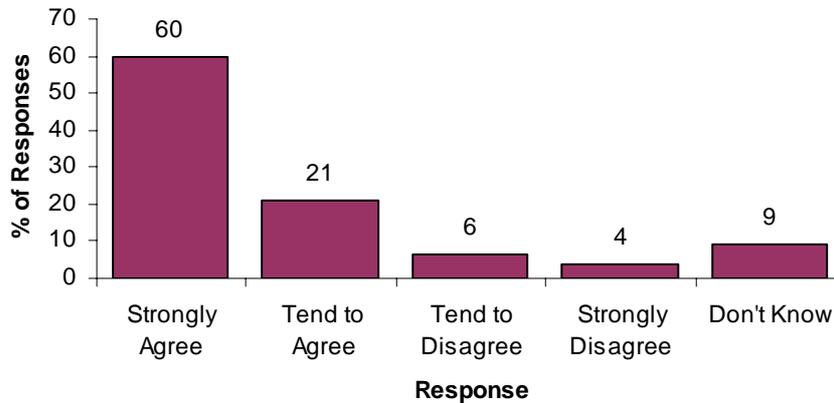
Figure 7. Response to Vehicle Emission Testing



Idling Vehicle Measures:

81 % of the responses strongly agreed, or tended to agree that measures to tackle emissions from stationary idling vehicles would assist in reducing emissions of NO_x within Glasgow’s AQMA. 10 % disagreed that the measures would assist in improving air quality and a further 9 % did not know.

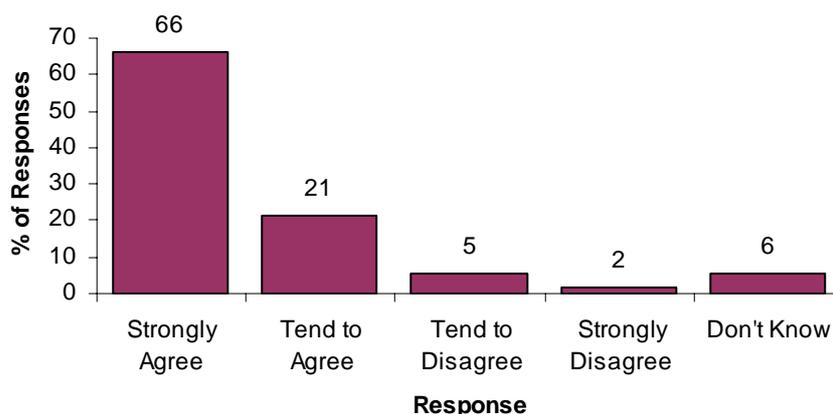
Figure 8. Response to Idling Vehicle Measures



Cycling and Walking Strategy:

87 % of the responses strongly agreed, or tended to agree that further development of the Cycling and Walking Strategy would assist in reducing emissions of NO_x within Glasgow’s AQMA. Only 7 % disagreed that the strategy would assist in improving air quality and a further 6 % did not know.

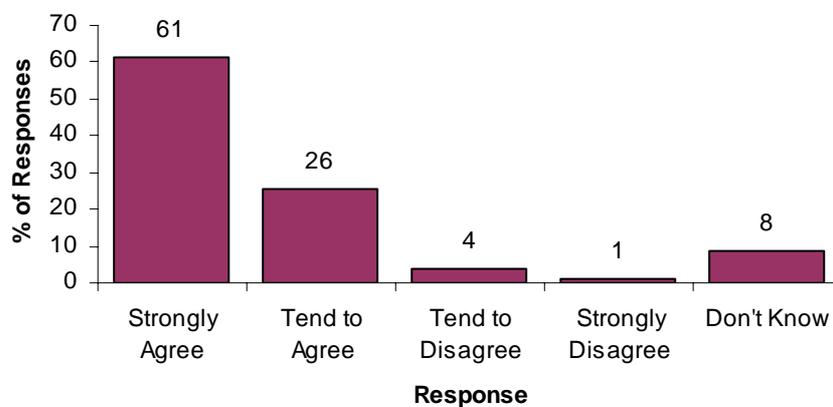
Figure 9. Responses to Cycling and Walking Strategy



School Travel Plans:

87 % of the responses strongly agreed, or tended to agree that the development of School Travel Plans would assist in reducing emissions of NO_x within Glasgow's AQMA. Only 5 % disagreed that the strategy would assist in improving air quality and a further 8 % did not know.

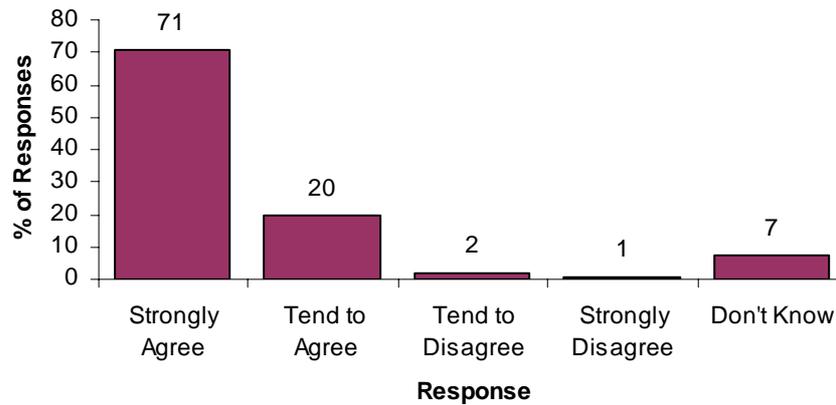
Figure 10. Responses to School Travel Plans



Air Quality Enforcement:

91 % of the responses strongly agreed, or tended to agree that strong enforcement of air quality legislation will assist in reducing emissions of NO_x within Glasgow's AQMA. Only 3 % disagreed that the strategy would assist in improving air quality and a further 7 % did not know.

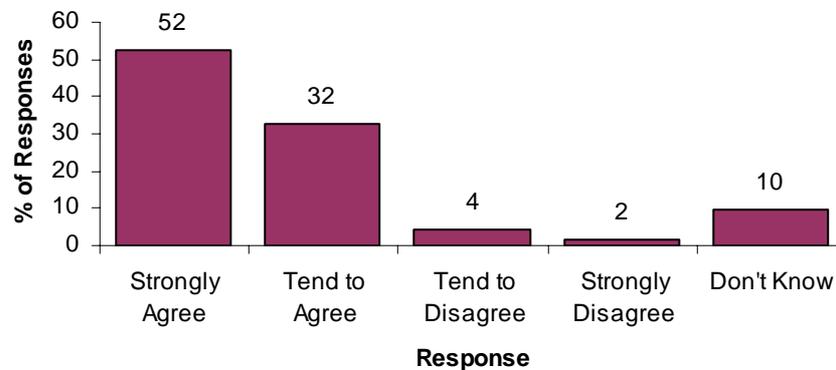
Figure 11. Responses to Air Quality Enforcement



Commercial and Domestic Sources:

84 % of the responses strongly agreed, or tended to agree that initiatives to promote energy efficiency will assist in reducing emissions of NO_x within Glasgow's AQMA. Only 6 % disagreed that the initiatives would assist in improving air quality and a further 10 % did not know.

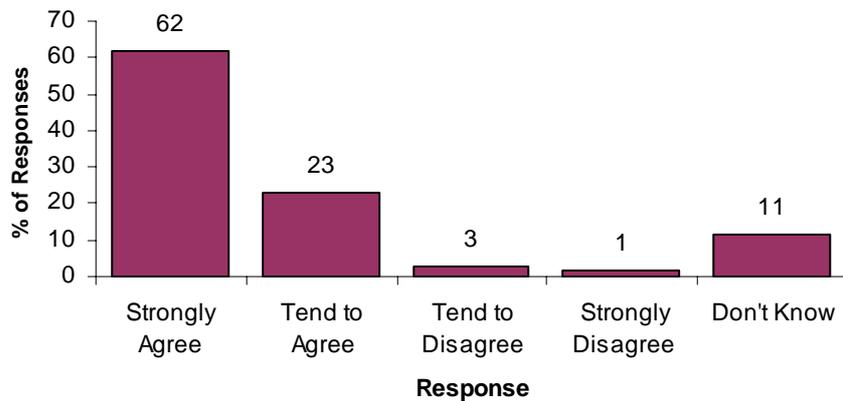
Figure 12. Responses to Commercial and Domestic Source Proposals



Industrial Sources:

85 % of the responses strongly agreed, or tended to agree that enforcement of legislation to reduce emissions from Industrial Sources will assist in reducing emissions of NO_x within Glasgow's AQMA. Only 4 % disagreed that the action would assist in improving air quality and a further 11 % did not know.

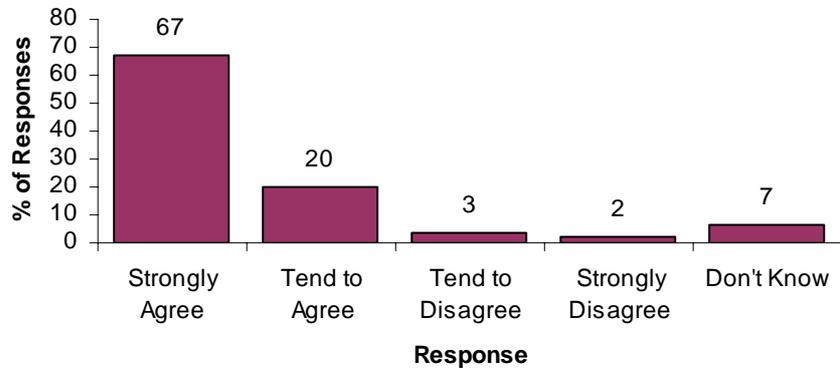
Figure 13. Responses to Industrial Sources Proposals



Glasgow City Council Leading by Example:

87 % of the responses strongly agreed, or tended to agree that Glasgow City Council Leading by Example will help to reduce emissions of NO_x within Glasgow's AQMA. Only 5 % disagreed that this action would assist in improving air quality and a further 7 % did not know.

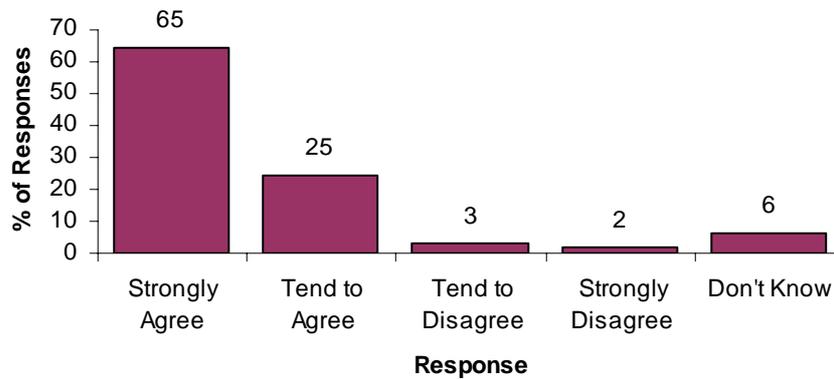
Figure 14. Responses to Glasgow City Council Leading by Example



Education and Awareness Raising:

90 % of the responses strongly agreed, or tended to agree that further Education and Awareness Raising of air quality issues would help to reduce emissions of NO_x within Glasgow's AQMA. Only 5 % disagreed that this action would assist in improving air quality and a further 6 % did not know.

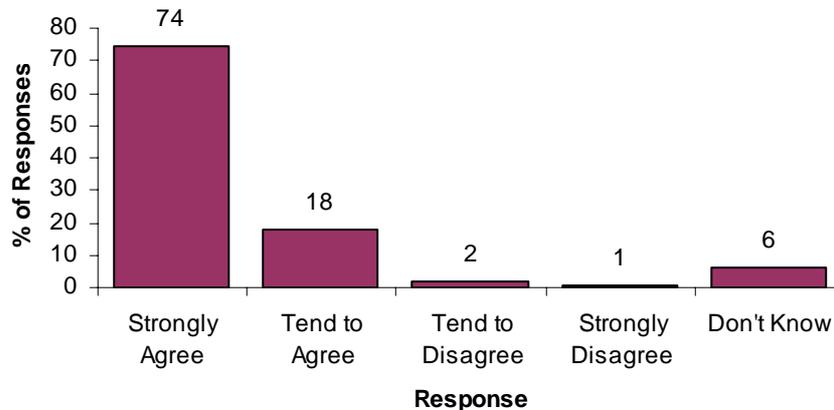
Figure 15. Responses to Education and Awareness Raising



Air Quality Monitoring:

92 % of the responses strongly agreed, or tended to agree that the continued Monitoring of Air Quality within Glasgow would assist the aim of reduce emissions of NO_x within Glasgow’s AQMA. Only 3 % disagreed that this action would assist in improving air quality and a further 6 % did not know.

Figure 16. Responses to Air Quality Monitoring



Comments and Suggestions

In addition to asking for opinions on the actions Glasgow City Council is taking to improve air quality within Glasgow’s AQMA, the Air Quality Action Plan Questionnaire asked for additional comments and other actions that people would like to be considered. Of the 459 responses received, 276 made additional comments and/ or suggested actions.

The comments made varied considerably in topic and content, with many making numerous suggestions/ comments. Due to the wide range of comments made it is not possible to discuss all of these in this report. However, many of the comments related to similar topics and could be divided into distinct categories. Topics that received the large numbers of written responses are summarised below:

Buses and Taxis

Of the 298 written/ spoken comments received, a total of 78 referred specifically to buses and taxis. Of these, 36 cited buses and/ or taxis as major sources of pollution and wanted further emissions testing of such vehicles. A further 12 comments stated that there are too many bus companies operating inefficiently in Glasgow (Re-regulation).

Eight comments were received relating to Glasgow's Quality Bus Corridor programme. In general these outlined that the corridors should only function during peak times, must be enforced to ensure cars do not use them or park on them and should not be allowed to have a negative impact on local trade or worsen pollution through the use of old buses or by causing congestion.

Other comments regarding buses included prohibiting other vehicles within the AQMA and initiatives to tackle idling buses.

Improved Public transport (Buses, Subway and Rail)

30 comments were received requesting improvements in public transport. The majority of these comments centred on more affordable, safe, clean and efficient public transport. Other suggestions included expansion of the underground and the provision of more services on the underground at night and on Sundays.

Increased Pedestrianisation/ Exclusions of certain vehicles from the city centre

21 comments were received regarding restricting vehicular access within the city centre. Of these, 9 specifically asked for increased pedestrianisation within the city centre, whilst the majority of the remaining comments suggested various restrictions (including complete bans) on vehicular access to the city centre.

One comment recommended limiting commercial vehicle access to the city centre to night time only.

Congestion or Workplace Charging

20 comments were received referring to congestion charging or workplace charging, 19 of which were in favour of introducing such measures in order to reduce congestion and air pollution.

Trams/ Crossrail

12 comments were received suggesting the re-introduction of trams and/ or promoting a Cross-rail project.

Proposed M74 extension

11 comments were received regarding the proposed M74 extension, with 4 for and 7 against the proposal.

Green Spaces

10 comments were received, requesting more provision of green spaces and trees throughout the city.

Park and Ride

4 written comments were received regarding Park and Ride schemes. All four comments were in favour of introducing more Park and Ride Schemes along city boundaries.

In addition to the comments relating to the above categories, numerous other points were raised regarding the Air Quality Action Plan that merit further investigation. These include:

1. The introduction of an American style school bus service.
2. Charges or restriction for single occupancy cars/ Encouragement of car sharing.
3. The use NOx absorbing paint on Glasgow's streets.
4. More provisions for cyclists – safer routes and secure cycle storage.
5. Strong enforcement of actions.
6. Further education.
7. Uptake of a 'Car free day' or one odd/ even number plate day each month.
8. Hotline to report idling or smoky vehicles.
9. Greater consideration of the impact of new housing/ commercial developments on air quality.

2.3 Report on Action Plan Workshop

This is a summary of the report on a workshop held as part the consultation process into Glasgow City Council's Draft Air Quality Action Plan of May 2004. The workshop was attended by 47 participants, 23 from the City Council and 24 from 20 other agencies.

This was the second consultation workshop of its type. The first was held in 2002, at the outset of the preparation of the Plan, not long after the declaration of the Air Quality Management Area (AQMA) for the city centre. Preparation of the plan is a statutory requirement, and the Council decided to hold a further workshop with interested parties to enable participants to discuss their reactions to the draft Action Plan, and provide an input to the wider public consultation underway.

The Workshop Format

The workshop was opened by *Liz Corbett* of Environmental Protection services, who welcomed delegates. She stressed the need for partnership in taking forward Glasgow's work in improving city centre air quality. Two presentations by *Alastair Brown* and *Lorraine Vogwell* then provided background briefing on the need for, and approach of, the draft Action Plan.

After the presentations, the workshop was divided into six groups for two breakout sessions. In the first session, each group had the same agenda: to discuss their reactions to the draft Action Plan. They were each asked to identify two key strengths, and two topics to take forward in further discussion. These topics were then reviewed, and structured to provide each group with a topic to take further in the second session. In that session, groups were invited to identify four main points. In a final plenary session, facilitators reported back on their group's priorities, then all participants were invited to vote on what were the priority topics of the day.

The group discussions were complemented by a brief individual questionnaire, completed within the workshop. This was based directly on the questionnaire circulated as part of the wider public consultation. Together, the group sessions and questionnaire responses enabled a degree of consensus to be reached by those taking part in the workshop on their views on the draft Action Plan, and what the next steps might be. The full record of the discussions and questionnaire responses are set out in the full workshop report and its annexes.

Workshop Outcomes

The main outcome of the workshop was clear. The workshop supported both the approach and the actions proposed in the Plan. At the same time, many participants wanted to see the Plan taken further.

The area-based approach to air quality throughout the city centre was supported, and the Plan was commended for its realistic stance. All the main action proposals were supported, with the strongest support for "Glasgow City Council Leading by Example", and "Air Quality Monitoring".

As at the previous workshop, **improving public transport and securing modal shift** came top of the agenda of proposed actions. Key elements included more park and ride provision (especially bus related and further from the city centre), improved and better integrated bus services, and a review of parking policy.

In setting out to achieve the desired objectives, **the Council leading by example** was seen as a crucial starting point, particularly because these were matters at the Council's own hand. These activities included not only monitoring and fleet maintenance, but also the Council operating a policy on flexible working hours and staff travel plans that would support the strategy on Air Quality. Further, it was considered that even when the Council does not exercise direct control, it is best placed to seek to influence, broker and potentially provide incentives for a more integrated transport strategy and service delivery.

The workshop advocated three main ways to take action further and build on what is set out in the draft Action Plan:

1. Improving the processes of **air quality monitoring and measurement**:
 - to be able to assess progress, and the costs and benefits of alternative actions;
 - to identify and tackle 'hot spots' (in terms of the most severe pollution; and impact on people in vulnerable places: hospitals and homes); and
 - to keep alert to emerging work on the relationship between emissions and health impacts.
2. **Development of partnership**: perhaps a core to secure implementation, and a wider partnership to secure a more strategic framework. The proposed West of Scotland Regional Transport Partnership may provide an appropriate framework for this wider partnership.
3. A parallel **education and awareness raising strategy**, developing from a wide distribution of the finalised plan, to commitment to a process of continuous improvement.

The main conclusion from the workshop is clear. **There is support for both the overall approach and content of the draft Air Quality Action Plan.** No-one suggested it had been wrong to adopt a holistic area-wide approach, and several comments explicitly supported it. Even though there were one or two reservations about most of them, **all of the proposed actions had a broad consensus of support.**

However, taking into account the tenor of all the comments, there are many ways in which **participants want the Action Plan to go further.** There were suggestions it is not radical enough, and consistent concern that it should become embedded as a process.

Key ways in which the plan should develop include:

- Improving the processes of **monitoring and measurement**
- to be able to assess progress, and the costs and benefits of alternative actions;
- to identify and tackle 'hot spots' (in terms of the most severe pollution; and impact on people in vulnerable places: hospitals and homes); and
- to keep alert to emerging work on the relationship between emissions and health impacts.

- **Development of partnership:** perhaps a core to secure implementation, and a wider partnership to secure a more strategic framework.
- A parallel **education and awareness raising strategy**, developing from a wide distribution of the finalised plan, to commitment to a process of continuous improvement.