London Borough of
Redbridge

Air Quality Action Plan

2007

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Executive Summary

Studies of air quality in the London Borough of Redbridge undertaken by the Council have identified that some of the Government's air quality objectives have not been met by the designated dates. As a result the Council is required to work towards achieving these air quality objectives within the Borough. This Air Quality Action Plan (AQAP) details the measures that Redbridge Council is taking, intending and considering that will help to improve air quality.

Most of the air pollution in London is caused by road traffic, the AQAP reflects this by including measures to both reduce the pollution emitted from vehicles in the Borough and to reduce the amount of traffic on the roads. Redbridge Council is also addressing air pollution from non-road sources such as industrial activities and domestic heating.

The AQAP is a working document that should stimulate new ideas and transform existing policies to improve air quality across the Council and beyond. The Mayor of London's Air Quality Strategy states that the measures within a Council's AQAP need to be at the centre of local authority policymaking.

Widespread and continuing consultation and participation are essential, both within the Council and externally with relevant stakeholders and the public. An effective Action Plan, that will achieve its targets, is one that has gained Member and Corporate commitment and support.

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1.0 Introduction to the LB of Redbridge Air Quality Action Plan

1.1 Introduction

This is the Air Quality Action Plan for the London Borough of Redbridge (the "Council") that will help to improve air quality and work towards the achievement of the Government's air quality objectives in the Borough. The Action Plan includes details of the Council's existing initiatives as well as proposed measures and their implementation.

The Action Plan is a requirement of the Council's continuing Local Air Quality Management responsibilities under the Environment Act 1995.

This Air Quality Action Plan (AQAP) was first published in draft form in November 2006 for consultation and comment. Consultation closed on the 30th April 2007 and this is the final version of the AQAP incorporating changes arising as a result of the consultation process.

1.2 Background

1.2.1 Air Quality and Health in London

Research commissioned by the NHS Executive London and published in 2000, found that more people in London are harmed every year by air pollution attributed to road transport than by road accidents. In 1998 there were 226 fatal accidents and an estimated 380 deaths due to road traffic emissions, although it is acknowledged that many of the deaths associated with pollution are probably in the elderly and the sick and the period of life lost may be small. It is estimated that 350 respiratory hospital admissions occur annually in London from transport related pollution and that 34,000 years of life are lost per year.

1.2.2 Government's Air Quality objectives

Part IV of the Environment Act 1995 introduced new responsibilities to both national and local government throughout the UK. These responsibilities included a requirement upon the national government and devolved administrations to develop an Air Quality Strategy (AQS) for England, Wales, Scotland and Northern Ireland (DEFRA, 2000). The overall purpose of the AQS is to seek improvements in air quality for the benefit of public health. The first AQS was produced in 1997; it was amended in 2000 and is undergoing a further revision.

Local air quality management (LAQM) was also introduced by the Environment Act 1995. It requires local authorities to periodically review and assess air quality across their areas. The AQS confirms that LAQM provides a major component of the government's plan for air quality improvement across the UK.

Air quality objectives have been set for those air pollutants deemed to be of most concern and seven of these are included under the LAQM regime. A summary of these pollutants and the air quality objectives is given in Appendix 1. The objectives are all based on health-based standards using current scientific advice taking into account the likely cost and benefits, as well as feasibility and practicality in meeting the objectives. The objectives are mostly in line with limit values prescribed by EU Directive, although additional objectives (including bringing forward the date for compliance) have been included for some pollutants.

1.2.3 London Borough of Redbridge position

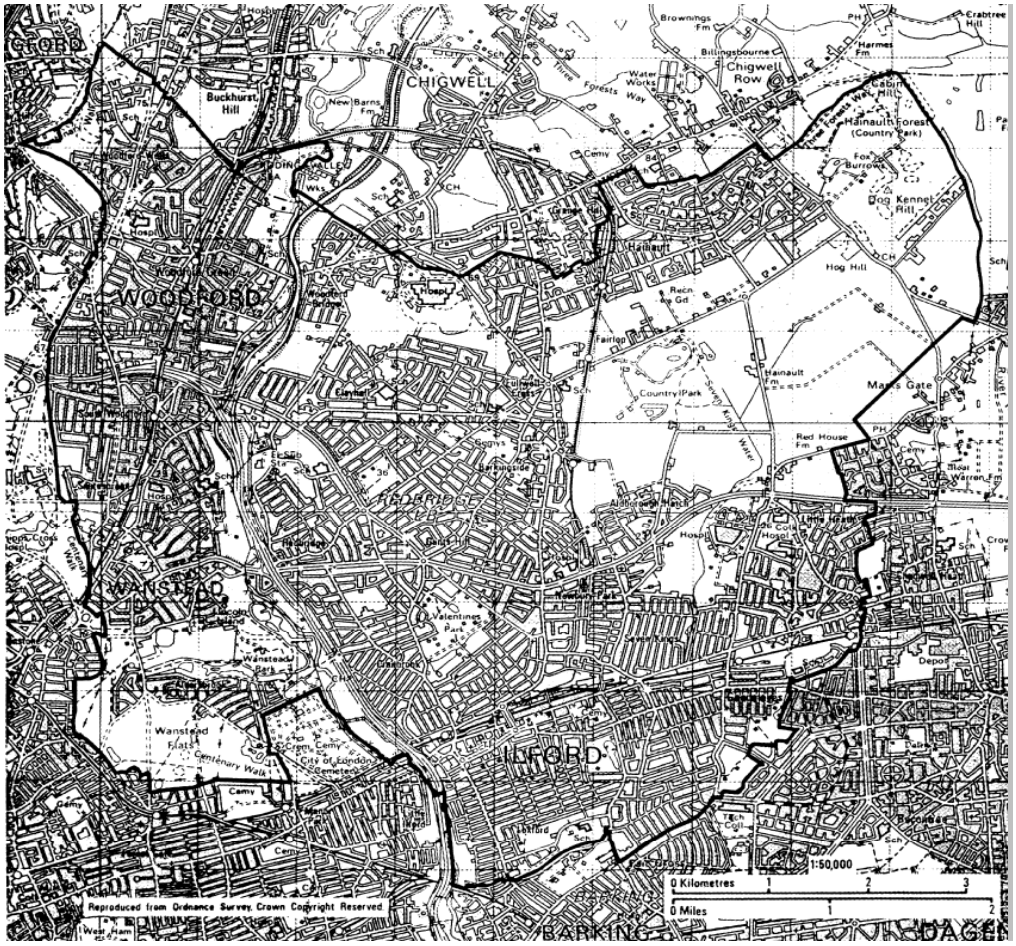
The LAQM process requires a phased approach. This is to ensure that each local authority undertakes a level of assessment that is commensurate with the risk of an air quality objective being exceeded. Previously the Council has assessed and screened (most recently in 2006): benzene, 1,3 butadiene, carbon monoxide, lead and sulphur dioxide (SO_2) and found that they were not likely to exceed to the air quality objectives in the Borough.

However for nitrogen dioxide (NO_2) and particulate matter (PM_{10}), Redbridge undertook another assessment (termed "Stage 3"). This showed that the annual mean objective for NO_2 of 40 µg m^{-3} and the 24-hour mean objective of more than 35 days with a daily mean exceeding 50 µg m^{-3} for PM_{10} were likely to be exceeded across the Borough.

A revised Stage 3 assessment utilising updated modelling methods; with improved data on traffic flows, the most recent vehicle emission factors, and more accurate dispersion modelling, predicted that the area that exceeded was larger for the annual mean NO_2 objective than the daily mean PM10 objective. The whole of the Council's area was assessed and the areas across the Borough that exceeded the objectives, mainly related to roads. Contour maps of Redbridge showing the modelled areas of exceedences for the NO_2 and PM_{10} objectives are presented in Appendix 3.

In Redbridge the Cabinet agreed with the consultative outcomes and an officer recommendation that the whole Borough be declared an AQMA (see Figure 1). The Order making the declaration came into force on 31 December 2003.

Figure 1 Redbridge Air Quality Management Area



1.3 Redbridge Further Review and Assessment

Having declared an AQMA, a further assessment was required (termed the "Stage 4"). This was undertaken to determine the relative contribution of the different sources of pollution.

This further review and assessment provided a technical justification for the measures contained in this Action Plan and allowed Redbridge specifically:

- To confirm the original assessment of air quality and to show that the Council was right to declare an AQMA
- To calculate more accurately how much of an improvement in air quality would be required to deliver the air quality objectives within the AQMA
- To refine our knowledge of the sources of air pollution so that the Redbridge AQAP is properly targeted
- To take account of any developments in local or national policy which occurred after the AQMA was declared, which were not factored into the earlier assessment work

To better understand the improvement needed at a location to achieve the AQS objectives, it was necessary to determine the individual source emissions that contribute to the overall predicted pollution concentration. Both pollutant emissions and atmospheric processes, including meteorology, determine the pollution concentration at any given location. Within Redbridge, this was further complicated by the actual size of London itself and the huge numbers of varying activities that contributed to the source of emissions.

The pollutants under investigation, i.e. NO_2 and PM_{10}, also complicated the understanding of source apportionment. For NO_2, to understand the different sources it was necessary to examine the contribution of oxides of nitrogen (NO_x) from combustion sources, this is because NO_2 is mostly a secondary pollutant, formed as a result of complicated atmospheric chemistry from NO_x.

For PM_{10} it was necessary to understand the influence of the primary, secondary and coarse components, which contributed to the total concentration. It was the daily (i.e. 24-hour) mean objective, which was predicted to be exceeded. However the source apportionment undertaken was based on annual mean PM_{10} concentrations, which were averaged over a longer timescale and therefore less affected by specific events.

A series of locations were chosen across the Borough (see Appendix 3) to help understand the source contribution of oxides of nitrogen (NO_x) and PM_{10}. These were randomly selected to provide a representative understanding of locations with predicted high concentrations of pollution in the Borough. The sites were predicted to exceed the 2005 objective for NO_2 by between 0.6 – 7.6 $\mu g\ m^{-3}$. The largest predicted exceedence was at a location close to the junction of Charlie Brown's Roundabout and Chigwell Road. The results confirmed the importance of road traffic to air quality and for NO_x; with a contribution of 62% from road transport and 38% from various background sources (such as domestic heating).

Two of the locations investigated were close to the Borough boundary and these areas highlighted the contributions from sources outside the Council's area. It is therefore important for the Council to work in partnership with other local authorities and organisations outside Redbridge in order to reduce air pollution levels.

For PM_{10} the contributions from heavy goods vehicles exceeded that of cars, and for all locations the contribution from cars exceeded that of buses. The background PM_{10} contribution at all locations was predicted as being almost constant (approximately 21 $\mu g\ m^{-3}$).

This review also tested the effectiveness of possible measures to improve air quality within the Borough and provided indicative results. The scenarios reflected the fact that road transport is the main source of emissions. The tests included: 1) a low emission type scenario with certain polluting categories of vehicle removed from Redbridge roads and 2) reducing the levels of traffic (apart from buses) generally across the part of the Borough where the East London Transit is proposed.

Intervention with the first scenario predicted improvements in NO_2 between 11 and 14 % (up to 5 $\mu g\ m^{-3}$) with only one of the locations assessed not meeting the annual mean objective. PM_{10} improvements were between 2 and 5%.

Only locations sited near to the proposed East London Transit were considered in the second scenario. Modelled with the scenario, improvements in NO_2 levels were predicted to be between 1 and 3% (0.4 – 1.4 $\mu g\ m^{-3}$) and in PM_{10} 2 to 4%.

These two indicative tests highlighted that for the greatest reduction London wide action (as opposed to just Redbridge action) was most likely to provide the greatest improvement in air quality.

1.4 Monitoring air quality

The monitoring of air quality in Redbridge is crucial if well informed policy decisions are to be made on matters that could affect pollution levels in the air. Redbridge has four long-term continuous monitoring stations (that are all part of the London air Quality Network) at:

- Perth Terrace (RB1) - an urban background site in Ilford (this site has been operating since 1999), which measures air quality that is most representative of air breathed by residents in the Borough. It measures nitrogen dioxide, oxides of nitrogen, PM_{10} and ozone.

- Fullwell Cross (RB3) - a kerbside site close to the roundabout in Fulwell Cross (this site started operating since 1999). It measures nitrogen dioxide, oxides of nitrogen and PM_{10}.

- Gardner Close (RB4) - a roadside site close to the A12 in Wanstead (monitoring at this site commenced in 1999). It measures nitrogen dioxide, oxides of nitrogen, PM_{10}, sulphur dioxide and carbon monoxide.

- Grove Road (RB5) - a roadside site close to the A406 (this site has been operating since 2003). It measures nitrogen dioxide, oxides of nitrogen and PM_{10}.

These monitoring sites are all operated to high standards of quality assurance and quality control, which are equivalent to those of the government's network, thus ensuring good accuracy, precision and reliability. The pollution levels measured at these stations, and results from nitrogen dioxide diffusion tubes (which are located around the Borough) were used for the validation of the modelling work undertaken in all review and assessment of air quality, together with other monitoring sites in the London Air Quality Network.

With the exception of RB1, the monitoring stations are sited adjacent to major roadways where public exposure may be present but is likely to be low levels. The concentration of a pollutant at any place is the result of local emissions added to a background component from further afield, and is dependant upon the weather conditions leading up to that point in time. Meteorological conditions affect both pollutant dispersal and chemical processes in the atmosphere.

The Council is undertaking research, funded by TfL, using NO_2 tubes to monitor dispersion in different locations e.g. before and after traffic calming is installed and across a transect of a dual

carriageway as well as at height (the location for these are yet to be determined). This will aid decisions regarding development control and the review and assessment process.

The Council currently has one portable particulate monitor to complement the existing air quality monitoring equipment.

Redbridge's Air Quality Reports can be accessed on http://www.redbridge.gov.uk/environment/localairquality.For up to date and historical air quality date see http://www.londonair.org.uk./

Relevant actions to this section listed in the Action Plan include: 1, 4, 5 and 6.

2.0 Consultation and stakeholder engagement

2.1 Introduction

The Redbridge Air Quality Action Plan is intended to be an evolving plan that will further develop in time, and a result will be the subject on going consultation by stakeholders and others.

2.2 Consultation process

Initial consultation was limited to the Council's internal Service Areas for feedback and Bureau Veritas, on behalf of government's Department for the Environment, Food and Rural Affairs (DEFRA), who run the help desk for Local Authority and give advice on Air Quality Action Plans. This initial draft plan was first amended in line with the comments received.

Subsequent formal consultation of the amended draft included DEFRA and the Greater London Authority (GLA), plus neighbouring local authorities. An open consultation was also undertaken with members of the public and other interested parties. The open consultation included publishing the draft plan on the Council's website and circulation of copies to all libraries in the Borough. The consultation period ran from February to the end of April 2007. The Council received one response as result of this consultation. The comment related to trees in the Borough and this is being considered.

This Action Plan is the final version, which takes into account comments received by the formal consultation process. The Council's response following comments received from DEFRA are explained in Appendix 1.

2.3 Stakeholder involvement

For many years the Council has worked closely with other local authorities as part of the East London Air Quality Cluster Group. This group includes representatives from the GLA and the Environment Agency. The Council has also consulted with DEFRA to ensure that its air quality policies and actions are consistent with its government requirements and guidance. Further consultation has always included other statutory bodies including neighbouring local authorities and the NHS bodies.

In addition many of the actions in the AQAP have already been the subject of separate intensive consultation, e.g. those relating to the Council's planning and transport policy and processes. We also regularly meet with local voluntary groups and the Redbridge Strategic Partnership. This stakeholder engagement will continue throughout the life of the AQAP.

2.4 Council decision making

The Vision for Redbridge has already been outlined elsewhere and this underlines the Council's commitment to sustainable development in the Borough. This AQAP will be the subject of Council approval through its Cabinet. Regular annual progress reports will be issued through the Council's standard reporting mechanisms outlining and updating AQAP progress.

3.0 Building upon existing plans

3.1 Introduction

This document sets out the actions that London Borough of Redbridge is currently taking and intending to take to improve air quality in the Borough. The actions described include those taken by the Council on its own, and those taken in partnership with the local community, local businesses as well as other regional and national agencies.

The Action Plan seeks to be consistent and build on other Council policies such as: the Unitary Development Plan (UDP) and the newly emerging Local Development Framework, which will supersede the UDP; and the transport related Local Implementation Plan.

The Action Plan has been developed within the context of Redbridge Council's vision and key priorities (see below) and the written in accordance with guidance issued by DEFRA and the National Society for Clean Air (NSCA).

Road traffic is a major determinant of air quality in Redbridge. However, air pollution comes from a wide variety of sources and the Action Plan reflects this by including actions relating to domestic, commercial and industrial activities as well as road transport. This Action Plan draws on all the measures that Redbridge Council is taking where air quality will benefit. It also shows how these actions have a wider significance. The wide range of proposed measures all seek to improve air quality throughout the Borough.

3.2 The Council's vision

On 18th November 2004, the Council adopted a new Vision, a set of key aims and a message for staff. These are consistent with the Community Strategy Ambitions.

The vision, aims and budget priorities are intended to guide the Council when it makes decisions about how best to provide services and how to fund them. The priorities are based on those things that local people have said are important to them.

At Redbridge, the ambitions of the Council and the Borough are reflected in our Vision.

Our ambition is for Redbridge to be a better place to live.

This vision is supported by six key aims and an internal message to reflect the priorities of residents, partners and the Council. The Council also sets a series of budget priorities. Based upon the Council's aims, the budget priorities guide the Council when making decisions about future spending.

The budget priorities are consulted on widely before the Cabinet and full Council agree them.

Council aims

The Council has developed the following aims to underpin its vision:

Redbridge: A safer place to live
Redbridge: A cleaner, greener place to live
Redbridge: A better place to learn
Redbridge: A better place for care
Redbridge: A better place for business
Redbridge: A better place to live together
Redbridge: A better place to work

Council budget priorities

Budget Priorities for 2006/7:

A safer place to live - by tackling crime and antisocial behaviour
A cleaner, greener place to live - by improving the environment
A better place for care - by continuing to support the elderly, vulnerable children and vulnerable adults
A better place to learn - by continuing to support our schools
A better place for business - by promoting the regeneration of the Borough

3.3 The Mayor's Air Quality Strategy

The London Borough of Redbridge Air Quality Action plan must also be integrated with regional policies such as the Mayor's Air Quality Strategy (MAQS). The Mayor expects the London Boroughs to contribute to the policies and proposals in his strategy, by addressing measures through their Air Quality Action Plans. The key issues addressed through the MAQS are:

- Reducing traffic
- Improving public transport
- Promoting the use of cleaner road vehicles including buses and taxis
- Low emission zones (LEZs)
- Traffic management
- Industrial and transboundary sources
- Construction and construction vehicles
- Energy and heating

3.4 Redbridge planning policies

These are used to guide decisions about new buildings or changes of use of existing ones. Recent changes to planning legislation require the Council to replace its Unitary Development Plan (UDP) with a Local Development Framework (LDF). This is a portfolio of planning documents, individually known as Local Development Documents that deliver the spatial development strategy for the Borough and build upon existing local and regional strategies and initiatives, in particular the Community Strategy.

The new planning system places an emphasis on strengthening community and stakeholder involvement in the planning process. The Statement of Community Involvement (SCI) sets out how local communities and stakeholders with an interest in the area can play a part in the preparation and revision of planning documents and the consideration of planning applications. On the 25th May 2006 the SCI was formally adopted.

The London Borough of Redbridge Local Development Framework currently includes the following Local Development Documents:

- Local Development Scheme
- Statement of Community Involvement
- Core Strategy
- BWPP - Borough Wide Primary Policies
- Development sites with housing capacity
- Development opportunity sites
- Proposals Map
- Area Action Plans
- Supplementary Planning Documents
- Annual Monitoring Report

The Local Development Scheme (LDS) is a three-year project plan that sets out all the documents that will be produced and timetable for their preparation. The new system involves substantial community participation from the beginning of the plan preparation process. Policies in Local Development Frameworks relate to 'spatial' matters rather than land use issues which Unitary Development Plans focus on. All policies and proposals are subject to a Sustainability Appraisal and Strategic Environmental Assessment to ensure that social, economic and environment issues have been taken into consideration The Government Office for London approved the Council's LDS on 17 March 2005. The scheme was revised as part of the Annual Monitoring Report (2004-2005) and was subsequently amended. The Government Office for London signed off the amended scheme on 2 June 2006.

The LDF emphasises the importance of locating high density development in areas of high public transport accessibility in order to achieve a reduction in traffic, increased public transport patronage and making better use of existing land. This is in conformity with the London Plan and the Mayor's Transport Strategy.

The following four documents, which will make up the Redbridge LDF, were published as Submission Development Plan Documents. These are to help shape the future of the Borough, making it a better place to live and work.

The Development Plan Documents are the:

- Core Strategy
- Borough Wide Primary Policies
- Development Sites with Housing Capacity
- Development Opportunity Sites

The four Development Plan Documents (DPDs), starting with the Core Strategy, are to be assessed in an Examination by an independent Inspector, appointed by the Secretary of State. All comments received as part of the recent consultation will be considered by the Inspector and taken into account when making his/her decision. The hearings are scheduled for the summer of 2007.

3.5 Redbridge transport policies

The London Borough of Redbridge produced a draft Local Implementation Plan, or LIP, as it is commonly known, which is a statutory document setting out how the Borough proposes to implement locally the Mayor of London's Transport Strategy until the year 2010/2011. Consultation was sought from residents, businesses and stakeholders on the schemes and strategies set out following publication of the draft LIP in 2005. The LIP also forms the basis for bidding for funds for traffic and transport schemes.

The eight priorities of the Mayor's Transport Strategy are:

- Improving Road Safety
- Improving bus journey times and reliability
- Relieving traffic congestion
- Improving parking and loading arrangements
- Improving accessibility and social inclusion
- Encouraging walking
- Encouraging cycling and
- Bringing transport infrastructure to a state of good repair.

The Mayor also expects the London Boroughs to ensure compliance with Directive 2001/42/EC of the European Parliament and Council on the Assessment of the Effects of Certain Plans and Programmes on the Environment, through the production of a Strategic Environmental Assessment (SEA) of the LIP. This is to ensure that significant environmental effects within the Borough are addressed, although it does also consider the effects of the proposals on surrounding boroughs and on global issues.

The LIP sets out how the Council is setting out to implement the priorities of the Mayor's Transport Strategy through the adoption of proposals, targets and plans.

3.6 Environment Strategy for Redbridge

The London Borough of Redbridge Environment Strategy is a comprehensive document that guides actions in protecting and improving the environment in Redbridge. It is a framework for other more detailed and specific plans and strategies.

Its purpose is to set out what the Council intends to do. It encompasses planning, coordination, allocating money, measuring our performance, working in partnership, community action and climate change. On this last topic, the Nottingham Declaration has been signed up to; this demonstrates our commitment to this issue, particularly in the three key areas of transport, waste and energy.

Our mission is to protect and improve our environment, working with the local community so that we do our best to make sure nothing we do today leaves problems for future generations. We aim to:

- Protect and enhance our open spaces and encourage a variety of wildlife in them
- Use land and buildings in a way that will benefit the people who will live, work or visit Redbridge in the future, develop eco-friendly local transport and keep our streets clean and litter free
- Reduce fuel use and the environmental impact of energy use in Redbridge homes
- Reduce pollution and contribute to a healthier environment
- Provide easily accessible recycling facilities and promote waste minimisation and recycling

- Increase community participation through raising awareness and promote practical action and work supporting Local Agenda 21
- Minimise our own impact on the environment

4.0 Identification of Transport Related Measures

4.1 Introduction

Transport plays a significant part in our daily lives so it is essential that policies and plans regarding transport integrate with other Council initiatives in supporting the achievements of the Council's priorities.

As already highlighted the greatest amount of air pollutants arises from road transport emissions, particularly from the heavily trafficked roads. Many of these roads (including the A406, A12, A1400 and M11) come under the jurisdiction of the Transport for London Road Networks (TRLN) and the Highways Agency (HA). As the Council does not have direct responsibility for roads such as these and any plans to control pollution needs to be in partnership with Transport for London (TfL) and the HA. The Council can however introduce measures on roads within their control (approximately 1800 roads) and lobby for improvements on others.

Current government and regional planning guidance identifies the requirement to reduce the need to travel by private road transport as a major objective to sustainable development. To pursue this sustainable objective the Council encourages the wider patronage of public transport and environmentally friendly forms of travel such as walking and cycling, whilst discouraging and restricting growth of motor vehicle use. Sustainability also involves development for economic growth to support the national and local economies.

Redbridge also supports policies within the London Plan (published in 2004 by the Mayor of London). The Council sees these policies as a means to tackle a whole raft of problems and issues, such as improving air quality, journey times, improving conditions for buses and encouraging people to walk and cycle more. In addition, the Council is taking a proactive role in supporting the implementation of several major transport schemes including Crossrail, East London Transit and the Thames Gateway Bridge, which will not only form a significant part of the overall transport plan for the London Olympics 2012 but also provide valuable links to and from the Borough.

Traffic congestion is an issue for the Borough's road network, which could be exacerbated by new developments in Redbridge and the wider sub-region if controls are not in place. In 1999, the Council adopted a strategy for traffic reduction on roads under its jurisdiction, to strive for zero traffic growth from 2000 to 2005. This was superseded by direction for the eastern sub-regions of London from the London Plan and the Local Implementation Plan. The direction states that traffic growth for Outer London should be no more than 6% and 1% for Town Centres, such as Ilford, between 2001 and 2011.

4.2 Low Emission Zone

Under the Greater London Authority (GLA) Act 1999, the Mayor for London produced an air quality strategy (MAQS), which contained policies and proposals for implementing the government's Air Quality Strategy and for pursuing the air quality objectives within Greater London.

The Mayor made a manifesto commitment to introduce a Low Emission Zone (LEZ), to improve London's air quality. The objectives of the proposed LEZ are to move London closer to achieving national and EU air quality objectives for 2010, and to improve the health and quality of life of people who live and work in London, through improving air quality.

Following consultation, the Mayor of London in May 2007, approved plans from TfL for the implementation of a LEZ, to cut harmful emissions from the most polluting lorries, coaches and

buses. It will launch in February 2008, with the aim of improving air quality across the capital. From February 2008 the LEZ will apply to lorries over 12 tonnes. From July 2008 the LEZ will also apply to lighter lorries, buses and coaches.

Operators of affected lorries, buses and coaches that do not meet the LEZ standards (unless exempt or entitled to a 100% discount) will need to pay a charge of £200 for each charging day they are driven in the zone. The level of charge has been set in order to encourage operators to clean up their fleets rather than to incur a charge. It is hoped that very few non-compliant vehicles will be driven in the zone.

Should an operator of a non-compliant vehicle not pay the daily charge for driving within the LEZ, then following the service of a penalty charge notice (PCN), a penalty charge of £1,000 will apply for lorries, buses and coaches and other relevant vehicles over 3.5 tonnes, reduced to £500 if paid within 14 days.

Cars, motorcycles and small vans are not included in the LEZ. Further details of the scheme can be found at http://www.tfl.gov.uk/lezlondon.

The London Borough of Redbridge believes that a LEZ for London would benefit air quality in the Borough. It is working with the GLA, London Councils (the new name of the Association of London Government) on the implementation of the scheme.

Relevant actions to this section listed in the Action Plan include: 2 and 3.

4.3 Freight

Redbridge does not have its own Freight Quality Partnership; however it participates in the Thames Gateway Regional Partnership and attends freight forums. The Council will continue to work with TfL to achieve the aims of the London Sustainable Distribution Partnership, directly or through the Thames Gateway Regional Partnership.

The Borough has given notice of withdrawal from the London Lorry Control System due to budgetary restrictions. However, the Council will be working with the London Councils regarding the scheme and any potential changes to it.

If the LEZ, as proposed by the Mayor of London is to be implemented, the Council will inform local transport operators of relevant developments and funding opportunities for fleet improvements.

In 1974 the former Greater London Council introduced regulations to ban heavy goods vehicles (gross weight of at least 5 tonnes) from parking overnight on residential streets. The Council continues to enforce these restrictions between the hours of 18.30 hrs and 08.00 hrs, seven days a week.

Relevant actions to this section listed in the Action Plan include: 19, 20, 21 and 5.

4.4 Parking and enforcement

Parking supply and charging policies for both on and off street parking can significantly influence parking demand, parking space turnover and ultimately car use and ownership.

The Council has a Parking and Enforcement Plan as required by the Mayor's Transport Strategy (2001). A good parking strategy, balances the needs of regulating car use whilst at the same time not penalising town centre economies, and is demonstrated at the Borough level. Parking provision is based upon the Council's Unitary Development Plan (UDP), which is in line with the

London Plan. The Council's Local Development Framework (LDF) takes account of the parking development standards set out in the London Plan.

In 1998 a Borough-wide consultation regarding Controlled Parking Zones (CPZs) for residents' was undertaken. Schemes have been implemented in those areas, which favoured the introduction of resident's parking permits. The Council has introduced 12 CPZs to date, which cover approximately 15% of the Borough. The CPZs are focused around the town centres e.g. Ilford and Barkingside, main rail stations as well as London Underground Stations. CPZs have been introduced around all the rail and underground stations in the Borough to discourage commuter parking.

Under the Ilford Action Plan off road parking spaces in the Borough are to be reduced. It is proposed that five public off-street car parks be replaced with schemes that enhance pedestrian usage or increase recreational activities in Redbridge.

As an incentive to residents to use zero emission cars the Council introduced a scheme whereby residents can park their electric vehicles free of charge in Council-run car parks. Residents' parking permits are free to owners of electric vehicles.

Relevant actions to this section listed in the Action Plan include: 15, 16, 17, 18 and 21.

4.5 Traffic Management

The Environment Act 1995 has confirmed that Traffic Regulation Orders, and hence management schemes, may be used for air quality management purposes. One form of traffic management, traffic calming, is utilised in the Borough in a variety of forms e.g. road humps, 20mph zones. Traffic calming has been shown to increase localised emissions and may only displace traffic elsewhere; however the potential improvement in air quality by reducing traffic volumes, congestion etc means that these schemes still play a part in vehicle emission management in particular areas. The overall impact on improving air quality would be minimal, but such schemes contribute to the net aim of this Action Plan and are particularly effective at reducing vehicle speeds, as well as the frequency and severity of accidents.

A transport model has been developed for Ilford town centre to assess the impact of various development scenarios. Options are being considered for a new link between the A406 and Winston Way to reduce the high level of traffic and associated pollution on Ilford Hill and Ilford Lane. Changes to signal phasing in this area to reduce standing traffic have improved the situation dramatically.

Road resurfacing is undertaken either during off-peak periods or overnight in order to reduce congestion and associated vehicle emissions, although it is acknowledged overnight working can be disturbing to residents. The surfacing material laid on the busiest roads has been changed to stone mastic asphalt, which can be laid in one process instead of the previous two, thus reducing plant usage and vehicle movements.

It has already been noted earlier that the both the Highways Agency and TfL are responsible for major routes in the Borough. In total TfL is responsible for a 580km network of main roads and all of London's 4,600 traffic lights. In addition, it manages the central London Congestion Charging scheme and regulates the city's taxis and private hire trade. The Council works in partnership with TfL on specific projects in the Borough and where improvements to air quality can be identified through transport management improvements, including UTMC and other ITS systems, such as selective vehicle devices, the Council will seek their implementation.

Relevant actions to this section listed in the Action Plan include: 5, 11, 12, 13 and 14.

4.6 Public transport

Redbridge enjoys a high level of accessibility by public transport. The availability of affordable, reliable, convenient and safe public transport services is important if people are to use it as a viable alternative to owning or using a car. The Council's UDP supports and encourages the improvement of public transport including new transport links, bus priority schemes, improved interchanges and access for people with disabilities.

The Council fully supports major public transport projects such as Crossrail and the East London Transit as a way to relieve overcrowding, congestion and to contribute to regeneration. The Borough hosts a quarterly public transport liaison meeting, which discusses further methods to increase public transport capacity.

Redbridge Council is part of the Thames Gateway London Partnership (TGLP). The TGLP acts as a sub-regional alliance of 13 local authorities, the London Development Agency, the East London Learning Skills Council and the Universities of East London and Greenwich. The partnership promotes major infrastructure and London wide action.

Those measures, which will specifically affect the Borough, are:

- Crossrail
- East London Transit
- Extensions to the Docklands Light Railway
- The Thames Gateway Bridge (including links via the existing network to Redbridge)
- Improvements to buses
- Enhancements to key regional transport interchanges
- Widespread implementation of travel plans
- Links to the new Channel Tunnel Railway Link

Relevant actions to this section listed in the Action Plan include: 22, 23, 26, 27 and 29.

4.7 Buses

Apart from being an efficient mode of transport and user of road-space, buses provide vital links to underground and railway services as well as to local shopping centres, places of entertainment and work. There are over 25 bus routes in the Borough, although the potential to provide new links and improve accessibility and bus stops is acknowledged. On some services there is scope to increase passenger numbers.

The Council supports the provision of bus interchanges across the Borough especially in Ilford Town Centre; with new bus standing facilities being considered as part of the Ilford station interchange study. Improvement measures to encourage modal shift from car to bus, such as relocation of on-street parking and provision of bus clearways for quicker journeys, are planned for the A123 High Street, Barkingside and have already been introduced on the A118 High Road and A123 Cranbrook Road.

Further measures have been deferred pending the design and implementation of major projects such as The East London Transit. Accessibility for bus users is to be improved throughout the Borough.

4.7.1 London Bus Priority Network

The Council is committed to continued support for partnership working with the London Bus Priority Network (LBPN). The LBPN was developed in 1994 by the 33 London Boroughs, London

Transport and the Government Office for London, as a cross boundary bus network for the whole of London. Up until the end of March 2004 the LBPN, as a project, has resulted in the Boroughs implementing over 3,500 bus priority schemes.

4.7.2 East London Transit (ELT)

The ELT scheme will initially be a road-based bus system using the latest vehicle design. The ELT will potentially run between Barkingside and Barking via Gants Hill, Cranbrook Road, Ilford Town Centre, Barking and possibly across the proposed Thames Gateway Bridge carrying up to 6 million passengers a year. The first stage, to be completed by 2007, will run between Ilford, Barking, Barking Reach and Dagenham Dock Station. A consultation survey found that support for the scheme is extremely high, with 94% of respondents in favour of the proposal.

Links to potential Thames Gateway development areas will offer sustainable and improved alternatives to the car for Redbridge residents and students to reach employment, education and training sites as well as provide strengthened public transport services through Ilford Town Centre linking it to the two underground stations at Gants Hill and Barking.

Relevant actions to this section listed in the Action Plan include: 2 4, 25, 28 and 29.

4.8 Railways and Underground

There are 4 major railway stations in the Borough namely, Ilford, Seven Kings, Goodmayes and Chadwell Heath. None of the stations provide an interchange with the Underground network. The main railway line comprises a number of tracks crossing the southern section of the Borough. Trains link the Borough with Liverpool Street and Stratford in the west and Shenfield, Southend, Chelmsford, Colchester and East Anglia in the east.

In partnership with TfL, London Buses and the Underground, the Council is to provide interchange facilities at Barkingside station with facilities for London buses and possibly a taxi rank. The Council has proposed measures for Ilford Station to become a major transport interchange. Elements of this improvement are being programmed in with Crossrail 1.

There are 10 Underground stations within the Borough, all of which are on the Central Line and are located in the northern half of Redbridge. Three stations are on the mainline to Epping namely; Snaresbrook, South Woodford and Woodford, and six stations are on its Hainault Branch - Redbridge, Gants Hill, Newbury Park, Barkingside, Fairlop, Hainault and Wanstead. Grange Hill is also on the border with Epping Forest.

Relevant actions to this section listed in the Action Plan include: 23 and 27.

4.9 Walking and Cycling

According to Central Government, 45% of car journeys are less than 5km. Walking and cycling offer significant potential to contribute to more sustainable journey patterns as well as promoting better health.

4.9.1 Walking

The 2001 census showed that approximately 6% of Redbridge's residents walked to work. The Council wish to encourage more residents to walk as an alternative to car use. There are numerous plans to improve conditions for pedestrians. For example through the 'Progressive Ilford Programme' improvements will be linked to major new developments and infrastructure changes such as Unity Square, East London Transit and Crossrail. Action plans have already been developed for Ilford, Gants Hill and Barkingside implementing such measures as repaving,

improved lighting, new street furniture, removal of street clutter and increased security. Other areas of the Borough are also to benefit from a revamping during 2007/2008.

Redbridge Council is involved in a Cross London Strategic Walking Partnership, which is currently completing and promoting the following six Strategic Walking Routes that cover over 500km of walking routes in the Greater London Area:

- The London Outer Orbital Path (LOOP)
- The Capital Ring
- The Thames path
- The Jubilee Walkway
- The Green Chain Walk
- Lee Valley Walk

4.9.2 Cycling

There are currently 36km of cycle network in the Borough, forming part of the London Cycling Network (LCN+). In Redbridge the routes follow the A118, A1199 and A406. Redbridge is committed to working with TfL and other stakeholders to provide a whole-life project management approach to the cycle schemes, including assessment of LCN+ routes on a network basis to enable improved delivery of maintenance and a consistent level of service. This will ensure that faster, safer and more convenient conditions for cyclists are provided on key routes by 2010, subject to funding.

The Council carries out a safety auditing of all cycle routes to ensure that a high level of safety is maintained throughout the Borough. Cycle accidents are monitored biannually with the results informing future remedial action. The Council has a dedicated Cycling Officer.

Redbridge provides cycle racks at many public facilities, including stations, with further provision planned for strategic points along cycle routes and at shopping centres. Season ticketed cycle lockers are planned for South Woodford, Chadwell Heath and Seven Kings Stations, as well as several other locations. Cycle facilities are shown on the Borough Cycle Map. TfL is funding the majority of cycle facilities.

The Council's Cycle Liaison Group meets twice a year; it comprises local cyclists, Council Officers and Councillors, who act as an advisory group for the Council on all aspects of cycling. Cycling representatives are consulted throughout the development of new schemes in the Borough. Redbridge London Cycle Campaign (LCC) works with the Council and other local, regional and national organisations to improve conditions for cyclists in the Borough. The LCC run short courses in basic cycle maintenance and have a Redbridge group (see www.redbridgelcc.org.uk). The implementation of the Roding Valley Way cycle/footpath, will link Essex to the River Thames, partnership with Barking & Dagenham and Newham.

As safety is of great importance to the Council, it offers cycle training to children aged 10 and over. Both on and off road training is available to all secondary schools in the Borough. Two hours free, one to one adult training is available for anyone aged over 14 who lives, works or studies in Redbridge.

Relevant actions to this section listed in the Action Plan include: 31, 32, 33, 34 and 35.

4.10 Council Fleet

The Council adopted a Green Fleet Policy in 2000 which states the following measures will be adopted while operating or commissioning vehicle use:

- Specify viable alternative fuel, exhaust and transmission systems for every vehicle upon its replacement
- Maintain all vehicles to a high standard to ensure that exhaust emissions are kept to a minimum
- Adapt existing fleet to reduce pollution
- Undertake trials to appraise alternative fuels and vehicle types
- Encourage Council contractors to use alternative fuels or other pollution reduction measures
- Promote the use of alternative fuels and other pollution reducing technology by the community
- Encourage its employees to use transport, which has a low environmental impact
- Work with its vehicle suppliers and other organisations to help stimulate the market for alternatively fuelled vehicles and to encourage the ongoing development of clean vehicle technology
- Comply with and if possible exceed all minimum statutory requirements for vehicle emissions
- Constantly review developments in this field and adopt new measures where applicable
- Implement systems to monitor the effectiveness of the policy

The current fleet of 382 vehicles run on ultra low sulphur diesel; the Council has a bulk fuel facility. Eighteen of the vehicles use catalysts to minimise particulate emissions. A small number of the fleet run on liquid petroleum gas (LPG); LPG may be obtained via two petrol stations in the Borough.

The Council is currently piloting an initiative with the objective of increasing fuel efficiency by 5% and tyre life by 25%. Thirty of Redbridge's welfare buses, which travel between 25,000 - 30,000 miles per year, have had the air in their tyres replaced with nitrogen. The nitrogen does not permeate through the tyres as air does, therefore they do not become under-inflated. Under-inflated tyres wear out more quickly and can increase fuel consumption.

However it has become evident that a proportion of the Council's fleet will not meet the LEZ standard when implemented in 2008. To address this problem the Council needs to investigate a more rigorous approach to greening the fleet.

Relevant actions to this section listed in the Action Plan include: 7, 8, 9 and 10.

4.11 The Council's Travel Plan

The Council adopted its own Travel Plan (TP) this year, providing a benchmark for other organisations within the Borough, as they develop their own Plans. The Council is one of the largest employers in the Borough, with approximately 8000 employees, therefore the uptake of such a Plan, in conjunction with other measures to tackle air pollution, will be of benefit to the wider community. The Borough has a dedicated TP Co-ordinator who also oversees the School TPs.

Although many of the Council's buildings are situated within easy access to public transport, a survey of a representative proportion of Council employees found that 77% of staff travelled to work by car (12% of those as a passenger) with most employees living within a 5-10 mile radius of their work.

The Council accepts that if its own TP is to be effective, it must not only tackle the car culture, but recognises that the car is an integral, and sometimes essential, part of life within the Borough. The principle aims of the Plan are to:

- Provide all new staff with a Sustainable Travel Pack. The packs will provide information on accessible alternative forms of transport, such as those detailed below.

- Encourage staff to cycle. The Council already has a number of initiatives to encourage staff to cycle such as secure, covered cycle shelters at the Town Hall, Lynton House and Ley Street House; paying an allowance for business use of a bicycle for officers and Members. It is recognised that further measures to encourage cycling by staff are required; therefore the Council's Cycle Policy is currently under review.

- Promote the link between walking and a healthy lifestyle. The Borough is to place a bid to TfL for funding of a dedicated Walking Officer.

- Encourage travelling by public transport. The Council offers interest free loans to staff to purchase annual season tickets. It is planned to have a dedicated intranet page to inform staff of timetables etc.

- Promote the Car Sharing Scheme that is run by liftshare.com and can be accessed via the intranet and Internet. Other Boroughs involved in this scheme are Corporation of London, Tower Hamlets, Newham, Hackney, Thurrock, Waltham Forest, Havering and Barking and Dagenham. There is a database for any employee who wishes to participate. Within that database a potential car share partner may be found.

- Pilot more flexible working arrangements – including hot desking, remote or mobile working and elements of home working.

- Undertake a travel survey every two years in order to establish if the plan is working, and set targets for further reduction in solo car dependency.

Engineering and Building Services are also using a hybrid car as a pool vehicle. The availability of further alternatively fuelled pool cars throughout the Council will be investigated.

The current arrangements to compensate staff for business travel however do not promote a reduction in vehicle emissions. The Association of London Government (now London Councils) states that where this is the case Councils should review their policies. In Redbridge employees on essential and casual car user allowances with the largest engine sizes i.e. 1200cc and above receive the highest tariff. In order to encourage the use of smaller, less polluting cars, the tariff structures should be reversed with perhaps the highest allowances being reserved for those who use alternatively fuelled vehicles.

The Council will review its business bicycle allowance, which currently stands at 26p per day.

Relevant actions to this section listed in the Action Plan include: 37.

4.12 School travel plans

Since 2001 Redbridge has been working with local schools to find ways of reducing the impact of the school run, which can account for up to 20% of traffic during the morning rush hour.

With the introduction of the Government's 'Travelling to School Initiative' grants to maintained schools with approved Travel Plans, Redbridge has secured the involvement of a great many schools in the Travel Plan process.

The Borough has set itself a target 5% above that required by Government and TfL by engaging 45% (36 schools) in the Travel Planning process by April 2006. Since 2001 27 schools have become involved in the process. The Council is concentrating initial efforts on state schools, as they are eligible for Government grants. However, Redbridge is committed to assisting all schools to obtain a TP. One private school has a TP in the Borough even though it does not receive a Government grant.

Redbridge is committed to the reduction of car use for the school run and to find the most sustainable and safest way for pupils, parents and teachers to travel to and from schools in the Borough. It is recognised that to achieve this, positive partnership working will be needed and will include relevant stakeholders such as local residents, council officers and members. Redbridge works with adjoining Boroughs on 'Cross Borough Travel Plans'.

Through the School TPs, the Borough encourages the use of more sustainable modes of transport to reduce congestion, exhaust fumes and additionally promote walking and cycling. The Council run three 'walk to school' campaigns a year and encourage and help organise walking buses. All School TPs must be in place by 2009. Travel awareness campaigns held in the Borough, such as 'Good Going Week' and 'Walk to School Week', are used to promote the Plans and involve the local community. The continued success of School TPs is dependent on external funding.

Relevant actions to this section listed in the Action Plan include: 38 and 39.

5.0 Identification of Non Transport Related Measures

5.1 Development Plans

Maintenance and improvement of the environment is an essential part of the Council's overall strategy. There are three primary ways that development can have a significant impact on air quality:

1. The completed development itself may cause deterioration in local air quality e.g. increased emissions from vehicles at the development, energy and heating outputs

2. If the development is located in an area of poor air quality, the occupants will be exposed to the poor air quality

3. The demolition/construction phase may have a significant impact on local air quality e.g. from dust generated on the site, plant and vehicle emissions.

The Council will seek to ensure that all development is well related to the transport infrastructure, which will serve its needs. The Council will actively discourage new development that generates significant numbers of trips at locations poorly served by public transport

The Council's Unitary Development Plan (UPD) (adopted in 2003) developed a number of guiding principles in relation to transport that are consistent with the policies set out by central and regional Government. These principles cover a variety of transport areas:

- More walking and cycling
- Wider public transport patronage
- Support for town centre economies and regeneration
- Reduced environmental impact of travelling, especially by car
- Road traffic and congestion reduced
- Improved air quality

The UDP set out maximum parking standards for new developments in areas well served by public transport. In addition, it set out the requirement for a Transport Assessment and Green Travel Plan for developments likely to generate a large number of journeys - a forthcoming Air Quality Supplementary Planning Guidance will also require an Air Quality Assessment for such developments.

Ilford town centre is to be developed under the Council's initiative 'Progressive Ilford', although the concept is in its early stages it is envisaged that there will be more emphasis on improved accessibility and 'walkability' through traffic management giving priority to buses, cyclists and pedestrians.

The Local Development Framework (LDF), which is currently being developed and will supersede the UPD in 2007, will encourage the construction of high density mixed use developments in areas which are particularly accessible public transport and the adoption of more sustainable patterns of travel.

The Ilford Area Action Plan promotes high-density development adjacent to major transport interchanges, for example it encourages the tallest buildings in the town centre to be located close to Ilford Station. Whilst public consultation revealed that there is significant public sentiment against tall buildings, the Borough is more likely to fulfil its housing targets without having to intensify housing densities in established residential areas.

The Council recognises that building design can have an effect on public exposure to poor air quality and will use planning conditions to implement mitigation measures. New developments in the Borough are required to meet the standards of the Building Research Establishment Environmental Assessment Method (BREEAM). The Council has produced its own Sustainable Construction Supplementary Planning Guidance (adopted May 2005) giving advice on sustainable construction techniques for new developments, which includes techniques to improve air quality internally and externally. Many of these measures will also improve energy efficiency and therefore reduce carbon dioxide emissions.

Council Officers expect developers to use the latest 'best practice' guidance available to pre-empt and resolve air quality problems.

The Council will also use the recently produced London wide Code of Practice for the Control of Dust and Emissions from Construction. This document aims to minimise air pollution arising from large construction projects has been developed by the Air Pollution Planning and the Local Environment a sub-group of the London Air Quality Steering Group, and was formally adopted by the Mayor and Association of London Government in November 2006.

To date, 15 of the Borough's 21 major building contractors have drafted a Sustainability Policy (sometimes referred to as an EMAS Policy).

The Council will examine the potential to address air quality issues through the use of Section 106 agreements as outlined in Planning Policy Statement 23, wherever possible.

Relevant actions to this section listed in the Action Plan include: 40, 41, 42, 43, 44, 45, 46, 47, 48 and 50.

5.2 Addressing Climate Change

Carbon dioxide does not have a direct impact on human health and is not therefore part of the government's Air Quality Strategy. However, this air pollutant does have a major impact on climate and therefore can have an indirect impact on human health. Emissions of carbon dioxide should be reduced where possible. Many of the measures in our AQAP and the Mayor's Air Quality Strategy, such as energy efficiency and traffic reduction, should lead to reductions in both air pollution and carbon dioxide emissions.

In 2001 the Council signed up to the Nottingham Declaration on Climate Change, this committed Redbridge to:

- Deliver the UK Climate Change programme at a local level
- Prepare a plan with local communities to address the causes and effects of climate change
- Make significant reductions of emissions from the Council's own operations
- Encourage all sectors to take action locally
- Assess the potential effects on our communities
- Provide opportunities for renewable energy generation in the Borough
- Monitor progress and publish results

Also in 2001 the Redbridge Strategic Partnership (RSP) was established. From a relatively modest start a strong and sustainable partnership, which is delivering positive outcomes, has been created.

In 2003 Redbridge adopted its first RSP Community Strategy 'Making a Deference in Redbridge'. The document sets out a vision on how the Council, working with all key players in the Borough, will seek to improve the quality of life for all residents. Among the aims is the promotion of a

positive attitude to the environment and have a cleaner, greener Redbridge. From the RSP core group stem five cluster partnerships, including the Environment Partnership set up in 2002; this partnership is leading on Climate Change.

The Environment Partnership brings together over 50 organisations from the public, private, business, community and voluntary sectors to consider the environmental agenda for the Redbridge. The Environment Partnership has its own Action Plan to help the Council meet commitments within the Nottingham Declaration. The Plan identifies ways in which the Council can minimise its own impact on Climate Change as well as inform the public and other organisations about the causes and effects of Climate Change and what they can do about it and how to adapt to it.

The two most significant sources of carbon dioxide emissions in Redbridge are from domestic gas and electricity consumption, in total 63%. This is followed closely by road transport at 23%. The road traffic measures within the AQAP will assist in reducing carbon dioxide contribution from road transport.

Electricity from renewable sources is currently being purchased through green tariffs for seven Council buildings and represents about 17% of electricity consumption in all Council buildings. The street lighting energy contract now uses electricity from a renewable source. These are helping to stimulate the market for renewable energy and contribute to the Government's objective of achieving 10% of electricity from renewable sources by 2010 as part of the UK Climate Change Programme. In addition, measures to increase energy efficiency and the use of renewable energy sources will result in lower overall emissions of nitrogen dioxide and PM_{10} from fossil fuel power plants.

Coppice Primary School has also recently installed wind-powered lighting in the school grounds to reduce carbon dioxide emissions. The school and the Council shared the installation costs. The project is a pilot; the system and results are being carefully monitored.

Relevant actions to this section listed in the Action Plan include: 49 , 50, 51, 52, 53 and 54.

5.3 Domestic Energy Efficiency

The Home Energy Conservation Act 1996 (HECA) placed a duty on local authorities to improve energy in all Council housing stock by 30% by 2010. The Council has an affordable warmth/fuel poverty strategy and has continued to implement policies to meet the requirements of the HECA. Changes in the energy efficiency of the housing stock in the Borough are carefully monitored. As of 31 March 2005 there had been an overall energy efficiency improvement of 19.33% in the Borough since the implementation of HECA in April 1996. If all of the measures identified in the Council's strategy come to fruition over the next 14 years, it is estimated that there will be a reduction in carbon dioxide of 194,560 tonnes per annum.

The Redbridge strategy is being taken forward through a range of projects and initiatives in conjunction with internal and external partners. Redbridge Energy Action Centre is an essential part of the strategy and its implementation will be a high priority of the HECA Officer.

5.4 Raising Public Awareness through the Council Website

The Council's website will contain a dedicated section for the provision of air quality information to the public in early 2006. It will contain general air quality information, together with links to up-to-date monitoring data and other websites, driving tips to reduce emissions and car use as well as downloadable copies of key Council air quality documents.

The content of the site will be reviewed regularly and updated as new information becomes available.

Relevant actions to this section listed in the Action Plan include: 55.

5.5 Green Procurement Policy

The Council's policy is currently a draft one. The objective of the policy is to support the Borough's aims towards promoting and employing good environmental practices by ensuring that all procurement will be conducted with due regard to sustainability issues throughout the supply chain.

Relevant actions to this section listed in the Action Plan include: 56.

5.6 Industrial Emissions

Although road transport accounts for the greater part of the emissions of both nitrogen dioxide and particulate pollution in Redbridge, the Stage 4 Review and Assessment identified other sources as contributory factors to air quality and therefore should be considered in this process.

The Environmental Protection Act 1990 introduced a system of Local Air Pollution Control (LAPC) and Integrated Pollution Control (IPC). Both systems regulated air pollution from industrial sources, the former controlling small/medium size operators and administered by the Council (Part Bs) and the latter dealing with larger operators and administered by the Environment Agency (Part As). In order to prevent or minimise pollution, the site operators are required to apply the 'Best Available Techniques Not Entailing Excessive Cost (BATNEEC). More recently, as a result of European Legislation, the Pollution Prevention and Control Act 1999 set out the Integrated Pollution Prevention and Control (IPPC) regime. The principals are essentially the same but the respective regimes are now called Local Air Pollution Prevention and Control (LAPPC) and Integrated Pollution Prevention and Control (IPPC). Under this new system local authorities are the regulators for Part A2s as well as Part Bs and the Environment Agency, Part A1s. Under the new regime site operators apply 'Best Available Technique' (BAT) instead of BATNEEC.

The Borough currently has no Part A2s and 35 Part B installations, comprising:

- 4 small waste oil burners
- 1 concrete batching plant
- 1 crematorium
- 1 wood coating installation
- 5 vehicle respraying installations
- 1 coating manufacturer
- 22 petrol stations

A list of these installations can be found on the Council's public register (which is kept by the Council at the Public Protection offices). The Council is currently permitting dry cleaning installations that have recently been introduced to this regulatory regime. These will be permitted by Autumn 2007 and hence are not included above.

The Council will continue to work closely with existing authorised or permitted installations to ensure compliance with conditions set by the Council in accordance with legislation. Redbridge has undertaken benchmarking with neighbouring authorities to ensure best practice and is part of an East London PPC group dedicated to authorised/permitted processes. The Borough also has a programme for identifying processes, which should be part of the regulatory regime.

Other industrial premises are controlled by nuisance powers under the Environmental Protection Act 1990 and the prohibition of dark smoke from industrial or trade premises under the Clean Air Act 1993. The latter legislation makes it an offence to burn any material that is likely to produce dark smoke. Under this Act the Council can take action after a fire has extinguished if there is evidence of material on the fire, such as plastics and rubber, which may have given rise to dark smoke. This is particularly useful where unscrupulous individuals/ businesses burn waste at night, hoping to avoid detection.

Relevant actions to this section listed in the Action Plan include: 57 and 58.

6.0 Impact assessment and options appraisal

6.1 Introduction

The Redbridge AQAP has been developed with the assistance of many bodies outside the Council, as well as different Service Areas within the Council. As a result the identification of the different parties is implicit, since no one Service Area can implement all the actions outlined. The actions included are mostly outlined within the Council's budget priorities, which as outlined, are assessed each year for fit within its Vision.

6.2 Impact assessment

The Council's AQAP has also considered that there are wider impacts to the measures proposed, since it is clear that many of the actions do have other non-air quality impacts. These considerations were considered when the action plan was formulated. Additional benefits and shortfalls of air quality improvement measures were assessed in terms of:

1. *Other (non-NOx/ PM_{10}) air pollutants* – those measures aimed at reducing emissions of NOx and PM_{10} from combustion sources through direct and indirect measures will in many instances lead to reductions in greenhouse and toxic gases.

2. *Noise* – road transport sources as well being emission sources are also significant sources of noise. The replacement of older vehicles by newer vehicle as in actions will have noise reduction benefits, as will those measures to improve streetscapes.

3. *Congestion* – measures to increase car sharing and use of cycles will remove vehicles from the road in the short term and thereby relieve congestion. If however congestion is relieved there is a potential for increasing traffic speeds with potential impacts being increased noise and emissions.

4. *Attractiveness of public transport* – this is an important consideration since any increase in public transport must be accompanied by improved attractiveness of stock and infrastructure, including public safety issues.

5. *Social inclusion* – this relates to access to buses, as well as other issues relating regeneration and reduced car parking.

6. *Economic vitality of local businesses* – this is a consideration of many of the planning and transport planning related actions

7. *Other* – many of the actions proposed relate directly to Council only based actions. This provides an important signal to others in the Borough that the Council is leading on initiatives to improve air quality, including promoting and educating good practice.

6.3 Implementation

In line with the different service areas and bodies that have helped develop this AQAP, key Service Areas have been identified. These are indicated in the Action table and defined in the following table.

Table 1 Who is responsible for AQAP actions

PP	Public Protection
EBS	Engineering & Building Services
P	Planning Policy & Information
EP	Environment Partnership
FM	Fleet Management
All	All of the Council

7.0 Cost Effectiveness

7.1 Introduction

The purpose of assessing the cost effectiveness is to enable the actions to be prioritised in order to determine which of the actions are to be implemented and in what order.

The Redbridge AQAP, however in line with the government's guidance, does not provide a full cost benefit analysis of the plan, with detailed costs of all the measures considered as well as the likely benefits that would arise. This would entail a detailed study of air pollution reduction costs e.g. the costs of improving air quality by 1 µg m^{-3} in the Borough, as well as that of the health benefit costs associated with air quality improvements. This is considered beyond the scope of action plans.

7.2 Cost effectiveness categories

The value of assessing the cost effectiveness of the actions is limited for a number of reasons. For example, the Council and its partners were carrying many of the actions described in this plan out prior to formulation. Furthermore, other actions included in the action plan are statutory duties of the Council and therefore must be carried out regardless of the cost.

There is no accepted means for assessing the cost effectiveness of actions. A quantitative assessment is almost impossible to achieve given the difficulty in obtaining accurate costs and accurate measures of air quality impacts. For these reasons, a quantitative method of prioritisation has been used using professional judgement. It should also be noted that the costs are costs of the action and therefore are not for the Council only.

Table 2 Cost rating descriptions

Cost banding	£	Description
Low	< 50k	Cost is covered by existing budget or by fees from polluter
Medium	50k - 200k	Additional funding is required, but may be incorporated with forward planning.
High	> 200k	Additional funding is required that cannot be incorporated into existing budget

These ratings are used to determine the cost/impact shown in the AQAP table (see Table 5). The existing Council budgets are able to meet the costs of most of the actions defined within the low cost rating definition. Those actions categorised as medium or high require additional funding.

Table 3 Air Quality impact rating descriptions

Air Quality Rating	Definition
Low (1)	Impact is small and localised. Will be beneficial as part of a wider measure (typically less than 0.2 µg m^{-3})*.
Medium (2)	Impact on improving air quality is considered important, and benefits from the action(s) are considered important with benefits clearly seen (typically 0.2 to 1 µg m^{-3}).
High (3)	The impact on air quality improvement is considered significant and the actions(s) are seen as the core (typically more than 1 µg m^{-3})

(* Note - to understand what the measures will achieve in quantitative air quality terms is very difficult; hence a subjective approach has been used. It should also be noted that these impacts are considered for guidance purposes only and are not necessarily Borough wide. This means that the improvements are not cumulative.)

The actions described in this AQAP will have a greater chance of success where there is public support and where they strike a balance between environmental and other objectives such as improvements in human health, noise, safety etc. The achievement of air quality objectives must therefore not be considered in isolation, although the definition of 'cost' in this AQAP is not intended to encompass additional effects.

A matrix has been used to assign an overall effectiveness value (1 - 9) based on how much of an improvement in ambient air quality the action will achieve and how much it is likely to cost. The most effective actions are given a value of 9.

Table 4 Costs and Benefits Assessment Matrix

Cost x impact = effectiveness	High Impact (3)	Medium Impact (2)	Low Impact (1)
High cost (1)	3	2	1
Medium cost (2)	6	4	2
Low cost (3)	9	6	3

7.3 Monitoring progress on the Redbridge AQAP

The actions set out in Table 5 of this Plan will be reviewed and assessed twelve months after the Council has adopted this final version of the AQAP.

Table 5 Air Quality Action Plan Proposals

Part I Actions - Air Quality Management

	Action (Includes refs. to chapters 4 and 5)	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts/ Notes
1	The Council will continue to monitor air quality in the Borough through the use of 4 automatic monitoring stations, NO_2 diffusion tubes and a smoke site. *(See section 1.4 earlier)*	PP	Ongoing	Low	1	3	• Data aid improvement of understanding and science of air quality for benefit of the community in both Redbridge and the wider area
2	The Council will participate in the London LEZ stakeholder consultation on strategy revisions in 2006. This is potentially the most effective action for improving air quality in London. *(Section 4.2)*	ALL	2006	Low	3	9	• Could prejudice those on low incomes who own older vehicles • Improve urban environment • Impact on local business • High implementation and running costs • May be less funding available for other local authority schemes
3	If the LEZ is to be implemented the Council will inform local transport operators of relevant developments and funding opportunities for fleet improvements. *(Section 4.2)*	ALL	2007/2008	Low	1	3	• Will promote new technologies
4	The Council will carry out research on dispersal of NO_2 using passive monitoring tubes in appropriate locations *(Section 1.4)*	PP	Ongoing	Low	1	3	• Inform future local planning conditions • Future AQ modelling material
5	As a means to extend the Councils air quality monitoring network and ensure that the air quality associated with traffic management schemes is monitored, NO_2 and PM_{10} levels will be monitored prior to, during and after some schemes are implemented. *(Section 1.4)*	PP	From 2005	Low to Medium	2	4 to 6	• Inform future local planning conditions • Future AQ modelling material

Part II Actions - Transport Related Measures

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts/ Notes
6	Carry out exhaust emission surveys from time to time *(Section 1.4)*	PP	Ongoing	Low	1	3	• Enlighten the public about the link between poorly maintained cars and air quality
7	Continue with trials with nitrogen inflated tyres, if successful implement within the Borough fleet and maybe, for a fee, employees cars *(Section 4.10)*	FM	Ongoing	Low	1	3	• Reduce Council costs • Reduce tyre waste
8	The Council will investigate grants available for assistance with greening its fleet *(Section 4.10)*	FM	2006	Low	2	6	• Sets an example to other fleet operators
9	The Council will investigate how to bring its fleet up to the Euro standard as required by the LEZ either through using alternative fuels or contracting out some of its fleet vehicles and having a green contract policy *(Section 4.10)*	FM	By 2008	High	2	2	• Encourages others to adopt similar practices • Newer vehicles are quieter
10	Ensure that the Council vehicles are: ▪ used sensibly (via staff training) and are well maintained ▪ not left idling unnecessarily ▪ used on routes and tasks which are worked out to be as efficient as possible by co-ordinating deliveries of goods and services ▪ operated by appropriately trained staff who utilise practices which improve fuel economy *(S. 4.10)*	ALL	Ongoing	Low	1	3	• Encourages wider good practice
11	Develop and implement a range of traffic management and calming measures to regulate through traffic and to protect residential areas from incoming traffic, particularly commercial traffic. *(Section 4.5)*	EBS	Ongoing	High	3	3	• Increases pedestrian safety • Reduction in road accidents due to decreased speed • If traffic displaced, may reduce emissions, noise and improve neighbourhood quality • Due to acceleration and deceleration may increase local emissions, vehicle noise & blight visual amenity with signs, bollards etc

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts/ Notes
12	Consider utilising models for traffic calming which gives the best outcome for air quality *(S 4.5)*	EBS	2006	Low	1	3	
13	Ensure traffic signals are phased for optimum benefit of air quality *(S 4.5)*	EBS	2006	Low	2	6	• Reduce idling traffic • Quicker journey time
14	Continue road resurfacing during off-peak times using a one stage resurfacing material *(S 4.5)*	EBS	Ongoing	Medium	2	4	• Reduces congestion and idling traffic queues • May disturb residents when resurfacing at night
15	Following public consultation, seek to increase the use of Controlled Parking Zones in appropriate locations in the Borough *(S 4.4)*	EBS	Ongoing	Low	1	3	• Improve local amenity • Improve residential access • Help less mobile residents
16	Continue to offer residents with electric cars free resident's parking permits and free entry into Council car parks *(S 4.4)*	EBS	Ongoing	Low	1	3	• Encourage the uptake of electric cars • Reduced noise
17	Consider extending the scheme in Action 16 to business users *(S 4.4)*	EBS	2006	Low	1	3	
18	The Council's Parking and Enforcement Plan will help regulate traffic volumes and may encourage a shift from private vehicle use to more sustainable modes of transport, which is supported by the Council's Local Implementation Plan. *(S 4.4)*	EBS	Ongoing	Low	2	6	• Improved urban environment • Could deter shoppers coming to the Borough
19	Continue to participate in the Thames Gateway Regional Partnership freight forums and work with TfL to achieve the aims of the London Sustainable Distribution partnership. *(S 4.3)*	EBS	Ongoing	Low	1	3	

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts/ Notes
20	Provide help, encouragement and awareness raising to road freight groups within the Borough, concerning funding for cleaner vehicles. *(S 4.3)*	ALL	2006	Low	2	6	• Reduce noise levels • Improve urban environment
21	Continue enforcing ban on HGVs parking in residential streets between 18.30 - 08.00 hrs, seven days a week. *(S 4.3 and 4.4)*	EBS	Ongoing	Low	2	6	
22	The Council will support and encourage the improvement of public transport including new transport links, bus priority schemes, improved interchanges and access for disabled.*(S4.6)*	EBS	Ongoing	Low	2	6	• More efficient use of road space • Reduce congestion • Increase personal choice Will require substantial • New employment opportunities
23	The Council will encourage the extension of the Docklands Light Railway to Ilford Station (LIP 5-6) *(S 4.6 and 4.8)*	EBS		High*	3	3	* High cost but will funded by TfL and others
24	Improve accessibility to buses Borough wide *(S 4.7)*		Starting 2006	Medium	1	2	
25	The Council will progress with the implementation of the East London Transit *(S 4.7)*	EBS	First stage 2007/8	High	3	3	
26	The Council will continue to support the Thames Gateway Partnership to promote major infrastructure and London-wide action. *(S 4.6)*	ALL	Ongoing	High*	3	3	* High cost but will funded by others
27	The Council has proposed measures for Ilford Station to become a major transport interchange; elements of this are in conjunction with the Crossrail project. *(S 4.6 and 4.8)*	EBS	2008	High*	2	2	* High cost but will funded by TfL and others
28	Continue to provide bus clearways for more efficient journeys *(S 4.7)*	EBS	Ongoing	High	2	2	

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts/ Notes
29	In partnership with TfL, London Buses and the Underground provide interchange facilities at Barkingside station for buses and taxis *(S 4.6 and 4.7)*	EBS	2007	High*	1	1	* High cost but will funded by TfL and others
30	To encourage walking the Council will improve paving, lighting, street furniture and security. *(S 4.9)*	EBS	2007/08	High	1	1	• Improve local environment • Reduce noise • Encourage health and fitness
31	Work with the Cross London Strategic Walking Partnership to complete and promote the 6 Strategic Walking Routes. *(S 4.9)*	EBS	Ongoing	Medium	1	2	
32	Where the Borough has responsibility for maintaining any of the 6 Strategic Walking Routes it will continue its maintenance duties. *(S 4.9)*	EBS	Ongoing	Medium	1	2	
33	Lobby for a dedicated 'Walking Officer' *(S 4.9)*	EBS	Ongoing	Low	1	3	
34	The Council will continue to carry out Cycle Route Implementation and Stakeholder Plan (CRISP) studies on all appropriate sections of the LCN as part of the development process. *(S 4.9)*	EBS	Ongoing	Low	1	3	
35	Continue to offer cycle training to children aged 10 and over and 2 hours free, one to one training for anyone aged over 14 who lives, works or studies in Redbridge *(S 4.9)*	ALL	Ongoing	Low	1	3	
36	Redbridge London Cycle Campaign in conjunction with other partners will continue to run short courses in basic cycle maintenance *(S 4.9)*	LCC	Ongoing	Low	1	3	• Reduce cycle casualties • Encourage cycling • Health benefits

37	The Council will continue to develop its own Travel Plan, including *(S 4.11)*: • Revision of existing cycling policy with a view to enhance facilities and safety • Promote the car share scheme • Pilot flexible working arrangements • Provide new staff with a Sustainable Travel Pack • Develop intranet page to inform staff of public transport timetables • Continue to offer interest free annual season ticket loans to employees • Consider alternatively fuelled pool cars throughout the Council for business use • Review the tariff structures for essential and casual car users • Review business cycle allowance	ALL	2005/2006	High	3	3	• Reduce congestion • Sets an example to other businesses • Reduce parking space requirements • Health benefits

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts/ Notes
38	The Council will continue to engage local schools in the School Travel Plan initiative with the aim that all schools have a TP in place by 2009. *(S 4.12)*	EBS	Ongoing - 2009	Low	2	6	• Reduce peak time traffic congestion • Improve road safety • Encourage healthier children • Children learn road sense
39	Raise awareness through campaigns such as 'Good Going Week' and 'Walk to School Week'. *(S 4.12)*	EBS	Ongoing	Low	1	3	

Part III Actions - Non Transport Related Measures

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts/ Notes
40	Actively discourage new development that generates significant numbers of trips at locations poorly served by public transport. *(S 5.1 and 4.6)*	PP/P/EBS	Ongoing	Low	3	9	• Development plans usually have a variety of environmental and socio-economic impacts
41	Ensure air quality is given material consider in assessment of proposals for development as stated in Gov. guidance PPS 23 *(S 5.1)*	PP/P	2005/2006 & onwards	Low	3	9	
42	The Council will produce an Air Quality Supplementary Planning Guidance for developers *(S 5.1)*	PP/P	2006	Low	2	6	
43	Investigate using Section 106 planning obligations to address air quality issues *(S 5.1)*	PP/P	2005/2006	Low	2	6	
44	Where a potential development is well served by public transport, the Council will encourage 'car-free parking' developments. *(S 5.1 and 4.4)*	PP/P/EBS	2006	Low	2	6	

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts/ Notes
45	The Council require that planning applications for new developments consider the provision of cycle parking where feasible. *(S 5.1and 4.9)*	P/EBS	Ongoing	Low	1	3	• As above
46	Developments with the potential to generate a large number of journeys are required to provide a Transport Assessment and a Green Travel Plan; an Air Quality Assessment will be a new requirement *(S 5.1)*	P/EBS/PP	Ongoing 2006	Medium	3	6	
47	Ensure the latest Codes of Practice and 'best practice' are followed by property developers *(S 5.1)*	P/PP	2006	Low	2	6	
48	Produce a Climate Change Action Plan *(S 5.2)*	EP	2006	Low	1	3	• Reduce CO_2 emissions • Reduce fuel poverty and associated health problems • Local action against global warming and climate change
49	Continue to encourage the Council's public and private partners to carry out environment audits and develop environmental action plans *(S 5.1 and 5.2)*	EP	Ongoing	Low	2	6	
50	The Council is investigating membership of the Local Authority Carbon Management Programme run by the Carbon Trust *(S 5.2)*	EP/EBS	2006	Low	1	3	
51	Work with schools and the local community to raise awareness of climate change *(S 5.2)*	LBR - Education ReBEP, private sector	2005	Low	1	3	

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts
52	Continue with awareness raising campaigns such as 'In Town Without My Car' *(S 5.2)*	EP in conjunction with the Local Economy and Health cluster groups	Ongoing	Low	1	3	
53	Actions the Council can take to minimise its impact on Climate Change include *(S 5.2)*:						
	• Implementing actions identified in the Home Energy Conservation Act (HECA) and the Council's Housing Strategy, to promote energy conservation in residential properties.	EBS	Ongoing	Low	1	3	
	• Introducing an Energy Cert. Scheme to encourage schools to reduce energy use and save money	EBS/EP	2006	Low	1	3	
	• Promoting energy awareness among Council staff through the staff environmental newsletter, Acorn.	EP	Ongoing	Low	1	3	
	• Increase the amount of electricity purchased from renewable sources	EBS	Ongoing	Medium	2	4	
	• Implementing the EU Buildings Directive when adopted by the UK	EBS	2007	Low	1	3	

	Action	Who	When	Cost	Air Quality Impact	Overall Effectiveness	Wider Impacts
54	Develop the Council's website with a dedicated air quality site *(S 5.4)*	PP	2006	Low	1	3	• Raises awareness of environmental issues • Up-to-date air quality info. may assist those with respiratory problems to make daily activity choices • Could discriminate against those without access to the internet
55	Aim to get the draft Green Procurement Policy adopted *(S 5.5)*	ALL	2006	Low	1	3	• Sets an example to external businesses • Encourage suppliers to adopted more sustainable practices • Items and services can be more expensive
56	Continue to apply the Environmental Protection Act regime and the new integrated Pollution Prevention Control regime in accordance with the timetable for implementation. *(S 5.6)*	PT	Ongoing	Low	1	3	
57	Continue to identify processes, which are required to be part of the LAPPC or IPPC regimes. *(S 5.6)*	PT	Ongoing	Low	1	3	

Appendix 1

The London Borough of Redbridge response to the DEFRA comments (dated 8/12/06) are:

1) Consultation (third paragraph of schedule from DEFRA) – it is highlighted that the plan does not specifically refer to public consultation or how consultation comments have been taken on board. To improve chapter on consultation has been brought forward in the document and expanded following the current round of consultation ending April 2007. Further information on the consultation process and any responses are given and how the plan was modified as a result of the feedback.

2) The measures in the tables and the main text in chapters 4 and 5 have been cross-referenced as suggested (paragraph 4 of schedule from DEFRA).

3) a. It was not totally clear what was meant by "Further consideration needs to be given in the final plan as to how far the action plan measures will contribute to improvements in air quality and delivery of the air quality objectives". Redbridge is required to set out what measures it intends to introduce *in pursuit of the Air Quality Objectives* (which it has done) and estimated impacts of these using the FAQ guidance from the action plan web site (i.e. in terms of low, medium and high).

   b. To further specifically understand what the measures will achieve in quantitative air quality terms is very difficult, partly because some the measures will only make very minor differences e.g. in the reductions in emissions (which may be too small to show an impact on air quality in any quantifiable sense). In its simplest terms for impact, low can be taken to indicate a likely improvement in NO_2 of less than 0.2 µg m^{-3}, medium an improvement of 0.2 to 1 µg m^{-3}, and high an improvement of more than 1 µg m^{-3}. (These quantities are based on subjective descriptions used by another London Borough). It should also be noted that these impacts are considered for guidance purposes only and are not necessarily Borough wide. This means that the improvements are not cumulative.

   c. Air quality impacts (where they are significant) are also extremely difficult to determine. For the more significant measures dispersion modelling can be undertaken. This can show the difference between prediction scenarios with no action (as a base case) and with defined actions. The impact of the actions can be shown for the whole or parts of the Borough in terms of mapped pollution plots, difference plots, and or measurements of the areas affected. Updated predictions for 2010 (rather than 2005) would be useful for indicating air quality improvement in quantitative terms for the most significant actions. The final decision of TfL/ GLA for the London LEZ has been incorporated into the final plan.

   d. Redbridge is also undertaking extensive monitoring to assess the impacts of its measures. This monitoring will in time confirm that whether or not there has been an improvement in air quality and that pollutant concentrations have dropped. The USA 2006 and Air Quality Progress Report 2007 for Redbridge showed changes in concentration over time based on rolling averages. These indicated that changes are confounded by many factors of which the most important are inter annual variation in meteorology and changes in emissions (e.g. the impact of direct NO_2 emissions). Future Redbridge air quality reports will update both monitoring and trends.

4) Funding and costs are now separated where possible. This helps clarify e.g. the high cost items that are not wholly the responsibility of Redbridge. Funding for some actions comes from GLA and the TfL. Table 1 gives information as to the service area within Redbridge that has responsibility. The costing and time scale of the measures have been re-examined and amended (where appropriate). Areas where shortfalls in funding are possible have been highlighted.

Table 6 Air quality objectives (from Air Quality Regulations 2000 and Amendment Regulations 2002)

Pollutant	Objective		Date to be achieved by
	Concentration	Measured as	
Benzene	16.25 μg m^{-3}	Running Annual Mean	31 Dec 2003
	5 μg m^{-3}	Annual Mean	31 Dec 2010
1, 3 Butadiene	2.25 μg m^{-3}	Running Annual Mean	31 Dec 2003
Carbon Monoxide	10 mg m^{-3}	Daily Maximum Running 8 hour mean	31 Dec 2003
Lead	0.5 μg m^{-3}	Annual Mean	31 Dec 2003
	0.25 μg m^{-3}	Annual Mean	31 Dec 2008
Nitrogen Dioxide (provisional)	200 μg m^{-3} not to be exceeded more than 18 times a year	1 hour mean	31 Dec 2005
	40 μg m^{-3}	Annual Mean	31 Dec 2005
Particles (PM_{10})	50 μg m^{-3} not to be exceeded more than 35 times a year	24 hour mean	31 Dec 2004
	40 μg m^{-3}	Annual Mean	31 Dec 2004
Sulphur Dioxide	350 μg m^{-3} not to be exceeded more than 24 times a year	1 hour mean	31 Dec 2004
	125 μg m^{-3} not to be exceeded more than3 times a year	24 hour mean	31 Dec 2004
	266 μg m^{-3} not to be exceeded more than 35 times a year	15 minute mean	31 Dec 2005

Table 7 Proposed new particle objectives (from Air Quality Strategy Addendum (2003))

Pollutant	Objective		Date to be achieved by
	Concentration	Measured as	
Particles (PM_{10}) (NB the objective for London is given in brackets)	50 μg m^{-3} not to be exceeded more than 7 (10) times a year	24 hour mean	31 Dec 2010
	20 (23) μg m^{-3}	Annual Mean	31 Dec 2010

Carbon monoxide (CO) is a colourless and odourless gas produced by the burning of fuels. Exposure to CO leads to a decreased uptake of oxygen by the lungs and can lead to a range of symptoms as the concentration increases. Early symptoms of exposure include tiredness, drowsiness, headache, pains in the chest and sometimes stomach upsets. Some people, for example those with heart disease, are at an increased risk. Exposure to very high concentrations will lead to death. However such conditions, where there are very high concentrations, are most likely to arise in confined spaces, rather than outdoors where the public are exposed and the air quality strategy (AQS) applies.

Benzene at normal ambient temperatures occurs as a liquid, but it readily evaporates and small amounts are detectable in the air. It is known from workplace studies that benzene is potentially carcinogenic, that is, exposure to it may lead to the development of cancer. EPAQS (1994) considered that the risks associated with the levels found in the air in the UK to be small and not be measurable with any accuracy. Nevertheless, it considered that efforts continue to be made to reduce the levels even further as a precautionary measure.

1,3 Butadiene arises from the combustion of petroleum products and its manufacture and use in the chemical industry. It is not present in petrol but is formed as a by-product of combustion.

Lead in particulate form in air can be inhaled directly by people, and ingested indirectly following its deposition on soil and crops. Exposure to lead has been known to be harmful to people for many years, with severe adverse effects on the blood, the nervous system and the kidneys (although these effects only occur with high exposures). More subtle effects caused by lower exposure to lead can also arise, such as may occur from the presence of lead in drinking water, paint and dust, and in the ambient air. These effects include the impaired intellectual development of children. EPAQS concluded that the available evidence suggests that the risks associated with the levels found in the air in the UK are very small and cannot be measured with any accuracy (EPAQS, 1998). However, efforts to reduce the levels even further continue as a precautionary measure.

Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen, and are collectively referred to as nitrogen oxides (NO_x). All combustion processes produce NO_x emissions, largely in the form of nitric oxide, which is then converted to nitrogen dioxide, mainly as a result of reaction with ozone in the atmosphere. It is nitrogen dioxide that is associated with adverse effects upon human health. At high concentrations NO_2 causes inflammation of the lung. Long-term exposure is also considered to affect lung function and exposure to NO_2 is particularly important for people with asthma and related diseases. NO_x is also important in the formation of ozone and secondary particle formation.

Sulphur dioxide (SO_2) is a colourless gas, produced from burning fossil fuels like coal and oil. Power stations and oil refineries are the main sources in the UK, with small releases from other industries. SO_2 is also found naturally in the air at low concentrations from natural releases such as volcanoes and forest fires. SO_2 also has role in the formation of secondary particles. SO_2 can cause breathing difficulties at high concentrations over short periods of time, particularly to those with asthma and chronic lung disease. As a result the AQS objectives are all incident based.

PM_{10} (particles measuring 10µm or less aerodynamic diameter) represent those particles likely to be inhaled by humans, accepting that the chemical and physical composition varies widely. In view of this there is a wide range of emission sources that contribute to PM_{10} concentrations in the UK. Research studies have confirmed that these sources can be divided into 3 main categories (APEG): (i) Primary particle emissions derived directly from combustion sources, including road traffic, power generation, industrial processes etc. (ii) Secondary particles formed by chemical reactions in the atmosphere, comprising principally of sulphates and nitrates. (iii) Coarse particles comprising emissions from a wide range of sources, including re-suspended

dusts from road traffic, construction works, mineral extraction processes, wind-blown dusts and soils, sea salt and biological particles. Particles are associated with a range of health effects, including effects on respiratory and cardiovascular systems, asthma and mortality. As a result, EPAQS recommended a daily standard based on the evidence reviewed with an annual mean standard to assist with policy formation.

A subgroup of the Committee on the Medical Effects of Air Pollutants (COMEAP) is currently preparing a report which will, as far as possible, quantify the benefits to health of reducing air pollution in the UK. This group have previously advised that there is strengthening evidence base that links long-term exposure to particles and mortality and are of the view that the associations reported are likely to represent causal relationships with air pollution. They are also investigating the effects on morbidity and aim to publish a detailed report.

Appendix 2

Extracted from Redbridge revised Stage 3 report

Figure 2 Predicted annual mean NO_2 results for Redbridge

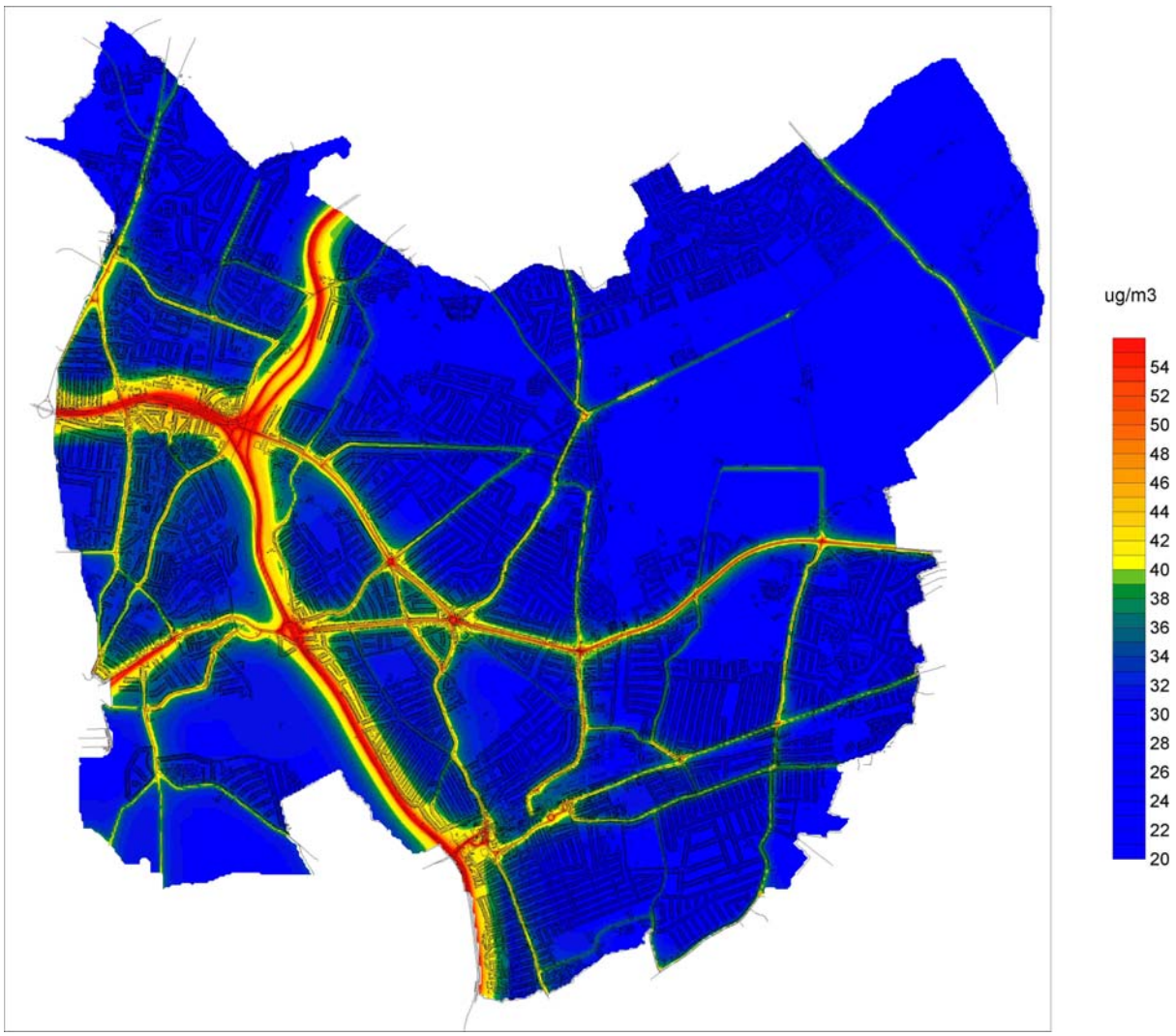


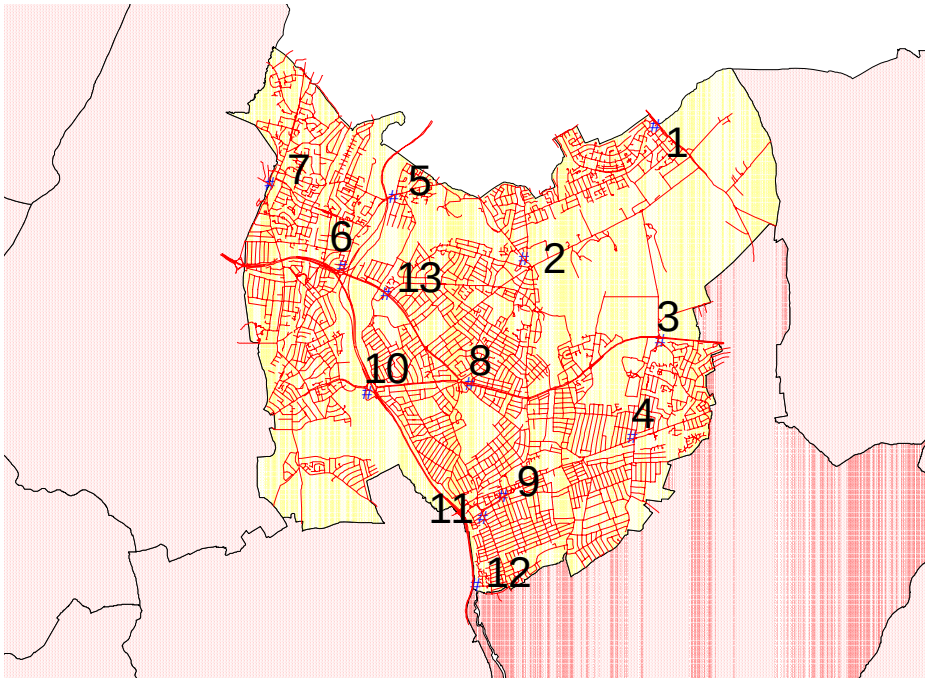
Figure 3 Predicted daily mean PM10 objective for 2004 in the LB of Redbridge

Appendix 3

Table 8 Description of Source apportionment locations

Site Number	Site Description	Façade from road (m)
1	Junction of Romford Rd & Latchford Place, Façade of House (93 Romford Rd, Hainault)	8.9
2	Junction of Thomswood Hill & Fencepiece Rd, Façade of House (1 Fencepiece Rd, Barkingside)	6.1
3	Junction of Chadwell Heath Lane & Eastern Avenue, Façade of Flats (372 Chadwell Health Lane, Chadwell Heath)	13.7
4	Junction of Barley Lane & High Road Façade of House (1 Barley Lane, Goodmayes)	4.6
5	Junction of Chigwell Rd & Gaynes Hill Road, Façade of House (599 Chigwell Rd, Woodford Bridge)	15.4
6	Junction of Charlie Brown Roundabout & Chigwell Rd, Façade of House (160 Chigwell Rd, Woodford Bridge)	11.8
7	Junction of Woodford High Rd & Chingford Lane, Façade of Flats, (1-36 Woodford High Road, Woodford)	12.8
8	Junction of Eastern Avenue & Parham Drive, Façade of House (427 Eastern Avenue, Gants Hill)	14.0
9	Junction of Winston Way & Griggs Approach, Façade of House (7 Holstock Rd, Ilford)	8.4
10	Redbridge Roundabout, Façade of Flats (7-12 Roding Lane Lodge, Redbridge)	17.4
11	Junction of Winston Way & Ilford Lane, Façade of Houses (93 Ilford Lane, Ilford)	5.2
12	Junction of Uphall Road & A406, Façade of Flats, (16-29 Conifer Court, Ilford)	73.5
13	Junction of Claybury Avenue & Winnigales Court, (Façade of Flats, Clayhall Avenue, Clayhall)	17.2

Figure 4 Locations Chosen for Detailed Source Apportionment (from Redbridge Stage 4 report)



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