MAYOR OF LONDON

Greener London

The Mayor's State of Environment Report for London

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Foreword by Ken Livingstone,

Mayor of London

London's irresistible dynamism, culture and diversity make it one of the foremost cities to live and work in the world today.

The Capital's stunning cityscape is enjoyed by over 7 million Londoners, approximately 26 million per year overnight visitors and a further 150 million people on day trips to London, drawn by a unique blend of parks, squares, distinctive buildings and river views. There is a feeling of vitality in the city and a sense of expectation as it plans for the challenges and opportunities ahead: addressing the impacts of climate change; accommodating the predicted population growth in London in a sustainable manner and preparing London for the Olympics and Paralympic Games of 2012.

London's environment is an essential part of its character. But from the balance between mobility and congestion to the variety of wildlife and the cleanliness of the River Thames, this environment cannot be taken for granted. It needs constant evaluation. It needs care and consideration. It needs the awareness and, increasingly, the active engagement of every Londoner.

This is my second State of the Environment Report. In my initial assessment in 2003 I set out a baseline from which to monitor the many aspects of London's environment. The indicators have been updated throughout the Report as far as possible, reflecting the developments of the past four years and highlighting challenges for the future.

Overall there has been a significant improvement in the various indicators, notably in public transport, renewable energy, recycling, water and air quality. London is world renowned for the protection and enhancement of its green spaces and water, as well as for reducing our reliance on the car and achieving a shift to more sustainable forms of transport.

This report does show, however, that much work remains to be done on key issues such as the reduction of waste going to landfill, reducing our water consumption and leakage, continued improvement of air quality, street cleanliness and prevention of litter, if London is to achieve my goal of becoming a first class sustainable world city.

Since that first environmental audit, concern for the environment has risen to the very top of the political agenda. There is now an international consensus on the urgent need to tackle climate change and the need to reconsider long-held practices that impact upon the environment from the efficient use of resources and transportation, to the thoughtful disposal of waste. Each chapter in this report can and should be seen in both a local and an international context as London seeks to address its everyday needs and obligations - and acts as a pathfinder for cities across the globe.

All those who live, work or visit London can and should make a difference to improving the environment. Eighty two per cent of Londoners think that climate change will be a problem facing future generations if no action is taken now. In February 2007, I launched my Climate Change Action Plan, *Action Today to Protect Tomorrow*, which sets out a programme of decisive action, which we are now aggressively implementing, and a strategy for the next 20 years.

My next State of the Environment report will be published in 2011, on the threshold of the Olympic Games. I am certain that the regeneration associated with the event will act as an example of sustainable development every bit as deserving of global attention as the sporting excellence that will undoubtedly be on display in the Olympic and Paralympics in 2012.

Ken Livingstone

Mayor of London

Introduction

Tackling climate change is the Mayor's top priority. The last four years have seen strenuous efforts to monitor and enhance the many aspects of London's environment. From air quality to energy consumption and from recycling to river restoration, there has been a dramatic increase in awareness, action and performance.

The Mayor has published five environmental strategies, setting out his proposals, priorities and targets for making London a cleaner, greener and more sustainable city. These cover air quality, biodiversity, energy, waste management and ambient noise. In addition to these, he has published his Animal Welfare and Tree & Woodland Frameworks and the draft Water Strategy was published for consultation earlier this year.

The Mayor's Climate Change Action Plan was launched in February 2007, setting out a comprehensive analysis of London's carbon emissions and route-map for achieving the necessary reductions. Its core message is that Londoners do not have to reduce their standard of living but we do all have to change the way we live to tackle climate change. Everyone has a part to play in moving from a high energy-use, wasteful economic model to one that conserves energy and minimises waste. Statutory strategies for tackling climate change mitigation and adaptation are in development. This State of Environment Report demonstrates the pervasive impact of climate change across the full range of environmental issues and the way Londoners live their lives.

State of London's Environment

The Mayor of London is required by law to publish this report every four years. Under the GLA Act 1999, several categories of compulsory information are required, but the Mayor may include other information which he considers appropriate.

The Act states that the Mayor's State of the Environment Report must include information on the following:

a air quality and emissions to air, including in particular emissions from road traffic
b road traffic levels
c water quality and emissions to water
d groundwater levels
e energy consumption and the emission of substances which contribute to climate change
f land quality
g biodiversity
h the production, minimisation, recycling and disposal of waste
i noise
j natural resources
k litter.

Green Capital, the first Mayor's State of the Environment report for London, was published in May 2003. It set out a range of indicators as baselines against which future changes could be measured and to help assess progress towards the Mayor's vision of London as an exemplary sustainable world city.

This second report collates a vast amount of data and analysis. Some of the statutory categories this report covers relate directly to the Greater London Authority's strategic responsibilities in planning, transport and environment. In these areas we are able to provide the relevant information ourselves. The Act also specifies some topics for which the Greater London Authority has no direct statutory responsibility. The Environment Agency has particular responsibility for water quality of rivers and waterways and for emissions to water, and we are grateful to the Agency for data in this field. In other areas - street cleanliness, water quality and emissions to water, groundwater levels, energy consumption and the emission of substances that contribute to climate change – information is patchy and so it has not always been possible to discern a trend.

The indicators within the 2007 State of the Environment Report build on those within the first report. An additional indicator measuring Areas of Deficiency in Access to Open Space has been included and further suggestions for new indicators have been made, such as an alternative measurement for groundwater levels, which now covers the whole of the capital. A summary table of indicators is provided for an 'at a glance' review of progress. Where directly comparable updates have not been possible, an indication of progress since the last report has been given.

In considering the scope of the State of the Environment Report, the Mayor is required to consult the Environment Agency and each London Borough. This exercise was undertaken in 2006 - with no major comments received - and we are grateful for their input.

Executive Summary

Chapter 1: Climate Change

Chapter 1 examines Climate Change, both *mitigation*, which means limiting further climate change by reducing greenhouse gas emissions as well as *adaptation*, which means preparing for the challenges that are now inevitable and may increase if we do not reduce our emissions.

Mitigation: Energy Use & Greenhouse Gas Emissions; Renewable Energy & Fuel Poverty

Since 1990, London's overall CO_2 emissions have gone down by 1.5 per cent despite a population growth of 0.7 million people; this change is largely due to a reduction in industrial activity in London. For 2006 it is estimated that CO_2 emissions per resident are 5.8 tonnes, 40 per cent lower than average UK emissions per capita. Overall energy use, has however, seen an increase since the first State of the Environment Report, as London's economy and population have expanded. To help prevent catastrophic climate change the Mayor has proposed an ambitious new target for London to stabilise its emissions at 60 per cent below 1990 levels by 2025, this is considerably more ambitious than the UK Government's target of 60 per cent below 1990 levels by 2050.

Energy use in existing homes is the largest single source of CO_2 emissions in London at 38per cent, and as such, the energy efficiency of London's homes must be dramatically improved. The commercial and industrial sectors combined account for some 40per cent of London's CO_2 emissions. Transport emissions in London (22per cent) have stayed stable since 1990 due to high long-term levels of public transport availability, use and, since 2000, unprecedented investment

in the public transport network. Through the programmes set out in the Climate Change Action Plan, a reduction of 33 million tonnes of CO_2 in the time period could be achieved, although some change in government policy would be required. A cut of around 20 million tonnes is possible under the existing regulatory environment, providing the vigorous action advocated by the Mayor is implemented.

Planning applications referable to the Mayor are required to incorporate renewable energy technologies and renewable generation capacity has started to become significant as the impact of London Plan policies start to feed through. Other greenhouse gases show a slight reduction, due to the reduction in methane, which is likely to have been achieved because landfill emissions have declined after the implementation of methane recovery systems. Fuel poverty saw a dramatic decrease both nationally and in London due to the fall in energy prices, although this is now expected to rise again as fuel price rises in the period from 2004 onwards start to bite.

Adaptation: Impacts; The Thames Barrier & Flooding; Water Supply & Consumption; Groundwater Levels

The possible consequences for London of climate change will be warmer, wetter winters and hotter, drier summers with an increase in the intensity and frequency of extreme weather events, such as heatwaves, tidal surges and torrential rain. The Urban Heat Island microclimate is likely to exacerbate the impacts and in summertime the warmer nights can negatively affect the health of older people. Unless steps are taken to prepare London, the effects will increasingly impact upon the health, comfort and safety of Londoners as well as on London's economy.

Since adapting to climate change is a relatively new challenge, no baseline was set in 2003 against which to compare interventions that will help climate-proof London or act as a climate change signal. However there are some indicators in areas where London is vulnerable and where the impacts on London may be seen.

Flooding

London is vulnerable to flooding from the tidal Thames, its tributaries, surface water flooding from heavy rainstorms and overflowing sewers. The number of properties flooded from both overloaded sewers and other causes has decreased over the period.

A significant part of London lies within the tidal floodplain but the likelihood of a flood is extremely low, less than once in every 1000 years (depending on the tide height). There have been over 100 closures of the Thames Barrier since 1982, 67 of which have been due to tidal surge from the North Sea. There has been an upward trend in such tidal closures in recent years but the lack of fluvial closures (because of heavy rainfall coming downstream from the upper Thames) over the past three years is likely to be as a result of the unusually dry winters experienced in that period.

London has a good quality water supply but the effects of a changing climate are likely to reduce the amount of water available. Eighty per cent of London's public water supply comes from the rivers Thames and Lee and there are four water companies that serve London. Since 1990, water consumption per capita in London has remained stable but at an average 156 litres of water a day per Londoner (2004/05) this is slightly higher than the national average (150 litres per day) and

also more than most other north European cities (circa 120 litres per day). Notably, metered households use 25-40 per cent less water than unmetered households.

Water supply lost through leakage has increased, with Thames Water having the highest level of leakage in England and Wales. The company is implementing an extensive mains replacement programme to renew much of the Victorian network over the next three years. Progress on will be kept under review by the GLA.

Suggestions have been made for possible future indicators to show London's level of adaptation to inevitable climate change, for example the number of times Level 3 in the Heat Health Watch system is reached in the Health Protection Agency's Heatwave Plan, could act as a useful measure of extreme summer temperatures.

Chapter 2: Resource Management: Waste & Recycling

Household recycling has increased significantly, by 126 per cent from 2000 – 2005, however, 22 of London's 37 waste authorities failed to achieve their statutory household recycling targets. The introduction of improved and extended services has contributed to the increase in recycling, as well as awareness raising campaigns, such as the Mayor's *London Let's Recycle More* campaign. The provision of an extended and consistent recycling service across London is a key part of creating a more equal and inclusive capital. Now over 90 per cent of London households either receive a recycling collection from home or have suitable access to near-entry facilities.

The way in which London's waste is managed and how Londoners use resources has a huge impact on London's contribution to climate change because of the emission of greenhouse gases from landfill, incineration and from the transportation of waste and recycled materials. Whilst waste being sent to landfill has decreased slightly by eight per cent since 2000/01, still well over half of London's waste is being sent to landfill, and about 20% is being incinerated. A change in culture, with greater emphasis being placed on preventing and reusing waste is required. Where waste cannot be reduced, reused, composted or recycled, waste should be used to power London's vehicles and buildings and the Mayor is taking a leading role in developing new, clean, energy from waste technologies.

Chapter 3: The Local Environment, Litter and Environmental Crime

A third of Londoners now think London is a clean city compared with just 19 per cent five years ago and the numbers of Londoners who think that litter is a problem has almost halved from 43 per cent in 2002 to 23 per cent in 2006. These changes coincide with the Mayor's Capital Standards campaign, launched in 2002 to improve London's street environment by working with the member boroughs. A number of successful training and awareness raising programmes have been run such as the *Litter Fairy* campaign in 2004, which was estimated to have reached 1.7 million Londoners. Another influencing factor is likely to be the increase in the number of enforcement officers boroughs employ in the issuing of Fixed Penalty Notices for littering.

Street cleanliness in London has improved with 26 of the 33 London Boroughs showing an improved Best Value score over the last three years. London is now less than one per cent over the government target of 25 per cent, compared to eight per cent over in 2003/04. Capital

Standards has set itself the challenging target of achieving an average score of 12 per cent by the Olympics in 2012. The canal network has also seen an increase in reported cleanliness.

A key contributor to an area feeling dirty and crime ridden is the removal of abandoned vehicles and graffiti. Despite various campaigns and crackdowns the number of incidents of graffiti remains high. Street scene enforcement activities have increased over the last four years and the successful removal of over 50,000 vehicles in 2004/05 as part of *Operation Scrap-It* has not only improved London's environment but also significantly reduced the number of non-accidental vehicle fires.

Chapter 4: Pollution

Air Quality: In many of today's modern cities, the main environmental health hazard to the population is the exposure to air pollution and London is no exception. Air pollution affects the health and quality of life of people who live, work in, and visit London.

Recent trends in air quality show that concentrations of key pollutants have reduced in the last 10 years. NO_x emissions fell by 37 per cent and PM_{10} emissions fell by 24 per cent. Mayoral transport policies including initiatives such as the Taxi Emissions Strategy, improvements to London's buses, and the Congestion Charge, combined with EU regulated improvements in vehicle technology have contributed to this reduction in recent years. However, air quality in London continues to breach EU and national health based targets. This is why the Mayor is proceeding with the implementation of the Low Emission Zone as the most effective way of quickly reducing pollutants that are among the most harmful to human health. All London Boroughs have declared part or all of their boroughs as Air Quality Management Areas; this is a positive move as the need to address poor air quality is recognised and action is now being taken.

Water Quality: Rivers in London support a variety of wildlife and The River Thames is one of the cleanest metropolitan rivers in the world. In the last 20 years around 120 species of fish have been recorded. There has been an overall improvement in both chemical and biological water quality in London's rivers and the number of pollution incidents monitored by the Environment Agency have fallen.

The recent welcome announcement to construct the Thames Tideway Tunnel (the single 30km long tunnel planned to intercept sewage and rainwater discharges along the River Thames) will improve the environmental quality of the Thames further and help to meet European obligations on sewage treatment. Water quality in the Lower Lee catchment area should improve from regeneration of the area as a result of the Olympics.

Noise: Excessive levels of unwanted sound can affect the quality of life. The Mayor's Ambient Noise Strategy focuses on reducing noise through better management of transport systems, better town planning and better use of buildings. For example, Transport for London is in the process of replacing existing road surfaces with quieter types and the proportion of the total Transport for London road network with lower noise surface material was 70 per cent for 2005/06. Boroughs deal with other sources of noise such as neighbour noise. The majority of noise complaints are about domestic sources of noise (for example, alarms, animals, music, DIY).

Chapter 5: Road Traffic Levels

There is an on-going need to reduce the environmental impacts of road traffic levels and the challenge for London is to deliver a sustainable transport system capable of supporting the success of the London economy and predicted population growth.

Good progress towards this goal has been made as London has achieved a world-beating modal shift away from the private car to public transport, cycling and walking. Since 2000 the number of journeys by all modes has increased and 50 per cent of journeys are less than 2km. Uniquely, London has achieved a five per cent shift away from car use, saving 500,000 car journeys and an estimated 210,000 tonnes of carbon dioxide emissions per year. Cycling in London has grown fast, up 83 per cent in the past six years. There are now an estimated 480,000 cycle journeys every day across London, around 30,000 more than a year ago and approximately 60 per cent more than in 2000. Despite this increase, campaigns to increase safety awareness for all road users have contributed to a reduction of 28 per cent in the number of cyclists killed or seriously injured on London's roads. Overall there has been a 29 per cent decrease in the numbers of road traffic collisions reported in London since 2001.

Traffic coming into and out of London has been relatively stable since 2000 but that crossing into central and inner London has decreased. The decrease in vehicles entering Central London is likely to be due to the Congestion Charging Scheme. -

Public transport use has continued to grow strongly with tube, bus, Docklands Light Railway and Croydon Tramlink networks experiencing growth in patronage. Significant improvement in the quality and coverage of the bus network has helped to increase bus use by over 34 per cent from 2000/01 – 2005/06 to 6 million passengers per day. Increases in bus patronage in London account for 100% of the growth in bus usage in the UK. Bus kilometres have increased by 27 per cent since 2000/01 and bus priority measures, such as bus lanes and traffic signal priority at junctions have improved reliability. Fare incentives have been progressively introduced too – with the aim of making London more accessible to young people and students.

Chapter 6: Land Quality and Land Use

Two thirds of London's 1,600 square kilometres is occupied by green space or water. The Green Belt accounts for 22 per cent of London's land and London is unique in designating nearly 10 per cent of its area as Metropolitan Open Land within the built environment (some 107,000 hectares), protecting spaces such as Richmond Park and Hampstead Heath. Through the Further Alterations to the London Plan, the Mayor continues to protect these valuable open spaces and areas of land covered in this way have remained stable.

River restoration has a key role in urban regeneration and renewal. Restored rivers positioned at the heart of London's urban fabric make a huge contribution to improving the quality of life for the people of London and revitalising its wildlife. Over 6km of watercourse have been fully or significantly improved since 2003 and the report summarises a range of schemes including the River Quaggy which used to flow in a concrete pipe under Sutcliffe Park in Kidbrooke, South London, and has now been restored to an attractive meandering stream.

There has been a small net increase in recreational open space (such as playing fields and sports grounds) and the area of derelict land has dropped by three quarters due to development. In the Further Alterations to the London Plan a target that at least 96 per cent of new residential development should be on previously developed land was achieved in 2005/06. This is significantly above the national target of 60 per cent.

The 737 allotments and 16 city farms continue to provide valuable green spaces in the urban environment that can help improve people's quality of life by promoting healthy food, exercise, education and community interaction.

The Mayor has led work on a 'Green Grid' for East London, which will create a network of interlinked, multi-functional open spaces to promote healthy living and improve quality of life. East London will be a major focus for regeneration and development, with the Olympic Park and Thames Gateway development and providing a significant opportunity to radically improve the environment in East London.

Chapter 7: Biodiversity

London has a great variety of wildlife habitats, from extensive woodland, heath and marshes, to the River Thames and the more formal landscapes of the Royal Parks and city squares as well as huge areas of private gardens. The total area has increased by almost 1000 hectares since 2003. These green spaces are home to a tremendous diversity of wildlife, including over 300 species of birds and 1,500 species of flowering plants. Protecting these habitats is key and the Mayor's target to ensure that there is no net loss of wildlife sites in London is being met. Having access to nature can have beneficial effects on well-being and areas of deficiency in access to nature is a new indicator in this State of the Environment report.

Trends in London's bird populations can provide an indication of changes to the local natural environment and the latest results from national bird monitoring show that birds are faring better in London than they are in surrounding areas.

Conclusion

A key issue in compiling this second State of the Environment report has been the difficulty in collating much of the information and, due to changes and improvements in methodologies, the difficulty in properly providing a comparison to the initial baseline in 2003. The report should be treated, therefore, as a snapshot giving an indication of progress since the last report.

Despite this, it is clear that there has been considerable improvement and it is anticipated that when the next State of the Environment report is published in 2011, just before the Olympic and Paralympic Games of 2012, a number of radical policies and initiatives will have been implemented and London will be an environmental showcase to millions of visitors from within this country and from around the world.

Summary Table of Indicators

Key to Trends:

↑ upward trend, increase
→ stable trend, no change
↓ downward trend, decrease
o no discernable trend, or insufficient data available.

No.	Indicator	Trend	Comment	Page No.
Chapter 1: Climate Change Adaptation & Mitigation				
31	Total Energy Consumption 2000-2003	↑		
31a	Total CO_2 emissions between 1990-2006	↓		
32	Non–CO_2 greenhouse gas emissions per annum in London	↓		
33	Energy produced from renewable sources	↑		
34	No. of houses in fuel poverty in London	↓		
9	Tidal closures of Thames barrier	↑		
10	No. of flood alerts in greater London	o		
11	No. of properties per annum in each borough	↓		
12	No. of properties flooded from sewers per annum	↓		
6	Average domestic water consumption per capita (litres per day)	→		
7	Average domestic water consumption per households (Litres per day)	→		
8	Water supply losses due to leakage	↑		
13	Ground water levels at Trafalgar Square	o	As this borehole is now used for abstraction it is not possible to use for analysis in this report. Chalk groundwater levels in the London Basin as a whole are analysed and considered to be stable.	
Chapter 2: Resource Management: Waste & Recycling				
28	Municipal waste arisings from 2000/01 to 2005/06 (London)	→		
29	Municipal waste management method from 2001/01 to 2005/06 (London)	→	Majority of London's waste is to landfill, amount of waste recycled is increasing.	

30	Number (%) of households served by a kerbside collection of dry recyclables 2005/06	↑		
Chapter 3: The Local Environment, Litter & Environmental Crime				
24	Quality of street environment	○	A lack of data and inconsistent reporting has made it difficult to analyse this indicator	
25	Local street and environmental cleanliness (% of land of a good/acceptable std of cleanliness) by borough.	↑		
26	Cleanliness of the Thames foreshore by borough (Thames 21)	○	It is not possible to discern a trend	
27	Cleanliness index of the canal network by borough (Thames 21)	↑		
Chapter 4: Pollution				
19	Total Emissions (tonnes per year) of the main air pollutants in greater London	○	It is not possible to discern a trend as the data sources are not directly comparable	
19a	Relative annual mean Monitored pollutant concentrations	↓	• NO_x concentrations declined by around 37% and NO_2 concentrations fell by 13% • O_3 concentrations rose by 50% • PM_{10}, CO and SO_2 concentrations decreased by 24%, 64% and 75% respectively, with the greatest reductions occurring prior to 2000.	
20	Percentage of London area covered by Air Quality Management Areas	↑		
15	Percentage of rivers in London where the chemical quality is classed as good or very good.	↑		
16	Percentage of rivers in London where the biological quality is classed as good or very good.	↑		
14	Number of pollution incidents in a year having a significant or major impact on air, land or water.	↓		
Chapter 5: Road Traffic Levels				
22	Number of journeys and distance travelled (per person per year)	↑	There is an upward trend in the number of more sustainable transport use.	
21	Traffic counts at London cordons since 1990	↓		
21a	Trends in use of public transport	↑		
23	Road casualties and % change	↓		

Chapter 6: Land Quality & Land Use				
1	Area of green belt and MOL in Greater London 2007	→		
5	Length of non – tidal river restored per year	↑		
4	Changes in area of recreational open space in each borough (hectares) from 2001 to 2003	↑		
3	Number of allotments sites in each borough	↑	Although it appears that there has been an increase it is likely that the earlier figures are less accurate than those returned for 2006. Comparison with the figures from the National Society of Allotment and Leisure Gardeners NSALG) 1997 survey show a downward trend.	
2	Area of derelict land in each borough	↓		
Chapter 7: Biodiversity				
18	Total area of wildlife sites identified in London	↑		
37	Areas of deficiency in access to nature by borough, 2006	o	New indicator – no comparable data available.	
17	Mean trend for 26 bird species in London, the SE and E of England 1994–2005	↑		

Chapter 1: Climate Change Mitigation & Adaptation

Introduction

Climate change is the most pressing environmental, social and economic problem facing the planet today**.**

Avoiding dangerous climate change requires immediate and sustained global action. Developed nations can lead by example and help developing nations through sharing new, cleaner technologies and increasing their resilience to climate[1] impacts. As a world city, London has a key role to play in tackling climate change through providing international leadership and sharing best practice.

Greenhouse Effect
Carbon dioxide is one of a number of greenhouse gases, so called because they keep our planet warm by absorbing and re-emitting infrared radiation that would otherwise escape into space. This is called the *greenhouse effect* and keeps the Earth at an average of 15°C, rather than an average of -18°C if there were no greenhouse gases. It is generally accepted that human activities, principally the burning of fossil fuels to generate energy, have increased the amount of greenhouse gases in the atmosphere, which has led to a 0.7°C rise in the global average temperature during the 21st century. This *global warming* is already changing the climate, presenting challenges and opportunities to the environment, society and the economy.

It takes at least 40 years for carbon dioxide to be removed from the atmosphere. The carbon dioxide levels in the atmosphere today are partly due to emissions from the last century, and today's emissions will still be influencing the climate in the middle of this century. If carbon dioxide levels continue to rise, then the atmosphere will continue to warm. Additionally, the changes to the climate may become more severe, particularly if positive feedbacks, such as the melting of polar ice and permafrost occur, as this will release additional greenhouse gases frozen beneath the ice.

Build up of atmospheric carbon dioxide is the primary cause of climate change. In January 2007 the Intergovernmental Panel on Climate Change, stated unequivocally that the threat of climate change is directly linked to human behaviour and average temperature increases[2]. This has been agreed by the governments of over 100 countries and by over 2,000 leading scientists. The burning of fossil fuels and land deforestation has altered the balance of sources and sinks of greenhouse gases. The rise in atmospheric levels of greenhouse gases has resulted in increases in atmospheric and surface ocean temperatures.

Addressing climate change presents two challenges:

a) **Mitigation –** limiting further climate change by reducing greenhouse gas emissions
b) **Adaptation –** preparing for the changes that are now inevitable and may increase further if we do not reduce our emissions

[1] It should be noted that 'climate' is a description of the average weather and its variability over a period of time (a minimum of 30 years is considered an appropriate period of time).
[2] Climate Change 2007: The Physical Science Basis, Fourth Assessment Report of the intergovernmental Panel on Climate Change (http://www.ipcc.ch).

This section addresses both of these challenges.

Since the last State of Environment Report, the Mayor launched his Energy Strategy in 2004,[3] setting out for the first time, a single strategic vision and direction for London in this area. Around the same time, the Mayor's *London Plan* was also published, setting a new, unprecedented planning context for tackling climate change, requiring energy efficiency, combined heat and power and renewable energy to be delivered in all new major developments. During the creation of these policies, the GLA has established the **London Energy Partnership, London Hydrogen Partnership and London Climate Change Agency** to work across sectors to help deliver the objectives and policies of the energy strategy and have since made significant contributions in this respect. For further information on these partnerships, please refer to Appendices 1.1, 1.2 and 1.3.

In February 2007 the Mayor launched his **Climate Change Action Plan** *'Action Today to Protect Tomorrow'*. This is the first comprehensive plan setting out decisive action to cut London's carbon emissions. The plan shows that Londoners do not have to reduce their quality of life to tackle climate change, but do need to change the way they live. It sets out the detailed actions and specific policies that will need to be adopted to achieve the target reductions. This will require actions across all sectors, including the Mayor's direct actions as well as areas where influencing public and corporate behavioural change and government and international policy will be critical.

Indicators

The wide range of London's activities, its economic development, transport systems, existing buildings, new development and energy supply choices, all impact on the capital's energy use and carbon dioxide emissions. Carbon dioxide is the key greenhouse gas released in London. To understand what the sources of emissions in London are, the GLA Environment Team produced a unique citywide geographic energy consumption and CO_2 emissions inventory[4]. The inventory is currently updated annually and the latest version produced in 2006[5] used 2003 data. . Emissions data from this inventory is given in Appendix 1.4.

Energy Consumption & CO_2 Emissions

Energy consumption data for 2000 and 2003 is provided below.

(31) Headline Indicator: Total energy consumption

Energy Consumption in London (GWh)	2000	2003	% change 2000-2003
Total Energy	151,502	160,879	6.2
Energy per capita	20.94	21.77	4.0

Table 1. 1

The Climate Change Action Plan updated the London Energy and CO_2 Emissions Inventory (LECI) emissions data from 2003, to provide projections for 2006. The report also provided a 1990 baseline. These data are shown below.

[3] Green Light to Clean Power – The Mayor's Energy Strategy February 2004, GLA

[4] London Energy and CO2 Inventory (LECI). The LECI provides energy consumption and CO_2 emission estimates across London's commercial, residential and transport sectors at both London borough and 1km^2 levels for various energy/fuel categories and sectors.

[5] The LECI is available from the Environment Group's Energy Team, Greater London Authority (GLA) on a CD-ROM – see http://www.london.gov.uk/gla/publications/environment.jsp for further details

(Sub-indicator) Total carbon dioxide emissions

Carbon dioxide emissions in London (kilotonnes)	1990	2006	% change 1990-2006
Total CO_2	45,100	44,303	-1.5

Table 1. 2

The 2006 projections in the Climate Change Action Plan (CCAP) show that London produced 44 million tonnes[6] of CO_2, representing eight per cent of total UK emissions, from the consumption of energy in the domestic, commercial, industrial and ground transport sectors. Of this, London's electricity and gas consumption causes emissions of 35 million tonnes of CO_2 per annum, 75 per cent of London's emissions. Only a relatively small amount of this energy is generated in London itself - less than ten per cent of electricity and around five per cent of heat.

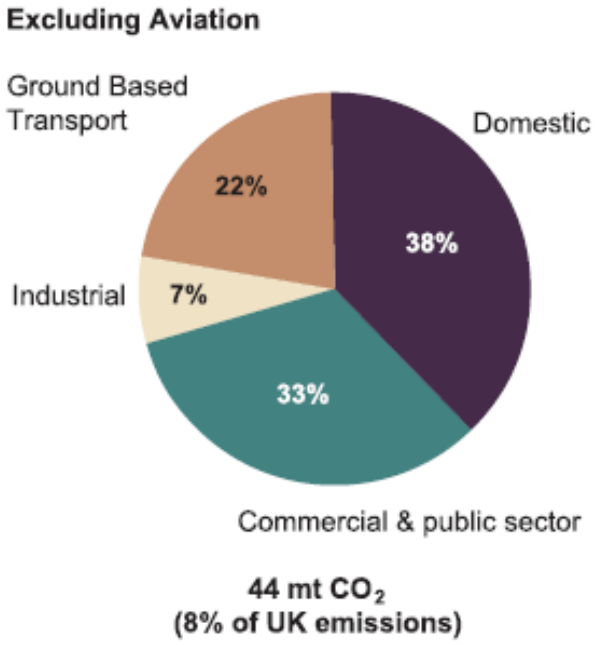


Figure 1. 1
Source: Climate Change Action Plan, Exec Summary Figure 1 (page xii)

Trend

LECI data for the period between 2000-2003 shows that:

- Total energy consumption within London rose by 9,377 GWh or 6.2 per cent.
- It should be noted that the LECI is constantly being improved and is the most accurate currently available for London. However, the improvements mean that the results are not directly comparable to the LECI 2000 figures used in **Table 1. 1** above, or those used in the previous State of Environment report.

[6] Action Today to Protect Tomorrow: The Mayor's Climate Change Action Plan, GLA – February 2007. 2006 figures are based on latest available LECI data (2003) projected to 2006 based on projections for each sector

- The emissions data produced for the CCAP show that overall, between 1990 and 2006 there has been a slight reduction in London's carbon dioxide emissions of 0.797 million tonnes or –1.5 per cent.

The London per capita figure for 2006 is 5.8 tonnes[7] of CO_2 per resident; this is approximately 40 per cent lower than average UK emissions per capita.

Analysis

The Mayor's Climate Change Action Plan shows that since 1990, London's overall CO_2 emissions have gone down, from just over 45 million tonnes per year to approximately 44 million tonnes in 2006. This is despite a rise in population of 0.7 million people, and a rise in employment of 0.4 million over the same period. This change is largely due to a halving of industrial emissions, as industrial activity has relocated to other parts of the UK or offshore, along with a significant shift in the UK's electricity generating mix, with a reduced contribution from coal and more from natural gas.

Energy use in existing homes is the largest single source of CO_2 emissions in London. Appendix 1.4 b – f provides a breakdown of emissions and energy consumption by fuel and sector. From this, it can be seen that the majority of emissions from the domestic sector is from the use of natural gas, most likely used for space heating and cooling, and hot water provision.

Compared with the domestic sector, a larger proportion of emissions in the commercial sector come from electricity usage. This is primarily due to greater energy consumption for purposes such as lighting and computing. Since current electricity provision has 125 per cent higher carbon intensity than for heating, the carbon emissions from the commercial sector are amplified.

Unlike other sectors, transport emissions in London have stayed flat since 1990 despite the rapid growth of London's population and economy. This is thanks to high long-term levels of public transport use and, since 2000, unprecedented investment in the public transport network, alongside the implementation of policies like the congestion charge to combat congestion and manage traffic.

Looking Forward

The existing UK Government aspiration is a 60 per cent carbon emission reduction from 2000 levels by 2050. To be on course for this, the Mayor's 2006 draft Further Alterations to the London Plan[8] set out the following interim targets for reductions in CO_2 from London as a whole:

- Fifteen per cent reduction from 1990 levels by 2010
- Twenty per cent reduction from 1990 levels by 2015
- Twenty five per cent reduction from 1990 levels by 2020
- Thirty per cent reduction from 1990 levels by 2025

These targets are particularly challenging given London's dramatic growth since 1990, and the continued growth expected to 2025.

However, as set out in Mayor's Climate Change Action Plan, the latest findings by the Tyndall Centre[9] and Stern Review[10] have indicated that a 30 per cent reduction in emissions by 2025 will

[7] Calculated using Climate Change Action Plan (2007) figures, based on a London population of 7.6 million.
[8] For further information go to http://www.london.gov.uk/mayor/strategies/sds/further-alts/docs.jsp
[9] "Living within a Carbon Budget", Tyndall Centre for Climate Change

not be sufficient to prevent catastrophic climate change. The Mayor has therefore proposed a new target for London, to stabilise CO_2 emissions in 2025 at 60 per cent below 1990 levels, with steady progress towards this over the next 20 years. This target is considerably more ambitious than the UK government's current aspiration of a 60 per cent reduction from 2000 levels by 2050 (see Figure 1. 2)

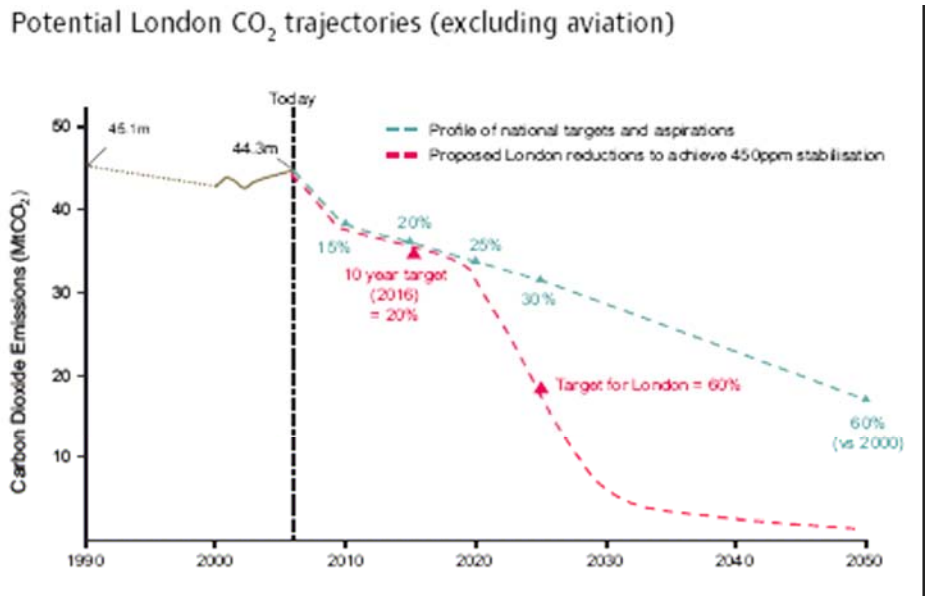


Figure 1. 2

Half of this target is achievable with current technologies but in order for London to achieve the 60 per cent target by 2025 as set out above, the UK Government must make regulatory and policy changes within the energy sector. The Mayor's top long-term priority for reducing carbon emissions is to move as much of London as possible away from reliance on the national grid and on to local, lower-carbon energy supply (including combined cooling heat and power (CCHP), energy from waste, and onsite renewable energy - such as solar panels). This approach is often termed 'decentralised energy'. The Mayor's goal is to enable a quarter of London's energy supply to be moved off the grid and on to local, decentralised systems by 2025, with the majority of London's energy being supplied in this way by 2050. Further details are set out in the Mayor's Climate Change Action Plan. Progress against this target will be a new indicator for the next State of Environment Report due in 2011.

CO_2 Emissions from Ground Based Transport

Given projected population and economic growth, demand for transport will increase over the period to 2025. Without intervention, car kilometres in London could increase by as much as eight per cent and freight traffic rise by 30 per cent from today's levels. Additional public transport capacity in the form of more buses and Underground trains will also be needed to meet demand. History would also suggest that realising substantial reductions in per kilometre CO_2 emission levels for new cars, trucks and buses, whilst possible, is by no means guaranteed. In all, this could lead to an increase in CO_2 emissions from ground transport of about two million tonnes to 11.7 million tonnes per annum in 2025, an increase of nearly 25 per cent. The Climate Change Action Plan sets out a series of measures to help combat carbon dioxide emissions from the transport sector, with priority focused on reducing emissions from car and freight traffic, as these represent nearly three

Research, July 2006 - http://www.tyndall.ac.uk/publications/
[10] Stern Review on the Economics of Climate Change, October 2006

quarters of emissions in this sector. Actions include a major programme of increased investment in public transport, promoting low-carbon vehicles and fuels and more widespread carbon pricing for transport.

Other Greenhouse Gases

In addition to carbon dioxide there are a number of other greenhouse gases emitted to the atmosphere. These include methane (CH_4), nitrous oxide (N_{20}), sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs). These gases are emitted in much smaller quantities, but are much more powerful in their global warming potential.

The Kyoto Protocol, agreed in December 1997, requires a reduction in overall emissions across a basket of six greenhouse gases. A survey of the impact of the full range of greenhouse gases in London was last conducted for the GLA in 2003 in a study undertaken by AEA Technology. This analysed the impact of the six main greenhouse gases over the time period 1990-2001 and is based on data collected by the National Atmospheric Emissions Inventory (NAEI). A proportion of each of these gases has been allocated to London on the basis of population, industrial activity and other indicators appropriate to the individual gases.

For the purposes of this State of the Environment Report, data presented for comparison is from the AEA Technology analysis.

The total emissions for the five non-CO_2 greenhouse gases for 2000 and 2001 are provided in Table 1.3. The previous State of Environment Report gave data for 2000. This has been revised and included here. Emissions are presented in units of carbon dioxide equivalent (CO_2e), in order to compare their relative contributions as greenhouse gases.

(32) Headline Indicator: Non-CO_2 Greenhouse gas emissions per annum in London

Greenhouse gas emissions	Kilotonnes CO_2e 2000[11]	Kilotonnes CO_2e 2001[12]
Methane (CH_4)	443	395
Nitrous oxide (N_20)	533	564
Sulphur hexafluoride (SF_6)	35	36
Hydrofluorocarbons (HFCs)	186	200
Perfluorocarbons (PFCs)	17	18
Total greenhouse gas emissions	1214	1195

Table 1. 3

Source: London Emissions of Greenhouse Gases 1990 – 2001, AEAT

Trend

Between 2000 and 2001, non-CO_2 total greenhouse gas emissions reduced by 19 tonnes CO_2 or 1.6 per cent.

Analysis

The five non-CO_2 greenhouse gases contribute the equivalent of approximately two per cent of London's total CO_2 emission output. The main sources of methane from human activities in London result from waste disposal and leakage from the gas distribution system. Other UK sources of methane include coal mining and agriculture. Emissions from landfill sites contribute the vast majority of London methane emissions, and these are calculated from estimates of putrescible waste disposed of to landfill. Landfill emissions have declined by over 50 per cent since 1990 because of the implementation of methane recovery systems. Since 1994 all new landfill sites must collect and either flare or utilise the landfill gas to generate power. The same applies to existing sites in the UK that still have significant remaining capacity and where significant gas production is likely. A reduction of emissions from the leakage of methane from the gas distribution system due to gas main replacement has also helped reduce overall emissions in London.

Nitrous oxide, N_2O, is emitted from power stations and vehicles which use certain types of pollution abatement technologies, such as catalytic converters. This equipment substantially reduces emissions of other types of pollution, especially nitrogen dioxide, NO_2, which has a significant impact on health. These technologies are being refined and optimised to minimise the production of N_2O emissions. Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) are gases with particular industrial applications, few of which take place within London.

Looking Forward

Analysis of methane (CH_4) and transport-related nitrous oxide (N_20) emissions are collated under the London Atmospheric Emissions Inventory (LAEI). Further detailed analysis of sources and emissions of HFC, PFC and SF_6 gases will be undertaken by the GLA in 2007/08.

[11] State of the Environment Report 2003, GLA
[12] London Emissions of Greenhouse Gases 1990-2001, AEA Technology, 2003

Energy Produced from renewable sources

Maximising the use of renewable energy conserves natural resources, and reduces the amount of carbon dioxide released when energy is used. Renewable sources of energy include solutions such as solar thermal, photovoltaics, wind power, borehole cooling, biomass boilers and heat pumps.

Data

The previous State of the Environment report provided details on renewable energy capacity and output for renewable electricity and heat for the year 2001[13] which stood at 158,000 MWh electricity and 46,300 MWh heat. The latest statistics, reproduced in Table 1.4, indicate preliminary data for renewable energy capacity and output as at March 2007. New technologies included in the latest survey include microwind, biomass and commercial and domestic heat pumps.

[13] Results were taken from study Renewable Energy Assessment and Targets for London, ETSU

(33) Headline Indicator
Energy produced in London per annum from renewable sources

	2001	**2007**	2001	**2007**	2001	**2007**	2001	**2007**
Technology	**Output Electricity (MWh)**		**Output Heat (MWh)**		**Capacity Installed (MWe)**		**Capacity Installed (MWt)**	
PV <50kWe	338 (combined)	**3,086**				**4.101**		
PV >50kWe		**80**				**0.114**		
Solar heating			3,840	**4,305-14,985**				**10.683-37.464***
Biomass				**3,979**				**0.2**
Biodegradable fraction of MSW incineration	256,000	**302,610**				**64**		
Sewage Sludge Incineration	44,900	**47,071**				**17.3**		
Small/Micro Hydro	44							
Landfill Gas	64,000	**119,358**				**18.182**		
Sewage Gas	49,000	**21,102**	42,500	**30,600**		**6.78**		**14.571**
Wind <50kWe	0.2	**255**				**0.083**		
Wind >50kWe		**9,466**				**3.6**		
Commercial and Domestic Heat Pumps				**180**				**0.079**
Total excluding MSW incineration**	158,300	**200,418**	46,300	**39,063 – 49,744**		**50.397**		**25.533-52.314**
Total including MSW incineration	414,300	**503,207**	46,300	**39,063 – 49,744**		**114.397**		**25.533-52.314**

Table 1. 4

* London estimate (from national figures) for solar heating installed as an output of government funding schemes
** Municipal Solid Waste
Source: London Renewable Energy Capacity Study (Draft) SEA/RENUE April 2007

Note: Statistics on solar heating for London are not available. However, an estimate is provided based on the number of installations known to have been installed nationally via industry sources, and the capacity of solar thermal schemes installed via the government's renewable grant programmes.

Trend

There has been a steady increase in the installation of renewable generation capacity in London and output of electricity and heat generated by renewables.

Total renewable electricity generation in London (excluding the biodegradable fraction of MSW incineration) has increased by 42,118 MWh or 26.6 per cent. Renewable heat has however, remained approximately at the same level due to the closure of sewage gas plant.

Small-scale photovoltaic installations, solar heating and landfill gas schemes have, experienced significant increases in overall capacity.

New technologies installed since 2001 include large-scale wind (a single 3.6MW scheme) and biomass heat plant.

Analysis

In the Mayor's Energy Strategy of 2004 a series of policy proposals and renewable energy targets were set out for London. Planning applications referable to the Mayor are required to incorporate renewable energy technologies, and applications for major developments are required to generate a proportion of their energy needs from renewables on site where feasible. The London Plan set a level of at least ten per cent, which is proposed to be increased to 20 per cent under the proposed Further Alterations to the London Plan (FALP).

Recent government funding programmes aimed at micro-renewable technologies have helped drive forward the use of PV, solar thermal and microwind schemes in London amongst both commercial and residential users. A precise breakdown on the proportion of these schemes installed in London is not available at present.

Ford Dagenham, London

In 2004 London's first wind park was completed at Ford Motor Company's Dagenham site.

The two 85m high wind turbines, with a combined capacity of 3.6MW, will generate over 6.7million kWh of clean electricity every year, provide all the electricity needed to power Ford's new Dagenham Clean Engine Facility. This is equivalent to enough electricity to power over 2,000 homes (nearly 7 million units per annum). This will mean that all Ford's diesel engines assembled at the plant will have been produced using wind power.

http://www.ecotricity.co.uk/

Looking Forward

The London Plan policy is driving ahead the use of a range of renewable technologies, particularly biomass boilers and heat pump technologies. However it is not yet possible to quantify the full capacity and output as much of this capacity is currently in the process of being installed.

The GLA are currently reviewing the impact, in terms of reduced energy use and carbon emissions, of the energy policies in the London Plan on applications referred to the Mayor. Renewable generation capacity started to become significant about a year after the start of the London Plan

and has grown steadily with the installation of Solar Hot Water systems, biomass, PV and GSHP providing the majority of the renewables installations (in that order). An interim report provides more details on the renewable component of planning referrals to the Mayor and further details will be provided in the completed London Southbank University report later in 2007.

The Review of the impact of energy policies[14] will strengthen current practice by identifying strategic opportunities for carbon saving gains within the planning application process and the application of the London Plan, leading to greater carbon savings across the capital, and provide support to the Mayor's proposals to increase the levels of energy efficiency and renewable energy provisions in new developments, as proposed in the FALP.

Recent analysis by the London Energy Partnership[15] has indicated that the maximum potential of (non-building integrated) wind energy capacity within the Greater London area is approximately 50 MW, which would generate around 144 GWh of electricity annually. The research also indicated that a total of approximately 540 – 600 installed biomass capacity, generating around 3.6 to 4.3 TWh of electricity and 7.2 – 8 TWh of heat was potentially viable within London.

The Mayor's Climate Change Action Plan announced a series of actions to promote the use of renewable energy technologies in London:

- Small and medium-scale renewable energy generation to be promoted through the revised London Plan standards, the Green Homes and Green Organisations Programmes.
- Pursuing large-scale renewable power generation in London.
- Much greater opportunities for wind power exist in the Thames Estuary, outside the Greater London boundary; at least enough to supply a million homes.
- The potential for using tidal and wave power from the Thames to be investigated.

Fuel Poverty

Fuel poverty is a critical social problem associated with energy use. Defined by the government as the need to spend ten per cent or more of household income on energy in order to maintain satisfactory indoor temperatures (meeting levels established by the government[16]), fuel poverty has been linked to excess winter deaths.

Fuel poverty is affected by:

- Household income
- Household occupants' characteristics (elderly, single parent etc)
- Housing standards (insulation, heating and ventilation)
- Occupancy issues (both occupancy levels and occupancy patterns)
- Energy price fluctuations and payment methods.

The Mayor's definition adopts a tougher standard for fuel poverty than that used by government, taking into account the high cost of housing in London and uses disposable income. This definition captures more households than the government's definition.

[14] Interim Report: EiP Panel Briefing Review of the impact of the energy policies in the London Plan on applications referred to the Mayor (Phase 2) May 2007

[15] London Wind and Biomass Study: Feasibility of the Potential for Stand Alone Wind and Biomass Plants in London http://www.lep.org.uk/projects/energy-demand-and-supply.htm

[16] This is defined as 21°C in the living room and 18°C in other occupied rooms

The indicator shows figures for both full and basic income in London in Table 1.5.

(34) Headline indicator: Number of households in fuel poverty in London

Number of households in fuel poverty	1996 London	1996 England	2004 London	2004 England
Full income Government definition	475,000	5.1million	119,000	1.2million
Basic income Mayor of London definition	961,000	5.5million	176,000	1.4million

Table 1. 5

Source: Detailed Breakdown of Fuel Poverty in England in 2004, Version 1, (BRE on behalf of DTI and Defra, 2006)

Trend

There has been a significant reduction in fuel poverty since 1996, when it was last recorded in the previous State of Environment report. London has experienced an 81 per cent reduction in fuel poverty during that time, from 961,000 households to 176,000. Similar improvements have been experienced nationally, when 5.5 million households were in fuel poverty in 1996.

Analysis

These figures do not take account of the fuel price increases experienced since 2004, the full impact of which is yet to show in the statistics, although a slight increase was experienced from 2003-2004.

Income is the main contributor to fuel poverty and most of the reduction seen in Indicator 34 has been through income measures with the remainder being due to fuel price decreases over the period to 2003, and to energy efficiency measures.[17]

The GLA 2002 London Household Survey found that almost eight per cent of responding households could not afford to heat their homes to the standards that they required (equating to around 240,000 homes if projected across all of the capital's housing). Women, lone parent families, older people, some minority ethnic groups and people in local authority housing were more likely to be affected.[18] In 2004/05 there were 3,400 Excess Winter Deaths[19] in London.[20]

The second biggest contributor to reducing fuel poverty is the ability to use advantageous payment methods, often less well used by the poorer community.[21] For any two identical households living in identical properties there could be a difference of £84 in the amount they pay for their fuel as a result of how they choose to pay, with direct debit being the cheapest and prepayment being the most expensive.

[17] London Energy Partnership: A Fuel Poverty Discussion Paper for London 2006

[18]

[20] London Energy Partnership: A Fuel Poverty Discussion Paper for London 2006

Looking Forward

There remain serious challenges in addressing the problems of the fuel poor. Recent energy price rises in the period from 2004 have placed significant pressure on the government's national and Mayor's London, fuel poverty targets.

Many of London's homes are very energy inefficient - because they are poorly-insulated, or have inefficient heating systems. The energy inefficiency of these homes is reflected in their low SAP (standard assessment procedure) ratings. The SAP system rates the energy efficiency of domestic buildings and their heating systems from 0 (very inefficient) to 120 (very efficient). Sixteen per cent of London homes have a SAP rating of less than 30.[22] The Mayor wants there to be no occupied dwelling in London with a SAP rating of less than 30 by 2010, and less than 40 by 2016.

In London, around 40 per cent of the carbon dioxide released into the atmosphere is from people's homes. Over half of this figure is from heating and cooling Londoners' homes. Improving the energy efficiency of homes will not only reduce CO_2 emissions but increase thermal comfort and reduce the amount Londoners have to spend on heating their homes. In the Climate Change Action Plan, the Mayor sets out measures that could save Londoners up to £1billion per year by 2025, or approximately £300 per year per average household. This will particularly benefit those on lower incomes for whom expenditure on heat and power consumes a large protion of disposable income and puts them at risk of fuel poverty.

The key new initiative to deliver carbon dioxide savings from the domestic sector will be the **Mayor's Green Homes Programme**, for which around £7 million will be set aside in the 2007/08 budget to initiate this scheme.

The Green Homes Programme

This will include:

A Londonwide offer to homeowners of heavily subsidised (and free to those on benefits) loft and cavity wall insulation.

A major marketing campaign to increase awareness about what actions Londoners can take to cut their emissions and reduce their energy bills.

A new one-stop-shop advice and referral service, available to all Londoners, on implementing energy savings measures and installing micro-renewables.

A pilot Green Homes 'concierge service', providing bespoke energy audits and project management of installation of energy efficiency improvements, micro-renewables and water conservation measures for the able to pay sector.

A programme of improving the energy-efficiency of London's social housing stock.

Identifying skills gaps in the sustainable energy industry and developing training to improve the skills required to install and service energy saving and micro-renewable products and services.

The London Energy Partnership is currently working on a fuel poverty action plan for London, which will aim to identify how London can work towards tackling the problem across the capital.

[22] The Mayor's Energy Strategy, Green Light to Clean Power, 2004 www.london.gov.uk

Through the implementation of the updated Mayor's Housing Strategy and the Strategic Housing Investment Plan (both of which will be finalised during 2007) energy efficiency for those in fuel poverty and in social housing can be further addressed and prioritised.

Climate Change Adaptation

The London Climate Change Partnership (LCCP) published the *London's Warming* report[23] in 2002. This outlines the key climate change impacts for London and highlights the possible consequences and adaptation options. The changes are expected to include:

- higher average temperatures in summer and winter
- wetter winters with more heavy downpours
- drier summers and additional pressure on London's water resources
- an increase in the intensity and frequency of extreme weather events – such as heat waves, tidal surges and torrential rain.

For more information on the LCCP, see Appendix 1.5.

The amount of change predicted varies by region, time and how greenhouse gas emissions are managed in the future. The South East of England is predicted to experience greater changes than the rest of the UK as its climate is affected by the European continental landmass. This is demonstrated in Figure 1.3

[23] London's Warming (2002) The London Climate Change Partnership. www.london.gov.uk

Predicted summer temperatures for the UK (UKCIP 02)

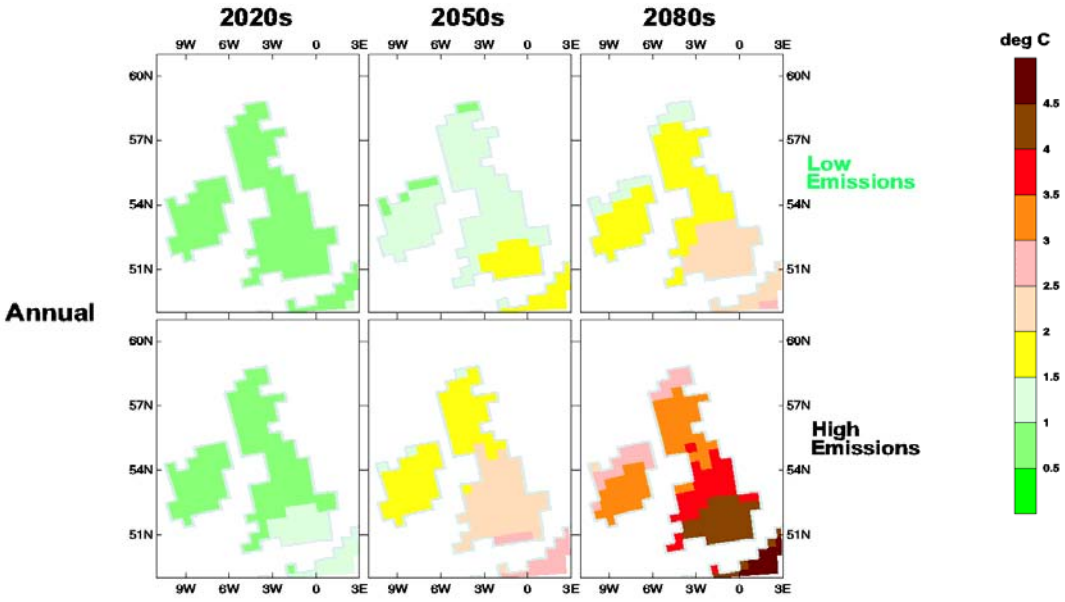


Figure 1. 3

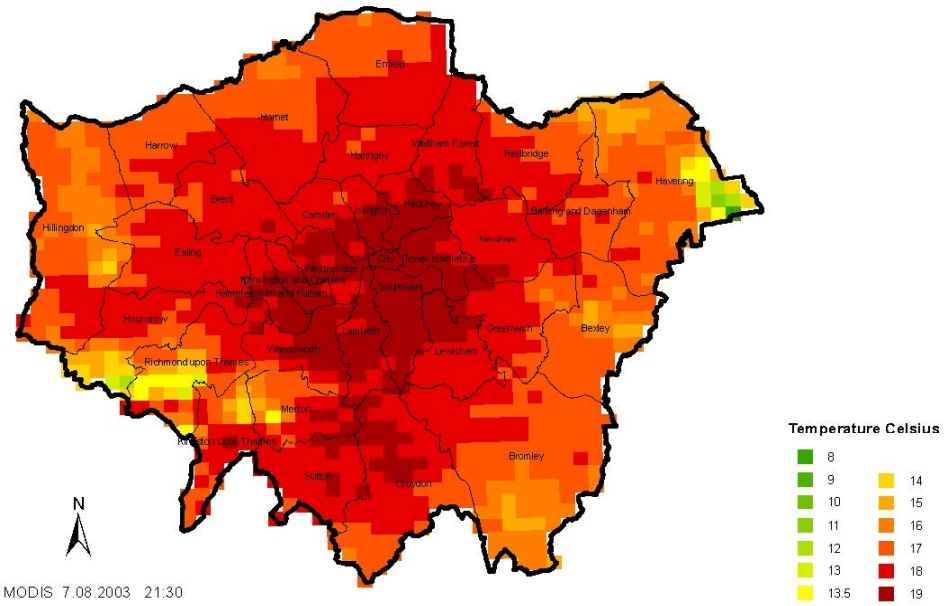
Urban Heat Island (UHI)

London, as with many large urban areas generates its own microclimate. The most understood of these is the Urban Heat Island Effect (UHI), where London's night temperatures can be higher than those in the surrounding rural areas. The UHI effect is demonstrated by the fact that snow seldom settles and that trees come into leaf earlier in London. During the winter, the UHI keeps London several degrees warmer than the green belt, so is beneficial to health, but in summertime hot weather, warm nights can affect the health of vulnerable people. In the heatwave of 2003, the centre of London was up to 9°C warmer than the green belt, which is believed to have contributed to the high number of excess deaths[24].

Figure 1.4 shows a satellite image of London taken using an infrared camera just before the 2003 heatwave. The surface of the centre of London can be seen to be more than five degrees warmer than the green belt.

[24] Kovats RS, Ebi KL. Heatwaves and public health in Europe. *Eur J Public Health*

Temperature distribution in London, August 2003



Health, Sustainability & Equality Issues

Unless steps are taken to prepare London, the effects will increasingly impact upon the health, comfort and safety of Londoners. Summer heat will reduce thermal comfort and may have serious health consequences for the old, very young and those with pre-existing long term conditions, particularly respiratory and cardiovascular conditions. It may also particularly affect people who live on their own, without good support networks.

Climate change is also likely to lead to more frequent storms and flooding events. These also will have more negative impacts on vulnerable and excluded people who live in poor quality housing and who do not have access to information, support and advice. A large proportion of those people who live on the Thames flood plain are from more deprived communities.

London's economy will also be affected by climate change. As estimated in the Stern Review, the overall costs and risks of climate change will be equivalent to losing at least five per cent of global GDP each year, possibly rising to 20 per cent. The Stern Review demonstrated that the benefits of strong and early action far outweigh the economic costs of not acting.

In response to these threats the Mayor of London has prepared the first Climate Change Action Plan for a world city, published in February 2007 and is preparing a Climate Change Mitigation & Energy Strategy and Climate Change Adaptation Strategy.

The **London Climate Change Partnership**, works to ensure Londoners are prepared for the impacts of inevitable climate change. It is currently researching to improve the capacity of retrofitting London's existing housing stock for the increasing risk of flooding, heatwaves and drought.

Indicators for Adapting to Climate Change

Since adapting to climate change is a relatively new challenge, no baseline currently exists against which to compare either what interventions help climate–proof London or the general level of preparedness. Suggestions are made in this section for possible future indicators to show London's level of adaptation to inevitable climate change.

It should be noted that 'climate' is a description of the average weather and its variability over a period of time (a minimum of 30 years is considered an appropriate period of time). Therefore the impacts experienced during the period under review in this report cannot be considered as evidence of a changing climate. It is however possible that a **'climate change signal'** may be seen in the trends of some of the environmental indicators – for example the increase in tidal closures of the Thames Barrier (see Indicator 9) may be indicative of climate change affecting sea level and tidal surges. How well London manages extreme weather events today also provides evidence of how resilient London may be under further climate change.

The number of times heatwave conditions are experienced in London could be an indication of the effects of climate change on London. The Health Protection Agency has produced a Heatwave Plan for the UK[25]. The basis for the Plan is a 'Heat-Health watch' system that operates from 01 June to 15 September. The Heat-Health watch system comprises four levels of response:

1. Awareness
2. Alert
3. Heatwave
4. Emergency

It is based on threshold day and night temperatures, as defined by the Met Office. These vary from region to region, but in London the threshold temperatures are 32°C during the day and 18°C overnight. Level 3 (Heatwave) is reached when the Met Office confirms that threshold temperatures have been reached in any one region.

The number of times Level 3 is triggered in London could be a useful measure of extreme summer temperatures, though again a long time series would be required as 'proof' of climate change.

In the summer of 2006, Level 3 was reached five times, all these were recorded in July.[26]

Flooding

London is vulnerable to flooding from four sources:

- tidal Thames
- fluvial tributaries to the Thames and the non-tidal Thames
- surface water flooding from heavy rainstorms
- overflowing sewers

Climate change will increase the probability of all these forms of flooding, whilst London's growth (more people, more assets and more valuable assets) will increase the consequence of any flood.

The Thames Tidal Defences comprise the Thames Barrier, 185 miles of floodwalls, 35 major gates and over 400 minor gates. A significant part of London lies within the tidal floodplain, and if London did not have the current defences many of these areas would flood twice a day with every tide (depending on the tide height).

The likelihood of a flood is extremely low, less than once in every 1000 years. The sort of tidal flood event that could actually seriously affect central London might occur in excess of a once in a 10,000-year return period. This is because the walls and banks downstream of the barrier would

[25] Heatwave Plan for England, Department of Health, 2006 (first published 2004)
[26] Met Office: *Record of Heat Health Watch Warnings Level 2 and Above, Summer 2006*.

overtop and the tidal surge would dissipate before reaching the Thames Barrier. Even if some water overtopped the barrier, the defences upstream would still be able to contain a large volume of water.

The defences are well maintained and regularly inspected (the operational costs of Thames Tidal Defences is around £8m per year with about £5m annual capital investment on maintaining / enhancing defences) further decreasing the risk of failure.

Tidal closures of Thames barrier

The Thames Barrier at Woolwich Reach, constructed between 1975-1982,[27] can be closed to prevent flooding from the Thames in central and west London. The Barrier is usually raised to prevent a tidal surge from the North Sea making its way up the Thames Estuary to central London (termed a 'tidal' closure). The Thames Barrier can also be closed at low tide, during heavy rainfall to provide space for freshwater flows coming downstream from Thames catchment (termed a 'fluvial' closure). This prevents the flows from meeting an incoming high tide and causing risk of flooding.

Climate change will contribute to an increase in the number of Thames Barrier closures through:

- the thermal expansion of sea water contributing to a rise in relative sea levels (sea levels are expected to rise between 26-86cms by 2080's) [28]
- an increase in the height and frequency of tidal surges

more seasonal rainfall (winter rainfall is predicted to increase) causing up to a 20 per cent increase in river flows.

Tidal and fluvial closures of the Thames Barrier since 1982/83 are shown in Indicator 9. The previous State of Environment report showed a single figure for tidal and fluvial closures up to January 2003. This has now been updated and figures for tidal and fluvial are given separately. There have been over 100 closures at the barrier since 1982, 67 of which have been due to high tides and tidal surges.

[27] For further information on the history of flooding in London, refer to SoE report 2003
[28] International Panel on Climate Change

(9) Headline indicator: Tidal closures of Thames barrier

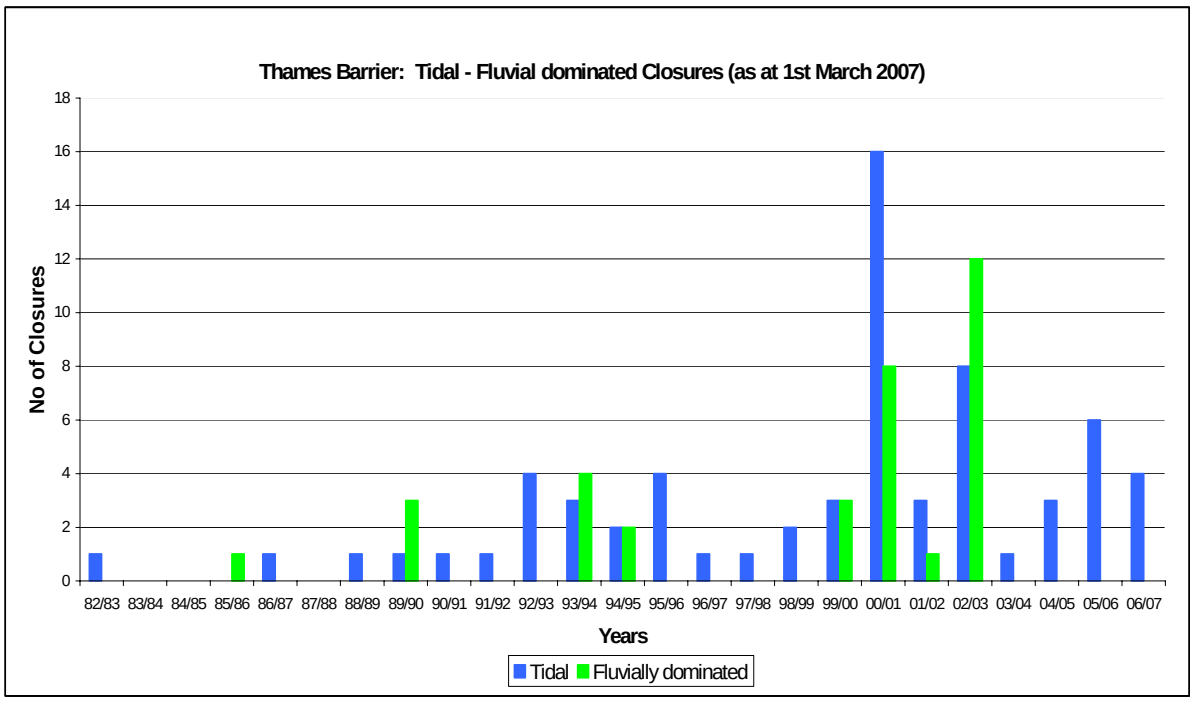


Table 1. 6
Source: Environment Agency

Trend

There does not appear to be a trend in the number of fluvial closures, but an upward trend in tidal closures is evident.

All closures for the past four years have been tidally dominated. Although we have seen high fluvial flows on the Thames these have not been the overriding factor in barrier closure.

Analysis

The Thames Barrier was designed with an expectation that relative sea levels would rise by 8mm year. The numbers of recorded closures are in line with the predictions based upon this allowance. It is important to note that the increased number of tidal closures depicted in Table 1.6 is not proof of climate change (as it could just be a period of unusual weather causing the closures) but it is indicative of a longer-term trend. The lack of fluvial closures over the past three years is likely to be as a result of the unusually dry winters experienced in that period.

Looking forward

The Thames Barrier and associated defences continue to provide a high standard of protection to London. The increase in the rise of relative sea level, increases in winter rainfall and increases in the frequency and height of tidal surges due to climate change, means that without further improvements to the standard of protection the level of defence provided will start to decline and the number of closures will increase.

The Environment Agency are developing flood risk management options to manage tidal flood risk in London and the Thames Estuary from tidal flooding for the rest of this century. The project, called Thames Estuary 2100, will report to government on the options in 2008/09. The GLA is working with the Environment Agency to help shape these options.

Flood Warnings

Since 2000, the Environment Agency has been providing a four-stage, escalating flood-warning system to inform the public. Warnings are provided on local TV and radio stations, as well as on the Environment Agency website. Warnings can also be sent by SMS text message or fax to people signing up to the Floodline Warnings Direct system or by calling the Floodline number, 0845 988 1188.

Four-stage flood warning system

- Flood watch – flooding is possible in the area. Be aware, be prepared, watch out!
- Flood warning – flooding of homes, businesses and main roads is expected in the area. Act now!
- Severe flood warning – severe flooding is expected in the area and there is imminent danger to life and property. Act now!
- All clear – there are no flood watches or warnings currently in force in the area.

Table 1.7 shows the number of flood warnings issued in London since 2001. Figures for September – December 2000, 2001 and 2002 were given in the previous State of Environment Report.

(10) Headline indicator: Number of flood alerts per annum within Greater London.

No of flood warnings issued within Greater London since 2003

Date	Flood Watch	Flood Warning	Severe Flood	Totals
2001	335	13	0	348
2002	247	6	0	253
2003	178	3	0	181
2004	202	5	0	207
2005	96	9	0	105
2006	101	12	0	113
01/01/07 – 31/03/07	*86*	*0*	*0*	*86*

Table 1. 7

Ref: figure 4 p34, SOER 2003

Climate change is predicted to increase winter rainfall and the frequency of heavy rainfall events. This will increase the peak volume of rainwater in London's tributaries and so increase flood risk.

Trend

There is not a discernable trend.

Since 2005 Flood Watches have been issued for a whole catchment only. Although Flood Watches were generally issued for a catchment prior to 2005 some were issued on a Flood Warning Area (FWA) basis. This means that the number of Flood Watches issued in previous years may seem high when compared to more recent figures. A further explanation and map of the river catchments within the Greater London area is given in Appendix 1.6

Analysis

The number of flood warnings issued should be treated with some caution as a measure of potential flooding, since the areas for which warnings are issued vary in terms of the size and number of properties covered. The flood warning system relies upon the accurate prediction of rainfall. Intense rainfall from localised summer thunderstorms can be unpredictable in both where it falls and volume of rainfall and therefore a flood warning may not be issued.

Looking forward

The Environment Agency has been undertaking flood risk management improvements in London, particularly upon some of the tributaries to the Thames more susceptible to flash floods. .

Currently 32,000 households in London are signed up to receive direct flood warnings via the Floodline Warnings Direct scheme. The majority of these are on the tributaries to the Thames where the risk is greater. For those areas protected by the Thames Barrier and associated defences, most will receive a flood warning by a media broadcast. The number of households and businesses signing up to the EA Floodline Warnings Direct scheme could be used in the future as one of a number of indicators to show London's level of adaptation to inevitable climate change.

Flooding to Properties in London

The largely impermeable urban landscape, with drains directing rainwater to rivers, means that during heavy rainfall, water levels in London's rivers can rise rapidly and any blockages of the river channel can lead to flooding. Climate change will increase the amount of winter rainfall and the frequency of very heavy rainfall events, leading to an increase in flood risk. Figure 1.5 shows the predicted increase in winter rainfall for London.

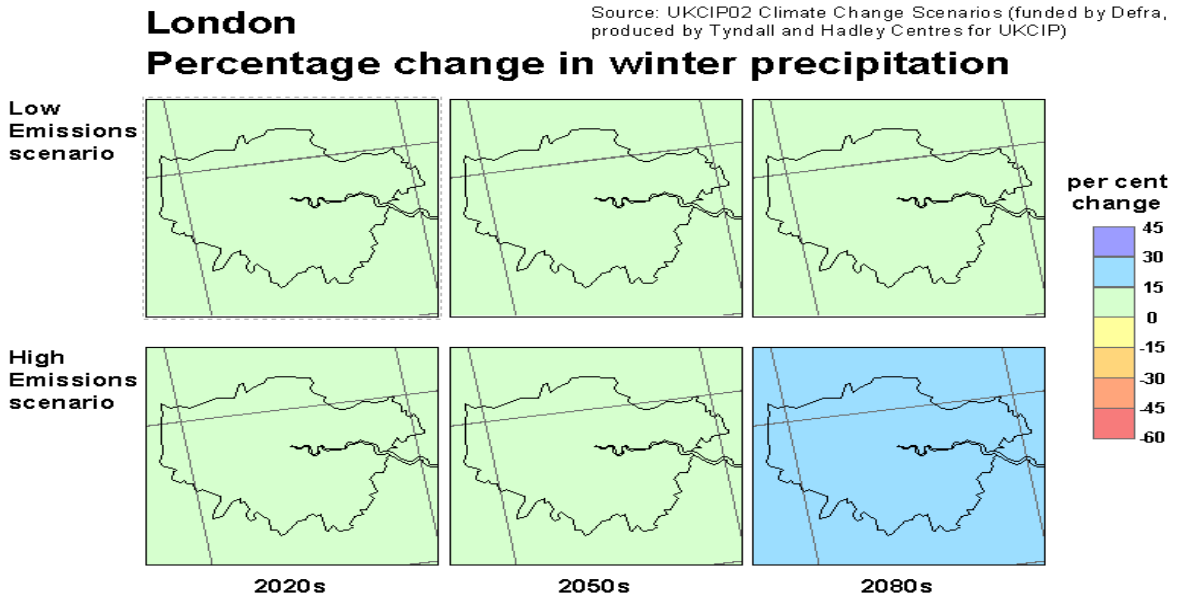


Figure 1. 5

Flood risk results from many sources: fluvial flooding from the rivers, tidal flooding from the River Thames, sewer flooding and surface water flooding. Often these types of flooding happen in combination and it is difficult to distinguish between the different sources. Surface water, sewer and fluvial flooding can occur within minutes of heavy rainfall. Flooding can therefore happen at any time of the year and there is very little time to provide flood warnings. The previous State of Environment Report gave the number of properties flooded in London by borough for 2000, 2001 and 2002. Table 1.8 includes this data and provides figures annually to 2006.

(11) Headline indicator: Number of properties flooded per annum in each borough.

London Borough	Number of properties flooded each year from main river							
	2000	2001	2002	2003	2004	2005	2006	
Brent	**2**	0	0	0	0	0	0	
Bromley	**2**	0	0	0	0	0	0	
Ealing	**3**	0	0	0	0	0	0	
Enfield	**76**	0	0	0	0	0	0	
Harrow	**2**	**4**	0	0	0	0	0	
Hillingdon	**33**	0	0	0	0	0	0	
Kingston	**5**	0	0	0	0	0	0	
Redbridge	**230**	0	0	0	0	0	0	
Richmond	**2**	0	0	0	0	0	0	
Sutton	**1**	0	0	0	0	0	0	
Wandsworth	0	0	0	0	0	**7**	0	

Table 1. 8

Source: Environment Agency

Trend

Since the last report, flooding to properties (gardens not included) occurred solely in the LB Wandsworth from the River Graveney in 2005.

This was a localised thunderstorm affecting only the Graveney. The intense rainfall falling in a very short period right over the catchment was made worse by blockages in the river channel. This is a constant threat with London's urban rivers due to the unpredictable nature of thunderstorms. The risk is increased where debris in channels from fly-tipping cause blockages.

Analysis

The rivers within the London boundary are predominantly urban rivers, which respond quickly to intense rainfall, but also fall again quickly when the rain ceases. The principal source of fluvial flooding in London is when intense rainfall in a short period overwhelms the drainage capacity. The rapid rate of surface water runoff from hard surfaces of built-up areas exacerbates the problem.

Many of the river channels in London have been modified or diverted, particularly through urban areas. They are typically straight concrete lined channels with many culverts. This often increases the rate of flow and decreases the time taken for water to travel through a catchment. Culverts and bridge crossings can cause restrictions to flow or be prone to blockage.

Managing flooding through spatial planning and allowing water to flow on to low-lying land can enhance the environment and recreation opportunities. This may include storing water in parks or

playing fields, and allowing rivers and streams to revert to more natural courses, creating wetland and other habitats.

This is discussed further with examples in Chapter 6 under 'Restoration of non-tidal rivers'.

Looking forward

In April 2005, Defra set non-statutory 'High Level Targets' to manage flood risk. Under High Level Target 5, the Environment Agency is required to report to Defra and The Department of Communities and Local Government (DCLG) the number of planning applications where the Environment Agency's sustained objections on flood risk grounds and final decisions, either by the local planning authority (London borough) or on appeal, were in line with, or contrary to, Environment Agency advice.

Flooding from the sewers

Flooding from the sewers takes three key forms:

- The sewers can no longer cope with the volumes of sewage (referred to as overloaded sewers). Such flooding can arise from groundwater infiltrating into the sewers, from the illegal connection of surface water drains to the foul sewers, through the increased volumes of sewage from new developments, and runoff from increased impermeable areas.
- Tidal or river floodwaters interfere with the effective operation of the sewers and become contaminated with sewage.
- The sewers fail because of blockages, collapses or pump failures (referred to as 'other causes').

The first two categories relate to the weather and mostly coincide with periods of heavy or prolonged rainfall. The weather can affect the last category, but it also relates to the condition of the sewer and associated equipment.

Whatever the cause, flooding of this nature is distressing to occupants and can have public health implications when the foul sewer overflows into the wastewater sewer and flows into the Thames. It is often far less predictable than river or tidal flooding yet it only affects a relatively small proportion of properties.

Table 1.9 shows the number of properties flooded internally with sewage in the Thames Water area in the last six years due to both overloaded sewers and 'other causes'. There are no comparative numbers for London, as Ofwat does not report the figures at a sub-regional level.

(12) Headline Indicator
Number of properties flooded from sewers per annum

Flooding from sewers in the Thames Water area from 1999/00 – 2004/05

Number of connected properties flooded per 100,000 properties (overloaded sewers)	
2004-2005	9.2 (9.9)
2003-2004	0.9 (4.0)
2002-2003	4.8 (10.1)
2001-2002	4.1 (9.3)
2000-2001	16.7 (14.3)
Number of connected properties flooded per 100,000 properties (other causes)	
2004-2005	12.3 (11.3)
2003-2004	7.8 (10.6)
2002-2003	10.1 (13.1)
2001-2002	12.7 (12.6)
2000-2001	25.2 (17.2)

Table 1.9

Note: (The figures in brackets are the average for England and Wales.)
Source: Ofwat

Trend

The general trend in the number of properties flooded from both overloaded sewers and other causes has decreased over the period, although in 2004/05 there was a spike. This follows the picture seen in the average for England and Wales.

Analysis

The downward trend is the result of a combination of weather factors (wet conditions prevailed at start of period), improved management of sewer network and increased investment in sewer flooding solutions over the time period.

Looking Forward

Due to climate change, heavy rainstorms are predicted to occur more frequently than in the past and have been a major factor in sewer flooding in London in the last few years. Thames Water has a significant investment programme of over £300 million for 2005-2010, in place to resolve flooding from the sewers on a prioritised basis, with the aim of reducing the risk of internal sewer flooding for virtually all properties.

Natural Resources: Water and Water Use

Water is essential for life and London has a good quality water supply. It is a finite, but recyclable natural resource that needs careful management to ensure that we have the right quantity and quality to live sustainably.

The effects of a changing climate, with reductions in river flows during summer periods and increased surface flooding, is likely to reduce the amount of water available for public water supply. The natural recharge of aquifers from which we abstract groundwater is likely to start later in the season, which may also impact on water availability. There will be a greater demand for water placed on the supply from the mains network, and therefore the environment.

The role of water in London's natural environment needs to be recognised to ensure water usage and wastewater disposal does not put excessive stress on water supplies or pollute, and that new developments do not compromise existing water and sewerage services. This section considers water sources uses, supply, management and the impacts of climate change.

Domestic water supply

London's annual rainfall is perhaps less than might be perceived, receiving less than in Rome, Istanbul and Dallas for example. It is though fairly uniform throughout the year and evaporation is modest. During most summers, there is sufficient water in the rivers Thames and Lee to meet London's demand for water. It is periods of low rainfall that threaten the security of supply which means restrictions such as hosepipe bans could be used more frequently or for longer periods. Low rainfall over the winter months limits the refill of groundwater stocks, which in turn lead to low river flows in the following spring and summer. Typically it takes two winters of below average rainfall to initiate drought actions, as was seen in the winters of 2004/05 and 2005/06.

Eighty per cent of London's public water supplies come from the rivers Thames and Lee. The water companies store this water in reservoirs around the capital; the major ones are in west London and in the Lee Valley. The remainder comes from water trapped in chalk layers under London and surrounding areas (see groundwater later in this chapter) Figure 1.8 shows the sources of London's water supplies (later in chapter).

There are four water companies that serve London (Table 1.10). They have a duty to develop and maintain an efficient and economical water service. In turn, customers have the right for the water company to connect them to the network and provide them with a water service. Not only do they supply water to Londoners but also to customers living outside of London. Figure 1.2 shows the extent of the water companies' supply areas. The figures in brackets show the London proportion of the company-wide total.

Water companies operating in London 2007

Company	Service	Population served (000)
Thames Water	Water supply and sewerage	5,693 (70%)
Three Valleys Water	Water supply only *	1,022 (34%)
Essex & Suffolk Water	Water supply only *	491 (28%)
Sutton & East Surrey Water	Water supply only *	277 (43%)

* Thames Water provides sewerage services in these areas

The figures in brackets show the London proportion of the company-wide total.

Table 1. 10

London water company supply areas

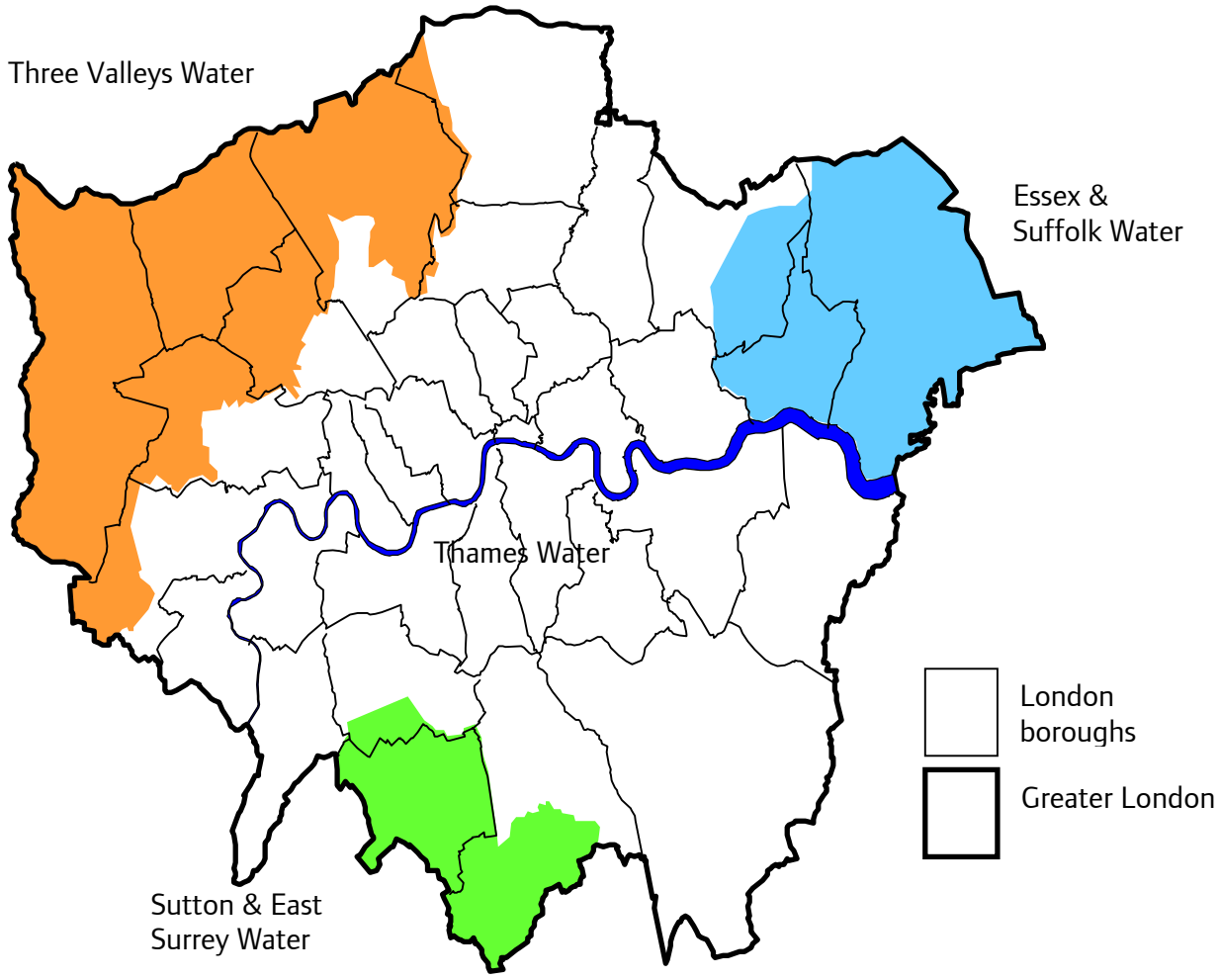


Figure 1.6

The Water Act 2003 requires all water companies to have sound drought plans, so that they can continue to supply water to their customers, when sources deplete. In 2006, Thames Water, Three Valleys Water and Sutton & East Surrey Water all imposed hosepipe bans. In addition, Sutton & East Surrey restricted its customers' non-essential use of water through a drought order. These have subsequently been lifted following above average rainfall and recovery of groundwater levels.

Domestic water consumption per capita

The way in which companies charge for water services varies, depending on whether or not they meter the volume of water used in a particular property. In unmetered properties, the charge depends on the rateable value of the property. In metered properties, water use is between five and ten per cent less than that in unmetered properties. Water companies are obliged to meter all new properties. In turn, the companies can insist a property has a meter, and pays by volume of water used, if it has water-intense appliances, such as a sprinkler or swimming pool. Tables 1.11 and 1.12 show the measured (metered properties) and unmeasured (unmetered properties) domestic consumption for the four water companies from 1990/2000 to 2005/06. The previous State of Environment report gives figures from 1997/8 – 2001/02.

(6) Headline Indicator
Average domestic water consumption per capita (litres per day)

Domestic measured consumption per capita (litres per day)

Water company	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Thames Water	156	154	150	149	154	153	154
Three Valleys Water	156	162	158	156	158	162	158
Essex & Suffolk Water	128	136	141	142	152	152	151
Sutton & East Surrey Water	144	142	146	145	155	147	143
England & Wales average	137	134	136	137	141	139	136

Table 1. 11

Source: Ofwat

Essex and Suffolk Water meter 37 per cent of all households it supplies, Three Valleys Water 26 per cent, Thames Water 21 per cent, and Sutton and East Surrey Water 20 per cent. The average for England and Wales is just below 30 per cent.

Domestic unmeasured consumption per capita (litres per day)

Water company	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Thames Water	166	167	161	165	164	161	167
Three Valleys Water	170	175	181	178	191	182	182
Essex & Suffolk Water			167	159	168	160	163
Sutton & East Surrey Water	166	165	176	176	190	178	177
England & Wales average	151	152	153	153	158	154	155

Table 1. 12

Source: Ofwat

Table 1.13 shows the combined average domestic water consumption for the four water companies.

Domestic consumption per capita (litres per day)

Water company	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Thames Water	165	165	159	162	162	159	164
Three Valleys Water	168	173	178	174	185	178	177
Essex & Suffolk Water	156	157	161	155	164	158	160
Sutton & East Surrey Water	163	162	172	172	185	173	171
England & Wales average	149	149	150	150	154	150	151

Table 1.13

Source: Ofwat

Trend

Water consumption per capita from 1999/2000 – 2005/06 has remained fairly stable. People in metered properties used on average 16.5 less litres per day than those in unmetered properties.

Analysis

Water consumption varies notably year-on-year depending on the weather; for example in the drier, hotter summer of 2003 the demand for water rose above normal. Ignoring these annual variations, the longer-term trend paints another picture. From 1961 to the 1990s water consumption rose from about 90 litres per person per day to nearly 150 litres. Yet since the 1990s, water use has more or less stayed the same. In 2004/05 (no hosepipe ban in this period) each Londoner used on average 156 litres of water a day. This is only slightly higher than the national average and higher than most other north European cities. Berlin and Copenhagen use just under 120 litres a day. Yet the amount used in London is clearly well below the figures reported for the four water companies. A reason for this is that water use, particularly garden watering, in those areas just beyond London is higher than that in London.

Water Awareness

In the summer of 2006, the GLA led on a partnership project with Thames Water to deliver a public information campaign to support key behavioural changes in water usage. Key messages included: turning off the tap when brushing your teeth, taking short showers instead of baths, not using hosepipes to water your garden or wash your car. The campaign consisted of a series of outdoor, press and radio ads over a period of several weeks. The creative work was based on the concept of translating wasted water into litre bottles, to reinforce the value of water.

The campaign proved very successful with campaign evaluation highlights including:

- Ninety-one per cent of Londoners saw/heard some save water communications
- Thirty-four per cent of Londoners saw either car wash or sprinkler ads
- Sixty-six per cent of the sample who saw toothbrush/bath ads claimed it made them think differently about how they use water
- Seventeen per cent increase in the number of people who claimed to turn the tap off when brushing their teeth.

Six per cent reduction in supply of water, over a three-month period, peaking at ten per cent during the summer weekdays.

Domestic water consumption per household

Average household water demand has increased dramatically over the past quarter-century, and we now use half as much water again as we did in 1980. The figures for 2001/02 – 2005/06 are also shown by measured and unmeasured and combined average, in Indicator 7. The previous State of Environment Report gives figures from 1997/98 –2001/02.

(7) Headline Indicator
Average domestic water consumption per household (litres per day)

Domestic metered consumption per household (litres per day) (excluding supply pipe leakage)

Water Company	2001-02	2002-03	2003-04	2004-05	2005-06
Essex & Suffolk	257	269	283	287	290

Thames	318	338	349	347	326
Sutton & E Surrey	339	338	360	342	330
Three Valleys	347	345	346	365	361
Industry	**278**	**281**	**288**	**284**	**281**

Table 1. 14

Domestic unmetered consumption per household (litres per day) (excluding supply pipe leakage)

Water Company	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**
Essex & Suffolk	462	459	480	458	475
Thames	413	410	410	402	426
Sutton & E Surrey	457	456	493	462	460
Three Valleys	494	487	524	495	497
Industry	**395**	**387**	**397**	**387**	**392**

Table 1. 15

Domestic combined average consumption per household (litres per day) (excluding supply pipe leakage)

Water Company	**2001-02**	**2003-04**	**2004-05**	**2005-06**	**2005-06**
Essex & Suffolk	403	401	415	399	407
Thames	396	397	398	391	404
Sutton & E Surrey	440	437	470	440	434
Three Valleys	470	461	487	465	461
Industry	**371**	**363**	**371**	**360**	**361**

Table 1. 16

Trend

Consumption levels appear relatively stable over the period, with Sutton & E Surrey and Three Valleys showing a higher consumption than for Essex & Suffolk and Thames Water and all are higher than the industry average.

Analysis

It is thought that water consumption is higher than average in London and the South East because summers are generally hotter and drier and that there is a greater use of more water-using appliances, such as power showers. More households now have a washing machine and one third also have a dishwasher. There are also more households with a single occupant, which places a greater demand on water supply per household.

Tables 1.14 and 1.15 indicate that metered households in London use 23-39 per cent less water than un-metered households. However, for similar households in similar properties, the average reduction is between 5-10 per cent. Water metering may have an impact on certain groups within the population. For example members of some communities have household sizes that are larger than the London average. These households will have a greater demand for water and therefore can incur greater costs for their water supply.

Looking Forward

Water must be used more efficiently as, due to the impacts of climate change, there will be an increasing number of drier summers and this, together with the predicted population growth, will

add pressure to the water supply. In the Mayor's Draft Water Strategy, the following hierarchy is proposed for managing water demand in London:

1. Improve the water efficiency of domestic water fittings and appliances without compromising on performance
2. Encourage water conservation across all householders
3. Use reclaimed water (rainwater and greywater) for non-potable needs.

Water efficiency can be incorporated into the design of new developments and in existing properties water can be used more effectively. For example, rainwater can be collected in water butts and used for watering gardens. This would reduce the amount of household water used for such a purpose, and associated energy required for purification and pumping, which contributes to greenhouse gas emissions.

The Sunshine Garden

In July 2006 the Mayor entered, for the first time, a show garden at Hampton Court Palace Flower show where Londoners could gain inspiration and tips on sustainable planting and responsible water use in their gardens.

Climate change means there will not be enough water reserves to support inefficient use of water in years to come. Thus the Mayor wanted to show Londoners it's possible to create a beautiful and productive garden using little or no mains water. Many gardeners water their plants more than is necessary and there are many easy changes that gardeners can make which together will make a big difference.

The 'sunshine garden' received wide local, national and international press coverage and is now on permanent display at London Zoo. The project received sponsorship from Thames Water and the Environment Agency. Project partners included the RHS and London Zoo.

For more information please visit www.london.gov.uk/sunshinegarden

The challenge is to proactively plan for and manage our response to the impacts of climate change and for everyone to use water more efficiently. These matters are addressed in the *Draft Further Alterations to the London Plan*, (published September 2006). In addition, the draft Water Strategy (in consultation at the time of writing) further strengthens the objectives already set out and aims to complement the plans and strategies of other organisations.

There is a need for much better information on variations in the level of water use across London. It should be possible to analyse district metered area (DMA) data in relation to social factors such as housing density and household size. A better understanding would indicate where water efficiency campaigns could deliver most.

Water supply lost through leakage

It is virtually impossible to achieve zero leakage from a large and complex network. All network industries (including gas, electricity and water) suffer some losses from their distribution systems. In terms of water, leakage is a wasteful use of natural resources; it is costly and compounds the need for further storage, treatment and enlargement of water mains.

Tables 1.17 and 1.18 show leakage in terms of both litres per property per day (table 1.17) and cubic metres per kilometre of mains per day (table 1.18). It is misleading to express leakage in terms of a percentage of the amount of water supplied. For example in a prolonged dry period, water use may well go up, and hence the percentage of leakage will decrease without leakage changing. Alternatively a reduction in water use could give an increase in the percentage of leakage losses.

(8) Headline Indicator
Water supply losses due to leakage

Leakage (litres per property per day)

Water company	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Thames Water	193	200	250	272	271	261	244
Three Valleys Water	120	116	129	125	124	120	120
Essex & Suffolk Water	98	96	97	88	92	87	86
Sutton & East Surrey Water	91	91	91	90	91	90	89
England & Wales average	143	139	146	153	154	151	149

Table 1. 17

Source: Ofwat

Leakage (measured in cubic metres per kilometre of main per day)

Water company	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06
Thames Water	21	22	28	30	30	29	28
Three Valleys Water	10	10	11	11	11	10	10
Essex & Suffolk Water	9	9	9	8	8	8	8
Sutton & East Surrey Water	7	7	7	7	7	7	7
England & Wales average	10	10	10	11	11	11	11

Table 1. 18

Source: Ofwat

Trend

Thames Water has the highest level of leakage in England and Wales. Its leakage levels are well above those of the other three water companies serving London and do not appear to be showing an improvement here, despite the investment being made. Over the period, Thames Water has seen an increase in leakage of both per property and per kilometre of main, peaking for both in 2002/03. The other three water suppliers have remained relatively stable.

Analysis

Most of the network that experiences the high leakage corresponds to Inner London within the Thames Water supply area. Large parts of London's water supply network date back to a Victorian legacy; over 60 per cent of the network are pre-1900. It is the aged infrastructure that leads to

most parts of London having the highest levels of mains leakage in the United Kingdom. It is London's high leakage losses that reveal a greater reliance on water restrictions.

It is not only the age of the network that exacerbates leakage levels, but the soil too. This can affect the pipes through corrosion (which causes pitting and structural weakness) and through movement (which puts stress on the pipes and their joints). Research shows that London has a significantly higher proportion of corrosive soils than other parts of the country. Likewise London's soils are more susceptible to soil movements due to the changes in the soil moisture.

Looking Forward

Since 2005, Thames Water has embarked on an extensive mains replacement programme that will see some 1600 km of new mains over the next five years in London. Transport for London and the London Boroughs have been working with Thames Water on this programme and the Mayor continues to press for the works to be accelerated. Through the Water Strategy and the new powers granted to the Mayor, the GLA will keep this under review.

Groundwater

Groundwater is water that occurs below the surface of the Earth, where it occupies spaces in soils or geologic strata. Plants use some of it, some evaporates and some moves due to gravity to the nearest river. The area beneath the ground where all the available spaces are filled with water is called the saturated zone. The water table may be at, or very close to the surface or hundreds of metres down. The level of water table varies depending on the antecedent conditions. After heavy rain the water table may rise to the surface. Dry weather or large-scale abstraction may lower the level of the water table. Rock strata that are able to store water are called aquifers.

Groundwater supplies are replenished or recharged by rainfall. Ideally, rainfall arrives at a rate below the infiltration capacity so that the water can soak in. Heavy rainfall will tend to run off into rivers and not replenish groundwater.

The majority of groundwater in the London area falls within the chalk formation, and forms part of the 'London Basin'. The London Basin is synclinal (u-shaped) with sands, silts and clays overlaying the chalk formation over most of the central part of London. Further away from the centre of London, chalk formation comes to the surface (outcrops) forming the higher ground to the north (Chilterns) and to the south (North Downs). This geology is illustrated in Figure 1.8.

London's water sources

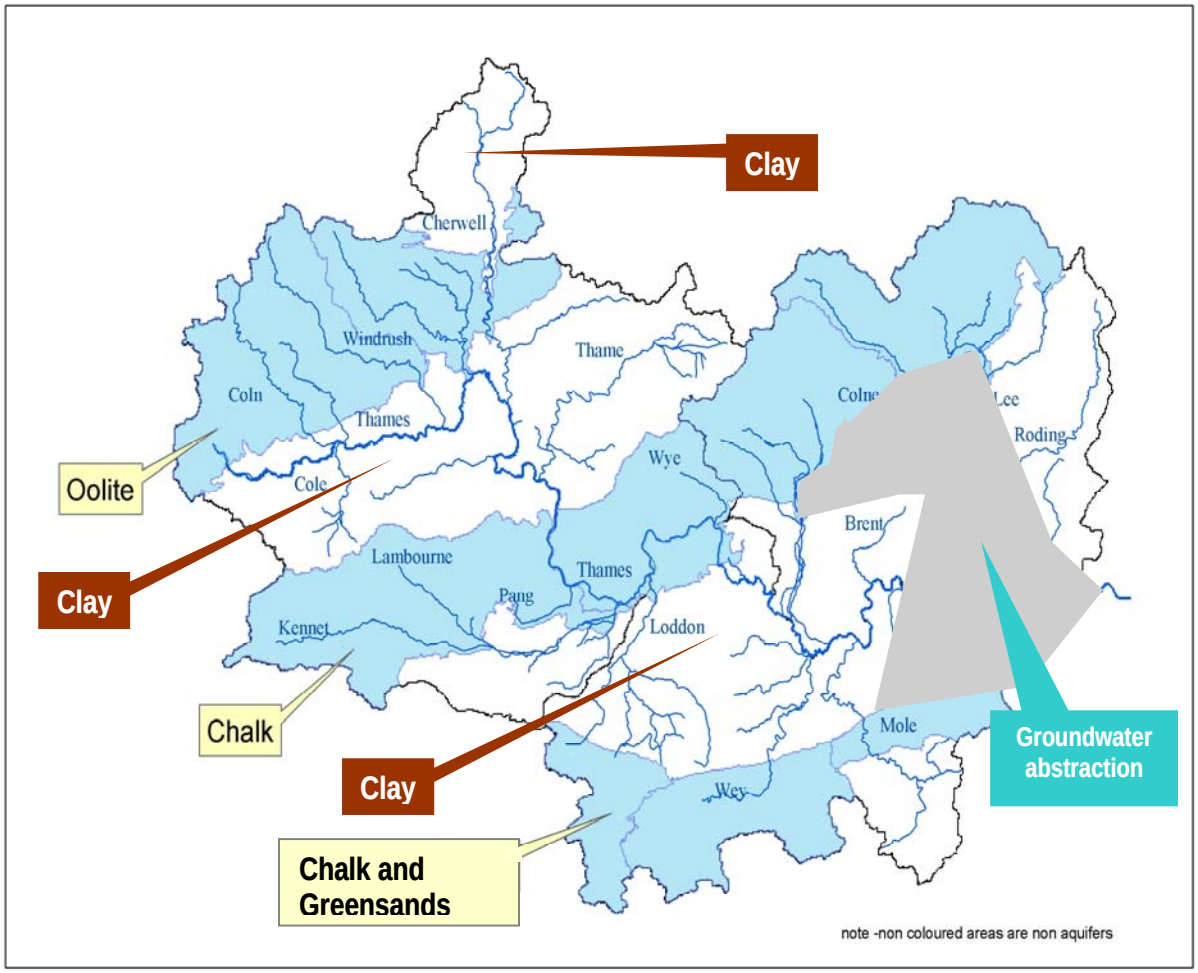


Figure 1.8

The Environment Agency has a long-term commitment to monitor and report on the state of groundwater levels beneath London from a network of observation boreholes illustrated in Figure 1.9 and that data is used here. For historical background to the abstraction and levels please refer to the previous State of Environment Report.[29]

[29] State of Environment Report 2003; Chapter 3; page 39

Groundwater Borehole Network

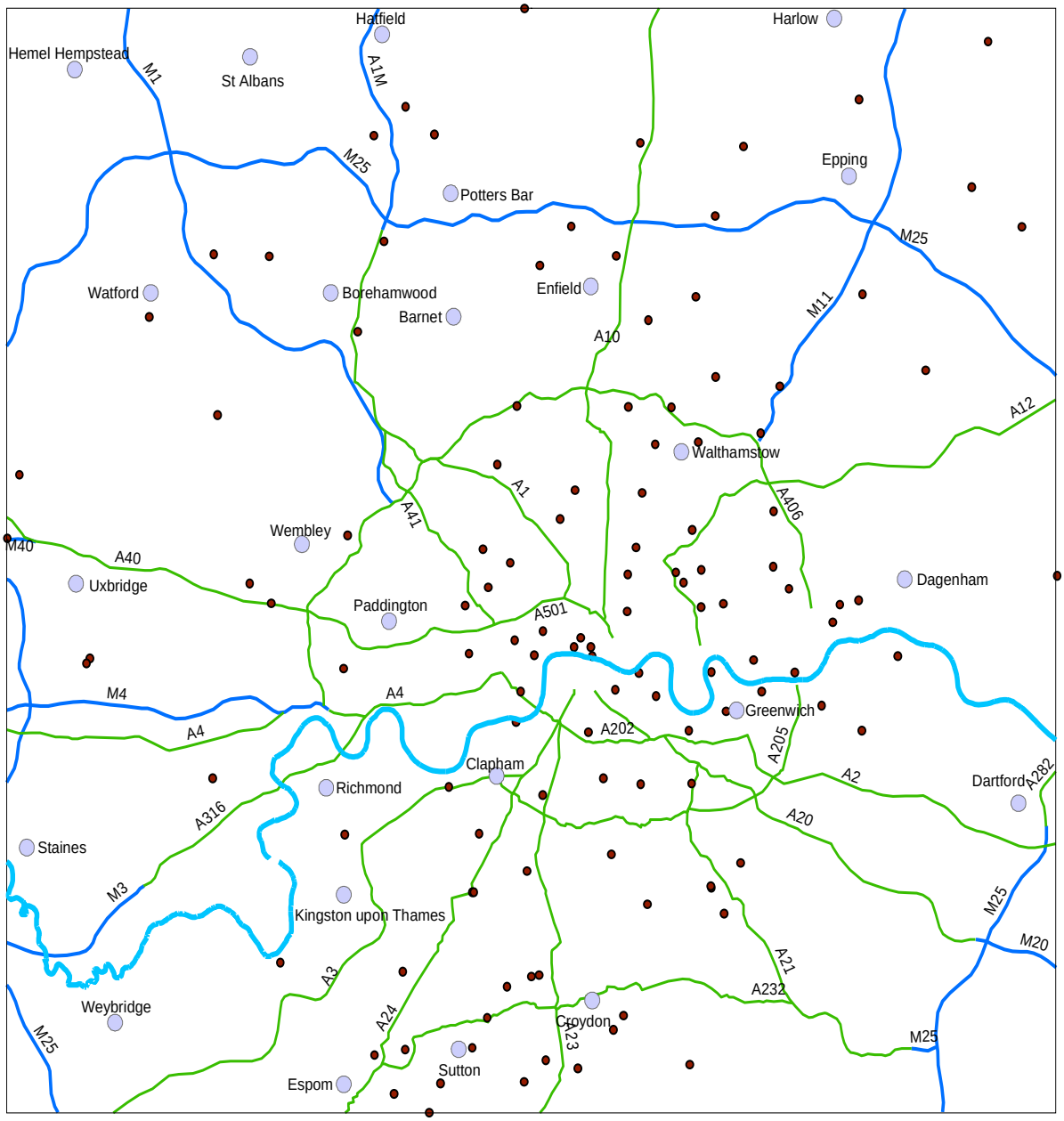


Figure 1.9
Source: Environment Agency

The Trafalgar Square observation borehole has often been used as a key borehole in the EA groundwater level report and was used as a key indicator in the previous State of Environment report.

(13) Headline Indicator
Groundwater Levels at Trafalgar Square

Figure 1.10 shows groundwater level at the Trafalgar Square borehole for 1995-2005. The previous State of Environment report looks back to 1850.

Hydrograph for Trafalgar Square borehole.

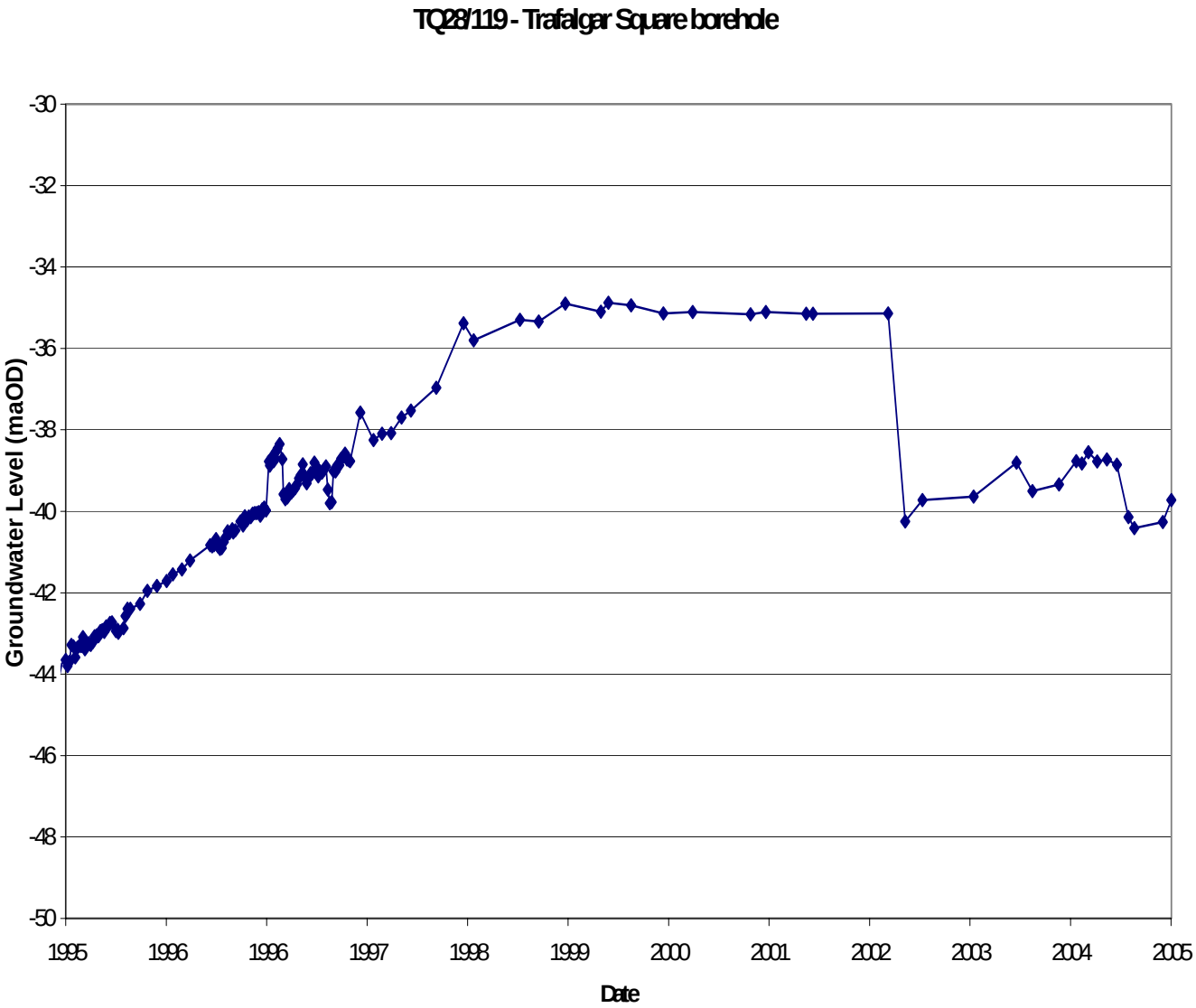


Figure 1.10
Source: Environment Agency

Trend

Since 1995 there was a steady increase that plateaued from1998–2002. It has since remained fairly stable at around –40maOD following a drop in 2002/03.

Analysis

As the Trafalgar Square borehole is now used for abstraction it is not possible to use for analysis in this report. Figure 1.11 shows a map of the rate of change of chalk groundwater levels in the London Basin as a whole.

Ground water levels in London Basin

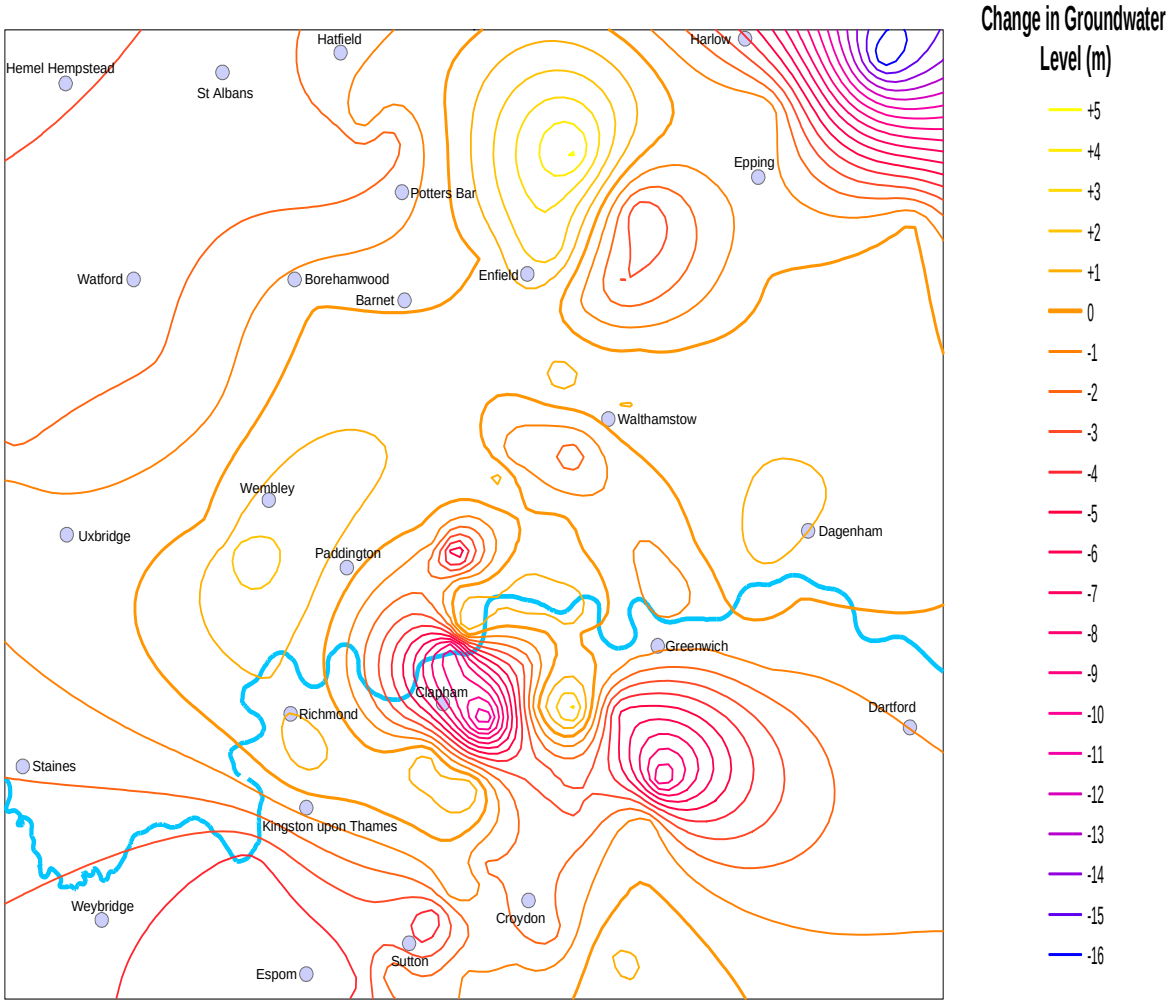


Figure 1.11
Source: *Environment Agency*

The rate of change is taken as the trend seen in the water level data over the previous two years. Where the data are directly affected by short-term abstraction changes and a long-term trend is not evident, the data have not been used.

Trend

The rate of change plot shows that groundwater levels are still rising in parts of northwest London. However, the rate of rise has decreased, as has the area over which the levels are rising. There are two points of significant reduction in groundwater level in south London, centred on the Bromley Reservoir and Brixton boreholes. These are probably related to local increases in abstraction, although natural fluctuations may also be having an effect on the water levels. Groundwater levels in the central cone of depression have only slightly changed so the groundwater level can now be considered stable.

Analysis

London's rising groundwater levels - which followed the cessation of large public abstractions from the 1950s onwards - have, until recently, left London's underground infrastructure at a real risk from inundation. In 1999 GARDIT[30] started to investigate how best to resolve the problem. It concluded that abstractions from London's groundwater should increase by 50 million litres of water a day. Since then, the Environment Agency has granted licences to take the surplus groundwater. It is the agency's view that since groundwater levels appear stable, they no longer pose a significant threat to the underground infrastructure.

Looking Forward

As a result of the GARDIT strategy and the controls imposed on central London, the whole of the London Basin chalk aquifer is becoming a managed entity, like many other natural systems.

The Environment Agency will continue to monitor levels and advise the major abstractors on the current situation so that abstraction can slowly be adjusted to achieve the required balance.

[30] GARDIT: General Aquifer Research, Development and Investigation Team

CHAPTER 2: Resource Management: Waste & Recycling

Introduction

London's households produced 3.326 million tonnes of waste in 2005/06[1], which is enough to fill an Olympic-sized swimming pool every hour[2]. This, together with just under another million tonnes (0.886 million tonnes[3]) of waste collected from businesses, litter and from municipal parks and gardens, is managed by London's waste authorities and is called municipal waste. Sixty four per cent of municipal waste was buried in landfill sites and 18 per cent was burnt in incinerators in 2005/06[4], both of which have negative effects on our environment and do not enable us to realise the opportunities from better managing our resources.

London's municipal recycling performance has improved since the last State of the Environment Report. However, it was not enough to ensure that London met the national household waste recycling target of 25 per cent in 2005/06.

London's municipal waste management arrangements are complex with all 33 London boroughs responsible for waste collection and 12 also having responsibility for waste disposal in their area. The remaining 21 London boroughs manage their waste disposal collectively through four statutory joint waste disposal authorities. This arrangement is shown in Figure 2.1.

In September 2005, the Mayor published a scoping proposal based on consultancy work and other evidence for discussion with government and stakeholders on his case for a London single waste authority (set out in proposal 89 of the Mayor's 2003 Waste Strategy). Following a consultation by government in November 2005 the government put forward a package of measures that it believes will strengthen London's ability to manage waste sustainably, without change to existing structures. However, it is the view of the Mayor and a number of key stakeholders that government has failed to address the fundamental flaws in governance arrangements in London and may well compromise the ability of London to respond to the challenge. Therefore the Mayor will continue to make the case for a London Single Waste Authority.

[1] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]
[2] Recycle for London www.recycleforlondon.co.uk [Accessed 4th January 2007]
[3] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]
[4] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]

London's waste management arrangements

Figure 2. 1
Source: Capitalwastefacts

Waste and climate change

As stated in Chapter 1, climate change is the single biggest threat to the development of human civilisation[5] and the Mayor has made it his top priority for London[6]. The way in which London's waste is managed and how Londoners use resources has a huge impact on London's contribution to climate change because of the emission of greenhouse gases from landfill and incineration and from the transportation of waste and recycled materials.

A key message of the Mayor's Climate Change Action Plan[7] is that Londoners do not have to reduce their standard of living for London to play its part in tackling climate change, but everyone must change the way they live. In terms of waste management this means we must reduce and prevent waste wherever possible, reuse products and materials and recycle, compost and recover energy from any waste that cannot be avoided. The waste hierarchy is a useful framework that has become a cornerstone of sustainable waste management, setting out the order in which options for waste management should be considered based on environmental impact and is shown in Figure 2.2.

[5] "Ken Livingstone backs Stop Climate Chaos" http://www.icount.org.uk/other/TextOnly/?ContentID=121&FontSize=0 [Accessed: 270207]
[6] The Draft Further Alterations to the London Plan, Greater London Authority, September 2006
[7] The Climate Change Action Plan, Greater London Authority, February 2007

The Waste Hierarchy

Source: Mayor's Municipal Waste Management Strategy

Figure 2. 2

For a breakdown of the waste hierarchy, please see Appendix 2.1.

Sustainable waste management, economic, health and equalities impacts

Managing waste sustainably, within London will require significant infrastructure development. The development of the green industries sector will lead to new training and employment opportunities for Londoners and contribute to London's sustainable economic growth. Economic growth and more diverse employment and business opportunities for Londoners have significant positive impacts by helping to overcome social exclusion through a lack of appropriate employment opportunities. Additionally, the provision of an extended and consistent recycling service across London is a key part of creating a more equal and inclusive capital.

Preventing waste halts the associated need to transport waste, a major source of air pollution and noise both of which can affect people's health (see Chapter 4 Pollution). The London Plan[8] has established the planning framework by which it is ensured that waste management facilities are designed and located in a way which minimises their impact on air quality, for example through managing and minimising vehicle movements and dust.

Waste can have a negative impact on communities and limit local peoples enjoyment of their neighbourhood's streets, parks and other public spaces. This can impact on social cohesion and on levels of physical activity due to reduced walking and cycling. Poorly managed waste, which can result in litter and fly tipping (discussed in Chapter 3) is associated with disease vectors such as rats and flies and is therefore a public health concern.

The Mayor's Strategy for London

In November 2003, shortly after the first State of Environment Report[9] was published, the Mayor launched his Municipal Waste Management Strategy: Rethinking Rubbish in London[10]. The

[8] The London Plan: Spatial Development Strategy for Greater London, Greater London Authority, February 2004
[9] Green Capital: The Mayor's State of the Environment Report for London, Greater London Authority, May 2003
[10] Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy, Greater London Authority, September 2003

strategy represented the first coordinated approach to waste management for London in 17 years. It set out the Mayor's vision that by 2020, municipal waste should no longer compromise London's future as a sustainable city.

To achieve this long-term goal, the strategy takes a visionary approach by clearly setting out an overarching framework of policy until 2020. Many of the proposals for action focus on the period to 2005/06 so the Mayor is revising the strategy to set new proposals for the period to 2010/11. The revised strategy will be launched for public consultation in 2007. A key driver in the revision has been to ensure the management of London's waste reduces London's contribution to climate change and the impact on London's environment.

Regional self-sufficiency

London's present capacity for managing municipal waste, within London, is small. Of the municipal waste landfilled in 2005/06 (2.7 million tonnes[11]) over 82 per cent (2.2 million tonnes[12]) was deposited in landfill sites outside the Greater London area, predominantly in the East and South East of England with just 16 per cent (0.44 million tonnes[13]) being landfilled in sites within London[14].

The Mayor's London Plan[15] has set regional self-sufficiency targets to ensure that facilities with sufficient capacity to manage London's waste are provided and to reduce our reliance on treatment and landfill facilities outside London.

Indicators

The State of Environment Report indicators have been updated to show London's progress towards reducing and managing waste more sustainably and in line with the waste hierarchy, as given in Figure 2. 2. The 2003 State of the Environment Report for London[16] reported on data between 1996/97 and 2000/01 and this report takes the data to 2005/06. New data has been included to compare London's performance with other English regions and to compare the UK with other European countries. For European comparison of municipal waste generated, see Appendix 2.2.

Municipal waste arisings

It is widely acknowledged that more must be done to separate waste growth from economic growth by better managing our resources and sustainably managing our waste. The UK is not alone in needing to take action to reduce waste. In the UK, 592 kg of municipal waste per head is generated each year, compared to just 428 kg in Greece but 732 kg in Ireland.[App2.2]

[11] Landfill deposits of MSW arising in London 2005/6 extrapolated from WasteDataFlow, www.wastedataflow.org [Accessed 13/12/06]
[12] Landfill deposits of MSW arising in London 2005/6 extrapolated from WasteDataFlow, www.wastedataflow.org [Accessed 13/12/06]
[13] Landfill deposits of MSW arising in London 2005/6 extrapolated from WasteDataFlow, www.wastedataflow.org [Accessed 13/12/06]
[14] Note there is a 1.5 per cent discrepancy because the total municipal waste figure includes hazardous waste while the tonnage landfilled does not.
[15] The London Plan: Spatial Development Strategy for Greater London. Greater London Authority, February 2004
[16] Green Capital: The Mayor's State of the Environment Report for London, Greater London Authority, May 2003

(28) Headline Indicator

Table 1 - Municipal waste arisings from 2000/01 to 2005/06 (London)

Thousand tonnes (% of MSW total)

Household waste from:	2000/01 (%)	2001/02 (%)	2002/03 (%)	2003/04 (%)	2004/05 (%)	2005/06 (%)	% change 2000/01 to 2005/06
Regular household collection	2,231 (50)	2,262 (51)	2,216 (50)	2,201 (51)	2,081 (48)	2,112 (50)	-5
Other household sources	336 (8)	310 (7)	298 (7)	274 (6)	306 (7)	277 (7)	-18
Reuse and Recycling Centres	520 (12)	519 (12)	497 (11)	411 (9)	328 (8)	250 (6)	-52
Household recycling	304 (7)	317 (7)	367 (8)	445 (10)	581 (13)	687 (16)	+126
Total household	**3,390 (76)**	**3,408 (77)**	**3,379 (76)**	**3,331 (77)**	**3,297 (75)**	**3,326 (79)**	-2
Non household waste	1,008 (23)	996 (22)	1,024 (23)	962 (22)	1,011 (23)	810 (19)	-20
Non household recycling	40 (1)	33 (1)	43 (1)	49 (1)	62 (1)	76 (2)	+90
Total municipal waste	**4,438 (100)**	**4,438 (100)**	**4,446 (100)**	**4,342 (100)**	**4,370 (100)**	**4,213 (100)**	-5

Table 2. 1

Source: Defra National Statistics

Trend

Indicator 28 shows that the quantity of materials collected from households for recycling has increased significantly – by 126 per cent between 2000 and 2005 (Appendix 2.6 details the recycling performance of each individual borough). However, 22 of London's 37 waste authorities failed to achieve their statutory household recycling targets and, collectively, London failed to achieve the national household recycling target of 25 per cent in 2005/06.

Several local authorities are already taking active steps to help householders reduce waste; running schemes such as offering subsidies or awards for not using disposable nappies and running waste exchange programmes. Such schemes are an important way of minimising waste arisings in accordance with the waste hierarchy.

Despite these developments, in terms of the overall consumption of resources, the quantity of waste (including waste which is recycled) produced by London's households has remained fairly consistent over the period, falling by just two per cent. However, it is worth noting that as a result of changes to how certain wastes, such as fly-tipped material, are defined, together with the improvements in data collection and accuracy, it is difficult to read too much into this trend. Taken overall, waste continues to grow nationally at about two per cent each year.

Analysis

The introduction of improved and extended services has contributed to the increase in recycling, as well as awareness raising campaigns encouraging Londoners to recycle more, which is an encouraging sign of progress towards sustainable waste management.

The London Recycling Fund
Between 2002 and 2006 the London Recycling Fund distributed a £50 million fund to help London boroughs and waste authorities develop their recycling services. The fund operated through a joint initiative between the Mayor of London, the Association of London Government (now London Councils) and London Waste Action. Since April 2002 the fund has awarded grants to over 130 different recycling projects run by the London boroughs and waste authorities, which (together with the matched funding) represents investment in new recycling infrastructure in London with a total value of over £100 million.

Projects included:

38 kerbside recycling projects and 29 recycling projects for estates,
22 projects sought to develop strategic reprocessing infrastructure[17] and 16 to develop Reuse and Recycling Centres and other local infrastructure
26 projects to raise awareness
8 projects to improve reduction and reuse.

There is a compilation of London Recycling Fund projects on the GLA website (May 2004) and a second report for the period to 2006 is due in 2007.

Looking forward

More must be done to prevent waste and increase recycling and composting for London's waste management to be sustainable.

Despite a significant increase on 2000 levels for non-household recycling, just 8.5 per cent of non-household waste collected was recycled in 2005/06[18]. Through the Mayor's revised Municipal Waste Management Strategy, the Mayor will encourage waste authorities to realise the opportunities of recycling more non-household waste, particularly business waste.

Municipal waste management method

The treatment and disposal of waste has a direct influence on the emissions of climate changing greenhouse gases. This is partly as a result of how waste and recycled materials are transported and partly because when managing the treatment and disposal of waste we also manage how the carbon will be released back into the environment.

[17] This includes eight Economic Development Infrastructure Building Programme projects.
[18] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]

Disposing of waste to landfill sites, for example, causes the waste to decompose in a way that leads to formation of methane. Methane is 21 times more powerful than carbon dioxide as a greenhouse gas[19] yet in 2005/06, 62 per cent of waste in the UK was landfilled[20] (64 per cent in London[21]). The Stern review[22] has shown that overall the waste industry is responsible for 3 per cent of the UK's emissions of gases that cause global warming (1.4 billion tonnes of carbon dioxide-equivalent), half of which comes from landfill sites.

(29) Headline Indicator

Municipal waste management method from 2000/01 to 2005/06 (London)

	Tonnes of Waste					
Method	**2000/01**	**2001/02**	**2002/03**	**2003/04**	**2004/05[r]**	**2005/06**
Landfill	3,207	3,244	3,163	3,021	2,856	2,692
(percentage)	*72%*	*73%*	*71%*	*70%*	*65%*	*64%*
Incineration with energy from waste	886	842	872	826	869	767
(percentage)	*20%*	*19%*	*20%*	*19%*	*20%*	*18%*
Incineration without energy from waste	1	2	1	1	1	0
(percentage)	*0%*	*0%*	*0%*	*0%*	*0%*	*0%*
Recycled/composted	344	351	410	494	643	763
(percentage)	*8%*	*8%*	*9%*	*11%*	*15%*	*18%*
Total [23]	**4,438**	**4,438**	**4,446**	**4,342**	**4,370**	**4,223**

Table 2. 2

Source: Defra National Statistics

Trend

Indicator 29 shows the following trends:

(i) The majority of London's municipal waste is still being sent to landfill.

(ii) London's use of incineration with energy recovery has remained stable at an average of 19 per cent.

(iii) The amount of waste (particularly household waste) recycled or composted is increasing.

Analysis

(i) London's use of landfill

Recycling ensures that materials that might have been previously sent to landfill are not wasted, so increasing recycling is a positive step in the goal to reduce our dependence on landfill and make better use of our resources.

[19] Twenty-one is the global warming potential (GWP) of methane using a 100- year time horizon as estimated by IPCC in 1995. This is the value used in international reporting of emissions. IPCC has more recently estimated the 100 year GWP to be twenty-three. Climate Change and Waste Management: The Link, Defra 2005

[20] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]

[21] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]

[22] Stern Review on the Economics of Climate Change, HM Treasury, October 2006

[23] Total municipal waste managed may not match total municipal waste collected as reported in Tables 1&3 due to stockpiling of waste between reporting periods.

The EU Landfill Directive[24] has set targets to ensure the amount of biodegradable municipal waste, specifically, that is landfilled is reduced. England has implemented a Landfill Allowance Trading System (LATS) to ensure the targets are met. For more information please see Appendix 2.3.

The 16 waste disposal authorities within the London region vary in amount of municipal waste generated, from the London borough of Greenwich as the least, to West London Waste Authority as the highest. In the first target year, 2005/06, all of London's 16 waste disposal authorities met their landfill diversion targets[25].

It is a concern that LATS targets may be being met by waste authorities actively reducing their non-household waste services, which is leading to the management of non-household waste being moved from the public (municipal) to the private (commercial) sector rather than municipal waste reducing as a result of waste minimisation initiatives.

(ii) London's use of incineration with energy from waste

London's use of incineration with energy from waste (at an average of 19 per cent) is substantially higher than the UK average of nine per cent over the same period[26]. London's waste management method compared with other English regions shows that London incinerated the second largest amount of waste of any region (see Appendix 2.4). London's incineration capacity is provided by two facilities, LondonWaste in Edmonton and South East London Combined Heat and Power Limited (SELCHP) in Lewisham. The Mayor intends that this current capacity will become oriented towards non-recyclable residual waste.

In June 2006, the government granted planning permission for the Belvedere incinerator in the London borough of Bexley. The Mayor worked with the London borough of Bexley to seek a judicial review of the government's decision. However, the High Court rejected the Mayor's bid for a judicial review of the decision. The building of this incinerator means that hundreds of thousands of tonnes of London's waste, which could have been recycled or used to produce biofuels and hydrogen, will simply be burnt.

Large-scale incinerators could lead to recycling being crowded out as authorities are 'forced' to supply minimum tonnages, which reduces their incentive to recycle. Electricity-only incinerators such as Belvedere, do not capture heat in the way that combined heat and power plants do, which are almost twice as efficient as separate production. The plant will release as much carbon per unit of energy as a gas fired power station. By 2020, it is predicted that the carbon intensity will increase such that electricity only incinerators will release as much carbon per unit of energy as coal fired power stations. This is a backward step in the fight against climate change.

The Mayor does not favour conventional incineration as a method for generating energy from waste for a number of reasons. A large majority of incinerated waste can be reused, recycled or used to produce bio fuels through non-incineration technologies. In order to be affordable, incinerators tend to be large and involve lengthy contracts and therefore reduce the incentives to recycle and increase the transportation of waste across London. Incinerators are inflexible as they cannot produce bio fuels for transportation and do not offer routes to produce renewable hydrogen. There is also continuing public concern about the emissions of heavy metals and dioxins.

[24] Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste
[25] Report on the Landfill Allowances and Trading Scheme (LATS) 2005/6, Environment Agency, November 2006
[26] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]

(iii) Recycling more

London's recycling performance was the lowest of any English region in 2005/06. The UK has a lower recycling rate, and disposed of a higher proportion of municipal waste to landfill, than most other European Union countries. For European comparison of municipal waste management methods, please see Appendix 2.5.

London's municipal recycling performance is improving, up from eight per cent to 18 per cent over five years with recycling of just the household fraction slightly higher at 20.7 per cent in 2005/06. However, this was not enough to ensure that London met the national recycling target of 25 per cent in 2005/06, with 15 of the 37 waste authorities meeting their 2005/06 recycling target. For a breakdown of performance by borough, please see Appendix 2.6

Recycle for London is a high profile campaign run by the Mayor that aims to encourage people to recycle more. It was launched in 2003/04 with the 'Everything Deserves A Second Chance' campaign and was realigned to the national 'Recycle Now' campaign in 2004/05 with the 'London Let's Recycle More' campaign.

In 2005, the GLA, London Waste Action and the Government Office for London commissioned Brook Lyndhurst to measure how much participation in, and attitudes to, recycling services had changed since an earlier study[27] from 2001. The research[28] shows that Londoners are taking more interest in environmental matters and their knowledge of recycling services and participation in those services is improving. For example:

- the number of consistent recyclers has increased from 50 per cent to 70 per cent
- the number of households that stated they couldn't be persuaded to recycle more fell from on in six to one in 20 households
- the number of households claiming to recycle a wide range of materials has doubled to over 40 per cent of households

the number of households who feel 'recycling is easy to fit into everyday life' increased from 40 per cent to 60 per cent.

The Recycle for London campaign was re-branded and re-launched in November 2006 to take account of the research findings with the 'It's Time for Action' campaign. The new Recycle for London campaign's key objective has shifted away from generic awareness raising towards more action orientated goals. The challenge for 2007/08 is to encourage people to recycle more often.

Looking Forward

(i) Reducing our reliance on landfill

In light of the urgent need for action to address climate change, a landfill-dominated strategy is no longer acceptable. A change in culture with greater emphasis being placed on preventing and reusing waste, and on treatment options further up the waste hierarchy is required.

Furthermore, the next landfill directive target year is 2009/10 and several London authorities will face a significant challenge to introduce schemes to ensure they do not exceed their allowances.

[27] Household Waste Behaviour in London Phase Two: High, Medium and Low Recyclers: attitudes, behaviour and needs, Brook Lyndhurst, 2004
[28] Household Waste Behaviour in London 2005, Brook Lyndhurst, March 2006

(ii) Recovering energy from waste

Where waste cannot be reduced, reused, composted or recycled, value can still be recovered in the form of energy, using technologies such as anaerobic digestion, pyrolosis and gasification.

The Mayor is taking a leading role in developing new energy from waste technologies. The panel's report[29], produced as a result of the Examination in Public of the Early Alterations to the London Plan[30], asserted that the 'Mayor has taken a bold but necessary step in the right direction by stating a preference for new technologies'.

The Mayor is particularly interested in the potential to produce hydrogen from London's waste. The output from gasification can produce biogas or generate heat and power but such facilities can also be adapted to produce a fuel to generate electricity via a hydrogen fuel cell, when the market is suitable. Hydrogen fuel cells produce energy by oxidising hydrogen into water, giving water vapour as the only exhaust gas. In the long run, hydrogen fuel cell technology could help combat air pollution and reduce noise and carbon dioxide emissions from urban transport.

The London Hydrogen Partnership has produced a report[31], which shows that as much as 141 tonnes of hydrogen could be produced from gasification, pyrolosis and anaerobic digestion of London's waste. The report indicates that this could fuel approximately 13,750 buses (compared to the present fleet size of a little over 8,000).

(iii) Recycling more

Targets for waste authorities for recycling of household waste have been set for 2007/08 (shown in Appendix 2.6). The government has consulted[32] on setting future national targets for the recycling of household waste of 40 per cent in 2010 (exceeding the current targets of 30 per cent in 2010 and 33 per cent in 2015) and 50 per cent in 2020, which may lead to higher targets being set at an authority level. Therefore, all authorities must continue to improve the services they offer and ensure that residents make best use of them.

Households receiving a recycling collection from home

A report from MORI[33] has shown that the provision of kerbside facilities is essential to increase participation in recycling but is not sufficient to change everyone's behaviour and must be accompanied by appropriate and regular communication with residents, especially in areas of high transience.

[29] Draft Early Alterations to the London Plan, Examination in Public 2006, Panel Report, the Examination in Public Panel, page 80, September 2006
[30] Draft Early Alterations to the London Plan, Greater London Authority, 2005
[31] The Potential for Hydrogen Production from Waste in London, The London Hydrogen Partnership, 2006
[32] Consultation on the Review of England's Waste Strategy, Defra, February 2006
[33] Public perceptions of waste and recycling issues, Ipsos MORI Social Research Institute, presentation made by Claire Gevaux, Senior Research Executive, Ipsos MORI Social Research Institute at London Remade's local authority network meeting: changing attitudes to waste on 12 July 2006

(30) Headline Indicator

Number (percentage) of households served by a kerbside collection of dry recyclables 2005/06 (BVPI 91a)

Authority	No of households *	BV 91a **
Barking and Dagenham	67,000	99.8
Barnet	135,000	100.0
Bexley	91,000	96.0
Brent	114,000	91.0
Bromley	129,000	100.0
Camden	99,000	100.0
City of London	4,000	100.0
City of Westminster	111,000	83.1
Croydon	142,000	76.0
Ealing	130,000	91.2
Enfield	116,000	95.7
Greenwich	96,000	94.3
Hackney	92,000	95.9
Hammersmith and Fulham	86,000	91.6
Haringey	101,000	99.0
Harrow	86,000	80.0
Havering	93,000	95.5
Hillingdon	102,000	100.0
Hounslow	89,000	98.6
Islington	85,000	90.1
Kensington and Chelsea	91,000	100.0
Kingston Upon Thames	64,000	84.2
Lambeth	130,000	97.3
Lewisham	112,000	100.0
Merton	84,000	88.0
Newham	98,000	80.0
Redbridge	99,000	89.0
Richmond	81,000	97.0
Southwark	117,000	100.0
Sutton	77,000	91.5
Tower Hamlets	90,000	100.0
Waltham Forest	96,000	100.0
Wandsworth	130,000	94.6
Average		**93.9**

Table 2. 3

Source: * WasteDataFlow
** Audit Commission BVPI 91a

Note: Percentage of households resident in the authority's area served by kerbside collection of recyclables 'Kerbside collections' include 'Near entry collection' or palladins etc. for blocks of flats and estates as long as the recycling bins are provided specifically for that block of flats in the same way, or similar way, to how waste collection more generally would be provided for that block, or is within the building or complex, or is as close to the building as the kerb.

Trend

Indicator 30 shows that over 90 per cent of London households now receive a recycling collection from home or have suitable access to near entry facilities. The data has been taken from BVPI 91a. The data produced for the last State of the Environment Report came from different sources and measured kerbside collections only (not including near entry services for flats), which means that the data for the two years are not directly comparable. However it is clear that there has been a significant improvement from the 53 per cent of properties receiving a collection[34] in 2000/01 to the 94 per cent receiving a collection in 2005/06.

Analysis

The London Recycling Fund has played a key role in helping local authorities improve and expand their services.

Forty seven per cent of the housing stock in London is purpose-built or converted flats[35], and the introduction of kerbside services to these types of properties is an important development because making it easy to take part is key to increasing participation in recycling and may improve recycling rates.

However, a kerbside service may not be feasible or cost effective to all flatted properties. Therefore, near entry facilities have been implemented for those high-rise properties that are not receiving, or cannot receive, a kerbside collection. The introduction of kerbside services to high-rise properties (and the extension of near entry facilities for those not on a kerbside service) is welcome because it ensures there is a more consistent and equal service provided to all Londoners. Overall, the bring bank or near entry facility network has expanded from 4,055 sites in 2003/04[36] to 7,052 sites in 2005/06[37] however this data, taken from WasteDataFlow, is incomplete as a number of boroughs have failed to provide the information (a chart is given in Appendix 2.7 to show the number of sites in each borough).

Similarly, the number of materials being collected for recycling from households at kerbside and through the bring bank network has increased. Proposal 16 of the Mayor's Municipal Waste Management Strategy[38] required that 'waste authorities provide [household] recycling collections of at least three materials by September 2004'. This has been met and in 2005/06 all authorities were collecting four or more materials[39], with some collecting more than nine through their kerbside service. Some kerbside collections therefore now include a collection of materials and products such as electrical items, household batteries and plastic bottles as a result of forthcoming legislation and new reprocessing infrastructure for London is being developed.

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[34] Green Capital: The Mayor's State of the Environment Report for London, Greater London Authority, May 2003
[35] Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy, Greater London Authority, September 2003
[36] The Mayor's Municipal Waste Management Strategy Progress Report, Greater London Authority, October 2005
[37] Data from WasteDataFlow question 17
[38] Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy, Greater London Authority, September 2003
[39] Capitalwastefacts Matrix, www.Capitalwastefacts.com [Accessed 4 January 2006]

Looking Forward

Local authorities need to continue to expand and develop their services so that all the households in their borough have access to suitable services. Where a kerbside service cannot be implemented, near entry facilities that are well maintained, at a sufficient density, suitably located and effectively communicated, are appropriate.

The Mayor, in the draft Further Alterations to the London Plan[40] has set a minimum target for housing provision of 30,500 additional homes per year to 2016/17. This is unlikely to be spread evenly across London. Local authorities will need to ensure that their planning processes are well coordinated and linked into the waste management challenge to ensure that as London continues to grow, homes are designed in a way which supports the local waste infrastructure and new developments are integrated into communications campaigns and operational rounds.

Business waste

This chapter has focused on municipal waste, because this is where the Mayor's statutory duty lies. However, London currently produces over 18 million tonnes of waste every year, of which, just over four million tonnes (approximately 25 per cent) is municipal waste[41]. Table 2.4 shows how much waste is produced by London's commercial and industrial sector and construction, demolition and excavation sector, which is managed by private waste contractors.
The Further Alterations to the London Plan[42] sets the following targets:

- achieve recycling or composting levels in commercial and industrial waste of 70 per cent by 2020, and
- achieve recycling and reuse levels in construction, excavation and demolition waste of 95 per cent by 2020.

Given the levels of recycling shown in Table 2. 4, significant improvements are required in order to meet the London Plan targets.

Total non-municipal waste produced and disposal method (London) 2003

Source of waste	million tonnes per annum	% disposed at landfill	% recycled	% incinerated	% other
Commercial and Industrial (estimated)	6.6	40	44	5	11
Construction, Demolition & Excavation (estimated)	7.2	15	85	0	0

Table 2. 4

Source: Alterations to the London Plan, Mayor of London, 2006

In his Municipal Waste Management Strategy[43], the Mayor made a commitment to produce a wider strategy covering all London's waste. The Mayor's vision is that by 2020 the waste

[40] The draft Further Alterations to the London Plan, Mayor of London, 2006 (Policy 3A.1)
[41] The London Plan: Spatial Development Strategy for Greater London. Housing Provision Targets, Waste and Minerals Alterations, Mayor of London, December 2006
[42] Draft further alterations to the London Plan (Spatial Development Strategy for Greater London), Mayor of London, September 2006

produced by London's businesses no longer compromises London's future as a sustainable city. London's businesses must take responsibility and action to use resources productively. London's waste industry and entrepreneurs must maximise the economic opportunities of reprocessing and managing waste within London.

The term 'business waste' refers to commercial, industrial, construction, demolition, excavation and hazardous waste produced by businesses operating in the public, private, voluntary and community sectors from those with a single employee to multinational corporations.

The draft strategy[44] will be launched for public consultation in the autumn of 2007.

Hazardous Waste

In July 2005 the Hazardous Waste (England and Wales) Regulations (2005) and the List of Wastes (England) Regulations come into force. Of significance, the regulations extended the number of materials being classified as hazardous waste and therefore requiring their separation from general waste and safe treatment. Hazardous waste includes a range of products and materials from batteries, fluorescent light bulbs and TV screens to oils and construction and clinical wastes.

London produces the second least amount of hazardous waste of any region in the country[45]. However, London has the lowest levels of self-sufficiency, where only four per cent of the hazardous waste produced is disposed of within the region[46]. Almost half the hazardous waste produced in London was construction, demolition and excavation and industrial waste.

Household hazardous waste collection is provided to all London boroughs by the City of London (other than LB Hillingdon, which operates its own service).

According to a study by Imperial College London[47], each year up to 10,500 tonnes of hazardous waste is produced in the capital's households. Yet in 2005/06 only 200 tonnes of this waste was collected by the City of London's Household Hazardous Waste Collection Service and properly disposed of. Consequently, as much as 10,000 tonnes of household hazardous waste is being mixed in with normal household waste collections and disposed to landfill or incinerated or being poured down the drain.

Whilst a small proportion of all London's total hazardous waste, clinical hazardous waste is a significant proportion of waste generated from healthcare facilities. Material Health[48] found that in 2001 the NHS generated an estimated 385,000 tonnes of waste. Of this, roughly two-thirds was general waste and one-third clinical hazardous waste. There are strict controls to ensure it is

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[43] Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy, Greater London Authority, September 2003
[44] The Mayor's draft Strategy for London's Business Waste, Greater London Authority, April 2007
[45] Environment Agency Strategic Waste Management survey for hazardous waste, 2002/03, http://www.environment-agency.gov.uk/subjects/waste/1031954/315439/923299/908241/?lang=_e [Accessed: 220107]
[46] "Movement of hazardous waste between regions in 2003", Environment Agency, http://www.environment-agency.gov.uk/subjects/waste/1031954/315439/923299/908241/908554/?version=1&lang=_e [Accessed: 220107]
[47] Future requirements for the management of household hazardous wastes, Department of Environmental Science & Technology, Imperial College London, August 2005

[48] Material Health: A Mass Balance and Ecological Footprint Analysis of the NHS in England and Wales, Best Foot Forward, April 2004

handled and disposed of safely. Effective waste stream segregation and management is key to prevent infection and minimise waste arisings.

CHAPTER 3: The Local Environment, Litter and Environmental Crime

Introduction

Environmental crime refers to a range of antisocial actions that harm or spoil the local environment and have an impact on the quality of life, these can include:

- fly-tipping - dumping household or commercial rubbish in private or communal areas
- littering - deliberately dropping litter on the streets
- graffiti - spray-painting or otherwise marking private property or communal areas such as bus-shelters and houses
- dog fouling – failure to pick up dog faeces in designated areas
- abandoned vehicles – abandoned without lawful authority.

Inner-city retail and poorer areas often suffer from environmental crimes to a greater extent due to larger populations, greater waste production and fewer resources. Effective enforcement can help to change anti social behaviour.

Litter, fly-tips and abandoned vehicles can be unsafe and attract vermin such as rats, flies and other disease carrying pests. This can have health implications; sustained improvements in the standard of cleanliness on London's streets and public spaces will therefore contribute to improved health and sustainable development. A clean environment will encourage Londoners to participate in their local community and utilise existing open spaces, thus improving their quality of life.

Since 2002 local opinion polls have shown that Londoners believe that London's streets are getting cleaner. In 2002, 19 per cent of people polled thought London was a clean city and 72 per cent of people thought it was not. This compares to 36 per cent of people polled in 2005 who thought London was a clean city and 55 percent of people not. However in the 2006 poll Londoners' opinion on whether London is a clean city fell for the first time with 33 per cent agreeing and 58 per cent disagreeing[1]. This shows that although there has been an overall improvement since 2002 there is still some way to go and the cleanliness of London's streets remains a key issue for Londoners and visitors alike.

However this overall improvement has not elevated London as a region compared with other English regions. ENCAMS produce an annual Local Environmental Quality Survey of England (LEQSE) for DEFRA for the purposes of monitoring cleanliness and informing policy. Since the first LEQSE in 2002/03, despite improvements, London has always been ranked ninth out of the nine regions although this statistic must be treated with caution, as London is the only region that is entirely urban.

The changes seen in public perception do reflect the direction regional cleanliness scores have been taking over a number of years but also coincides with the commencement of the Capital Standards campaign and the government's Cleaner Safer Greener agenda.

Additionally, in 2005, the Clean Neighbourhoods and Environment Act came into force, which means a fine can be levied for harming the environment in terms of littering, fly-tipping, and

[1] Ipsos MORI Annual London Survey

waste dumping alongside many other environmental offences relating to waste. This legislation has been a positive push to change public perception and to impose consequences for those destroying the environment. This act supports the existing work being done through the Mayor's Capital Standards Programme.

Capital Standards

The Mayor's Capital Standards campaign has been running for over four years and in April 2006 began a new three-year programme. Capital Standards includes a full cleansing enforcement and monitoring training package that ensures the staff of boroughs involved in the programme are fully trained to engage in street environment enforcement activities.

Membership consists of 28 London boroughs, the GLA, London Councils, LFEPA, TFL, MPA, Environment Agency, GOL and five street cleansing contractors that operate in London. Since 2002 the Capital Standards campaign has had a number of successes including:

- the London Schools Environment Awards, which in 2006 had over 700 primary schools registered
- the 'Litter Fairy' anti-litter cinema and poster campaign, and
- the Street Academy Enforcement training programme that has trained over 500 London borough enforcement officers in enforcement legislation and how to use it.

Following the success of 'Street Academy' the Capital Standards programme has introduced a new advanced enforcement training programme, to complement the existing course, concentrating on training borough officers in the collection of evidence and case file preparation for successful prosecution of persistent or serious offenders of environmental legislation. The Capital Standards partnership is looking to train around 150 officers per year on the two Capital Standards Street Academy courses.

During 2007 the Capital Standards partners, along with other stakeholders, will run a high profile 100-day clean up campaign targeting areas in London with poor standards of cleanliness, educating Londoners and visitors on what they can do to clean up London, undertaking coordinated multi-agency enforcement activities and generally publicising and celebrating good practice. The network also wishes to expand its membership to include businesses, landowners and other areas of society that have a responsibility, influence or control over the public realm.

Capital Standards is delivered in partnership with ENCAMS (formally Tidy Britain Group) through a contract. A major component of the programme is the undertaking of Local Environmental Quality Surveys and the production of Best Value Performance Indicator 199 scores for the borough members (see Headline Indicator 25). ENCAMS (Environmental Campaigns) produced the Local Environmental Quality and BVPI 199 methodology and undertakes the Local Environmental Quality Survey of England for DEFRA and this provides Capital Standards and its members with a quality assurance that is not available from any other partner.

Indicators

The State of Environment report indicators have been updated as far as possible to provide an indication of the cleanliness of London's streets and open spaces. The responsibilities to keep land clear of litter are *primarily held by the London Boroughs as Litter Authorities* but despite

litter being municipal waste and therefore an issue that the Mayor of London must cover in his strategy, waste collection and disposal authorities do not have to have regard to the Mayor's strategy when tackling litter and do not have to notify the Mayor when they intend to advertise street cleansing contracts. This means that the Mayor is unable to influence these contracts and the standards or levels of service specified within them.

It has therefore been difficult to collect comprehensive information from across London and despite establishing a Voluntary Information Scheme in 2002, to gather street enforcement activity data from boroughs. Many entries have been late and/or incomplete. The Mayor has been consulting the London boroughs on a further information scheme to collect information on the state of the environment and has applied to the Secretary of State to make the scheme compulsory.

(24) Headline Indicator

Quality of the street environment

Data is presented in a series of tables in the following pages detailing issues such as littering, abandoned vehicles and dog fouling.

Trend

It is difficult to discern a trend in the quality of London's street environment using the following set of data due to the inconsistent quality across time periods for the data and lack of response from boroughs under the Voluntary Information Scheme referred to above. The following tables give an indication of the cleanliness of London's streets through looking at number of enforcement notices served, extent of dog fouling and levels of abandoned vehicles and graffiti in each borough.

Data

Section 88 - Fixed Penalty Notices for Litter	**2002-2003**	**2003-2004**	**2004-2005**	**2005-2006**
No. of Fixed Penalties Issued	10248	2860	9693	10917
No. of Fixed Penalties Paid (percentage)	3861 (37.7%)	1784 (62.4%)	5201 (53.7%)	5676 (52%)
No. of cases of non-payment taken to court (percentage)	68 (0.66%)	47 (1.6%)	378 (3.9%)	40 (0.4%)

Table 3. 1

Source: Defra Borough breakdown available at Appendix 3.1

Analysis: Section 88 - Fixed Penalty Notices for Litter

It would appear as though, apart from for 2003/04, the number of fixed penalty notices (FPN's) issued has risen but does vary depending on the priority placed by boroughs on addressing enforcement. In 2002/03 Westminster council had an enforcement drive and issued a massive 8,547 FPN's. However, the London Boroughs of Bromley, Camden, Harrow, Havering and

Kingston do not enforce at all, or do not provide data to Defra on activity, despite being required to do so.

It is very difficult to attribute this rise to any one factor. Capital Standards Street Academy enforcement training coming on line in 2003 is likely to have been an influence, but the most influencing factor is likely to be the provision in the London Local Authorities Act 2004, which states that London boroughs may retain the FPN payments and use it for improving services. This has resulted in an increase in the number of enforcement officers many boroughs employ and an increase in the number of notices issued. Although this does not directly reflect the cleanliness of London's streets it does mean awareness about anti social behavior and environmental crime is on the increase, which in turn should have an impact the amount of litter dropped.

A concern with the data in table 3.1 is the relatively poor payment rate being experienced by London boroughs as this can undermine the effectiveness of Fixed Penalty Notices to change behaviour, which is the whole purpose of the Fixed Penalty Notice system.

Section 87 - Offence of leaving litter	**October 2002 - March 2003**	**April 2003 - September 2003**	**October 2003 - March 2004**	**April 2004 - September 2004**
No. of boroughs issuing formal warnings	11	15	5	6
Initiating prosecutions	9	6	5	6
With no action	21	18	27	26
Total	4361	2816	2283	5194
Highest number issued by one borough	2434	1270	1055	2556
Lowest number issued by one borough	0	0	0	0

Table 3. 2

Source: Voluntary Information Scheme

Analysis: Section 87 – Offence of leaving litter

For the last two periods reported here only 16 of the 33 boroughs provided information. Of those that responded, for the first three half years Westminster took most action but over spring and summer 2004 the most active borough was Islington with 2556 warnings issued. The number of prosecutions initiated has been much higher than the number of successful prosecutions. However Waltham Forest appears to have by far the best record for successfully prosecuting all initiated action.

Litter Fairy campaign

A significant factor in improving the cleanliness of London's street environment is that of changing behaviour and stopping litter from being dropped in the first place. Enforcement plays an important role in this education but it should not be the only medium for spreading the social responsibility message. Media campaigns, although sometime expensive, reach many people when effectively targeted. Research undertaken by ENCAMS[2] has shown that the age bracket that is most likely to drop litter is 16 to 24 year olds and with this in mind the Mayor of London in partnership with Capital Standards developed the highly successful *Litter Fairy* campaign.

[2] ENCAMS: Environmental Campaigns

The *Litter Fairy* campaign ran in cinemas across London in spring/summer 2004 and cost around £300,000, most of which was gained through external sponsorship. As well as being shown alongside the film Starsky and Hutch, posters were displayed on bus stops and other media and it is estimated that the message reached 1.7 million Londoners.

The short film ironically followed a Tinkerbell style fairy flying through well-known London landmarks at night picking up litter that had been dropped throughout the day. The campaign's key message to Londoners is that there is no magical fairy that cleans the streets at night and therefore encourages Londoners not to litter as 'A cleaner London is up to you'.

The strap line 'A cleaner London is up to you' encapsulated the message that Capital Standards is aiming to spread amongst Londoners and continues to be used in other campaigns such as the anti smoking-related litter campaign and London Clean-up.

Section 93 - Street Litter Control Notice

This section of the Environmental Protection Act 1990 enables borough councils to serve a notice on the occupiers of premises imposing requirements in relation to litter and refuse for the purposes of preventing accumulations of litter and refuse.

Redbridge was the only borough returning information that took action by issuing two litter control notices between October 2003 and September 2004.

Section 99 - Abandoned Shopping Trolleys	October 2002 - March 2003	April 2003 - September 2003	October 2003 - March 2004	April 2004 - September 2004
Have you adopted section 99 enabling the seizure or removal of abandoned trolleys? If yes:	8	8	5	5
Total	528	1616	674	348
Highest number issued by one borough	467	1500	656	319
Lowest number issued by one borough	0	0	0	0

Table 3. 3

Source: Voluntary Information Scheme

Analysis: Section 99 - Abandoned Shopping Trolleys

Of those that returned information, Waltham Forest is consistently the most active borough in seizing and removing abandoned shopping trolleys.

Dog Fouling	2002-03	2003-04	2004-05	2005-06
Number of fines issued by London boroughs	34	16	90	65
Number of fines paid to London boroughs	24	11	39	45
Number of cases taken to court	33	1	1	0

Table 3. 4

Source: Defra

Analysis: Dog Fouling

Over the past ten or more years allowing your dog to foul public places has become increasingly socially unacceptable. This is predominantly due to high profile public campaigns about the health implications associated with dog fouling, particularly toxicariasis, although younger generations of dog owners may not be aware of these campaigns. To help address the issue, local authorities provide bins for dog owners to deposit their dogs' faeces in. A range of products are also sold in pet shops, and to increase the incentive to scoop the poop local authorities are empowered to fine dog owners or guardians if they do not clean up after their dog.

Fixed Penalty Notices are not widely used in London for tackling dog fouling although their use is on the increase. The number of cases taken to court has dropped dramatically since 2002/03. In 2002/03, only four boroughs issued fixed penalty notices for dog fouling offences. In 2005/06 this number rose to 12. The two main reasons for this increase are likely to be the available training through Capital Standards and the change in legislation enabling boroughs to retain the value of fixed penalty notices.

	Graffiti - Section 12, London Local Authorities Act 1995			**Graffiti - Town and Country Planning Act 1990**	
Period	No. of reported incidents on area the London Boroughs have responsibility for	No. of reported incidents on private land	No. of notices served	No. of incidents of graffiti removed by London boroughs from private land	Average time between receiving report and removal of graffiti (days)
Oct 02 - Mar 03	13986	12686	813	40513	5.2
April 03 - Sept 03	15908	13807	1946	15114	5.7
Oct 03 - Mar 04	6165	7279	301	8778	7.3
April 04 - Sept 04	10823	6091	513	5971	7.3

Table 3. 5

Source: Voluntary Information Scheme

Analysis: Graffiti

The presence of graffiti continues to be a major concern for Londoners and despite various campaigns and crackdowns the number of incidents remain high. Graffiti, like abandoned vehicles, is one of the major contributors to a perception of crime and poor cleansing and is therefore an extremely important aspect of environmental crime to deal with. Of those boroughs reporting incidences of graffiti and the number of times they remove it, it seems the majority do not serve notices on private property requesting the owner to remove it. Data received through the information scheme shows Brent as serving the vast number of notices above.

Abandoned Vehicles ***Operation Scrap-it results***	**Oct 2004 - Dec 2004**	**Jan 2005 - Mar 2005**	**April 2005 - June 2005**	**July 2005 - Sept 2005**	**Total**
Number of confirmed reports of nuisance vehicles	18945	19891	19800	18450	**77086**

Number of nuisance vehicles removed in London	12899	13381	13382	12082	**51744**
Number of vehicles available for removal in 72 hours	12509	12118	12926	11449	**49002**
Number of nuisance vehicles removed in 72 hours	11968	11951	12810	11331	**48060**
Percentage of vehicles removed in 72 hours	96%	99%	99%	99%	**98.25%**
Number of vehicles enforced against in other ways in 72 hours	6436	7773	6874	7001	**28084**
Percentage of vehicles enforced with 72 hours	97%	99%	99%	99%	**98.50%**
Number of vehicles not enforced within 72 hours	541	167	116	118	**942**

Table 3. 6

Source: Operation Scrap It

Analysis: Abandoned vehicles

As a key contributor to an area feeling dirty and crime ridden it is extremely important to have abandoned vehicles removed as soon as possible. Data shown here is limited to one year as it has not been possible to source any other reliable data. What is clear is that Operation Scrap-it installed robust procedures into removal of abandoned and nuisance vehicles. Response rates increased as did the number of vehicles passed on to other agencies such as the DVLA. The number of vehicles dealt with in other ways also increased therefore helping to identify the actual number of vehicles abandoned.

Operation Scrap-It

In 2002/03 more than a third of England's abandoned vehicles were in London.

From October 2003 for two years, London Councils and the Home Office ran Operation Scrap-it - a successful campaign to remove untaxed and abandoned vehicles from London's streets within 72hours of reporting. As well as tackling the problem of abandoned vehicles over the life of the project, it was designed to develop useful partnerships that could go on reducing crime and disorder long-term.

One of the elements of the scheme was a free take-back service, signed up to by the London boroughs, which received £30 per vehicle from the London Councils funding. Scrap-It also provided £9m for enforcement, complementing existing borough budgets for tackling abandoned and untaxed vehicles.

In 2004/05, Operation Scrap-It removed over 50,000 nuisance vehicles from London's streets of 98 per cent were dealt with within 72 hours.

On top of the enforcement operation, 24,000 vehicles were voluntarily surrendered to councils in 2004/5.

According to the London Fire and Emergency Planning Authority (LFEPA), which runs the London Fire Brigade, non-accidental vehicle fires were reduced by over half in the two years up to the end of March 2005.

Looking Forward

Capital Standards is addressing the issue of low payment rates on FPN's for litter through its Street Academy training. A new enforcement-training course has also been developed that focuses on evidence gathering and case file preparation. This course will empower officers to build cases and give evidence in major environmental offences as well as ensuring that details are taken thoroughly when issuing Fixed Penalty Notices to help locate non-payers.

Capital Standards will continue to train London borough officers in how to effectively issue fixed penalty notices and how to prosecute repeat offenders or non payers of fines. The dog fouling situation will continue to be monitored through the Capital Standards Local Environmental Quality Surveys and if a significant increase is identified the allocation of resources to a targeted campaign will be considered.

In dealing with abandoned vehicles, on 1 January 2007 the free take back element of the End of Life Vehicle Regulations 2005 began. Registered owners of end of life vehicles can now deliver them to take back facilities for de-pollution, recycling and recovery with the manufacturer picking up the bill. In theory, this should mean that abandoned vehicles are likely to be unregistered. This should lead to a further reduction in the number of vehicles abandoned on London's streets.

Despite a lack of reliable data, what can be seen from the information above is that enforcement activities have increased over the last four years. This is predominantly due to new legislation such as the Clean Neighbourhoods and Environment Act 2005, the Anti Social Behaviour Act 2003, London Local Authorities Act, as well as government's adoption of the 'cleaner, safer, greener' agenda and associated funding, and of course, the success of the Capital Standards programme. The GLA will continue to collect this data, as it is an essential component of a range of information needed when trying to determine why a particular borough or area in London is not performing well.

Waste left or dumped on the streets from commercial activities is always an issue in London and it is often left up to the boroughs to educate commercial waste producers about their Duty of Care responsibilities and to enforce these responsibilities when they are flouted. However, since the first State of the Environment Report, the Environment Agency has launched the website www.netregs.gov.uk with the aim of providing guidance to small and medium size businesses on environmental issues such as energy, air quality, noise and waste. As well as providing guidance on how to reduce the impact of a business on the environment, the website tells companies about their legal responsibilities, particularly relating to waste.

As mentioned throughout this document the lack of good quality data to help evaluate and inform policy remains an issue but for flytipping however, this should start to improve. In 2005 the Environment Agency and DEFRA launched Fly Capture, a web based reporting facility for fly tipped waste. The first set of Fly Capture results, April 2005–March 2006[3] ,have been published and unsurprisingly London as a region has reported significantly higher incidents of fly tipping. What is disappointing though is that only 26 out of the 33 London boroughs submitted a full

[3] http://www.defra.gov.uk/environment/localenv/flytipping/flycapture.htm

year's data in 2005/06. Through London Councils and Capital Standards the Mayor will be encouraging a 100 per cent completion rate from all boroughs for future years.

Street Cleanliness

In 2003 Best Value Performance Indicator 199 was launched along with the introduction of targets or minimum standards for England and Wales. Comparability with previous data is therefore not possible and as such data prior to 2003 has not been included here.

BVPI 199 records the percentage of land surveyed that falls below a good or acceptable level of cleanliness for litter and detritus, thus when comparing data, a lower score is better. In determining a good or acceptable standard of cleanliness, surveyors will refer to the code of practice on litter and refuse which gives pictorial examples of these (below a Grade B). In April 2005 it was extended to include graffiti, fly posting and flytipping, these are recorded separately and are shown in Appendix 3.2. Data for the last three years shows that London boroughs are the worst performing in England and lag someway behind the national average. Although there has been overall improvement over the past three years, this needs to continue.

Average BVPI 199 score 2003/04 - 2005/06

	2003/04	2004/05	2005/06
	Average	Average	Average
All	21.74	18.1	15.3
London borough	33.59	24.26	25.6
Metropolitan Authority	24.57	21.25	17.4
Unitary Authority	21.41	18.5	14
District Authority	19.12	16.3	13.7

Table 3. 7

(25) Headline Indicator

Local street and environmental cleanliness (percentage of land falling below a good or acceptable standard of cleanliness) by borough

For 2005/06 government set an acceptable level of 25 per cent or below.

Authority	2003-04 %	2004-05 %	2005-06 %	Percentage point Change from 2003/04 & 2005/06
Barking & Dagenham	47	36.1	37.7	-9.3
Barnet	29	22	9.0	-20
Bexley	35	26	28.0	-7
Brent	45	34	30.0	-15
Bromley	28	10	10.0	-18
Camden	24	20	17.0	-7
City of London	2	3	6.0	4
Croydon	36	22	37.0	1
Ealing	49	35	36.5	-12.5

Enfield	28	24	15.7	-12.3
Greenwich	38	27	43.0	5
Hackney	44	30	36.0	-8
Hammersmith & Fulham	26	30	24.0	-2
Haringey	47	32	37.1	-9.9
Harrow	41	19	31.0	-10
Havering	43	37	44.0	1
Hillingdon	39	34	43.0	4
Hounslow	42	34	39.0	-3
Islington	36	32	24.4	-11.6
Kensington & Chelsea	18.2	10.4	4.8	-13.4
Kingston-upon-Thames	34	27	30.6	-3.4
Lambeth	34	24	17.0	-17
Lewisham	33	21	28.5	-4.5
Merton	39	25	17.0	-22
Newham	40	27	38.0	-2
Redbridge	16.5	14.5	12.0	-4.5
Richmond upon Thames	15	35.5	31.0	16
Southwark	34	20	20.0	-14
Sutton	29	26	6.0	-23
Tower Hamlets	34.1	22	23.0	-11.1
Waltham Forest	34	35	28.0	-6
Wandsworth	22.3	8.9	26.7	4.4
Westminster	20	8.3	14.0	-6
London Average	**32.8**	**24.6**	**25.6**	**-7.2**

Table 3. 8

Note: Boroughs highlighted are not members of Capital Standards
Source: DCLG

Trend

The table above shows that in the second year of this indicator the vast majority of London boroughs improved, some significantly. This improvement was not sustained for the third year where the London average began to rise again, but not to the detriment of the general trend. Over the three years for which there is comparable data London has improved by 7.2 percentage points, with 26 out of the 33 London boroughs showing an improved score over the period, and overall London is less than one percent over the government target of 25 per cent. For 2005/06 the following five boroughs reported the best BVPI 199 scores; Kensington and Chelsea, City of London, Sutton, Barnet and Bromley and the following five boroughs reported the worst scores; Newham, Hounslow, Greenwich, Hillingdon and Havering.

Analysis

Londonwide data produced by ENCAMS suggests that it was a greater abundance of detritus that brought the scores down for 2005/06. However it would not be expected that the opinion polls would pick up an increase in detritus.

The 28 London boroughs that are members of Capital Standards have their BVPI 199 surveys undertaken by ENCAMS as the core part of the Capital Standards programme. The independence of the surveyors being the primary benefit. The five boroughs that are not members of Capital Standards (highlighted in the table) undertake their own surveys and produce their own scores,

using Defra / ENCAMS methodology and therefore lack the independence of the surveys undertaken through the Capital Standards programme.

Local Environment Quality Survey

In addition to the nationally reported BVPI 199 scores and the data reported through the information scheme, ENCAMS undertakes an annual Local Environmental Quality survey of the 28 London boroughs involved in Capital Standards and reports the findings both at a borough level and a pan-London level. Data suggests that the Capital Standards area has remained relatively stable in LEQ terms with an overall improvement between 2003/4 and 2005/6 (see Appendix 3.3). However the BVPI 199 scores produced by Encams shows that this apparent minor improvement is not year on year and is not representative of all land use classes (see Appendix 3.4). In 2005/06 the overall BVPI score for litter fell by one percentage point but this was not reflected in all land uses. Primary and secondary retail and commercial areas showed improvements whilst all housing types got worse. Industry, recreation and all road classes all scored worse than in 2004/05 but at present there is no apparent reason for this decline in cleanliness standards.

The BVPI score reported to government also includes detritus (very small pieces of litter and organic material). In 2005/06 there was an overwhelming decline in the detritus scores for the Capital Standards Boroughs resulting in a five per cent fall in the overall score when compared to 2004/05. This had the overall effect of reducing the BVPI 199 for litter and detritus by three percentage points. Capital Standards is taking steps to identify why London has experienced this decline in the BVPI 199 score including correlating weather records with survey results.

It is important to note that the ENCAMS report does not include data for the Boroughs of Barnet; Bromley; Enfield; Kensington & Chelsea and Redbridge as they are not currently members of Capital Standards.

Looking Forward

Capital Standards has put some resources behind further analysis of the data to determine what can be done to ensure that subsequent years BVPI 199 scores improve. Although data is only available for three years it is clear, looking at both the data above and the opinion polls, that since 2002 London's streets are getting cleaner. There is still some way to go though. In 2012 London will open its doors and windows to the world when it hosts the Olympic and Paralympic Games. If London is to be seen as the sustainable world city it is becoming, then its standard of cleanliness must improve. As such Capital Standards has set itself the challenging target of achieving an average BVPI 199 score of 12 per cent by 2012.

London Schools Environment Awards

The London Schools Environment Awards (LSEA) works with primary schools across London to develop children's sense of responsibility for their environment.

The LSEA is run by the GLA in partnership with Capital Standards, external sponsors, and committed 'link officers' from the London boroughs that facilitate the scheme at a local level. Schools enter projects on the following environmental themes: Litter and the Local Environment Quality; Waste and Recycling; Water; Energy; Transport to School and Biodiversity. Entries are

judged and prizes awarded by the Mayor at an annual awards ceremony for which over 700 primary schools entered in 2006

Litter on Waterways

There is no statutory responsibility on any authority to remove litter from waterways within London. The Environment Agency and Port of London Authority will only remove rubbish if it is a danger to flooding and navigation respectively, whilst British Waterways chooses to make an effort to keep navigation clear. Thames21, an environmental charity working with communities to bring London's waterways to life, carries out surveys on the quantity and distribution of litter along the waterways within Greater London.[4]

The surveys are carried out quarterly by Thames21 along stretches of waterways that are the primary focus of Thames21's work, and do not include tributaries of the Thames, lakes, ponds or any other watercourses. It covers:

- the tidal Thames foreshore at low tide from Eastern Boundary of Greater London in the East to Richmond half-lock and weir in the West
- the canal towpath, water surface and offside on the Paddington Arm from Bull's Bridge (Southall) to Paddington and from Norwood Toplock (Southall) to Cowley (West Drayton) on the Grand Union Canal.

At present, grades are awarded for 100-metre reaches on the canals and 250-metre reaches on the Thames. The grades are awarded a score and a Cleanliness Index generated, which provides a scale from 0 (all reaches Grade D) to 100 (all reaches Grade A and completely clear of litter).

The Rapid Appraisal of the Thames foreshore is conducted from a boat, starting at low tide on the Eastern boundary of London and travelling upstream at a speed equal to that of the outgoing tide. This provides a snapshot of the entire inter-tidal foreshore.

The assessments are based on the 'ABCD Rapid Appraisal' method, which requires 2 surveyors to form a general consensus for the appropriate grade (**Table 3. 9**). Types of litter being recorded vary from floating items such as plastic, tin cans, clothes, paper and polystyrene to immobile items such as tyres, traffic cones, shopping trolleys, vehicles and scrap metal. Mobile and immobile items are recorded independently when surveying the Thames foreshore, which generate an appropriate grade.

Grade definitions based on the Environment Agency's General Quality Aesthetics methodology and the Environmental Protection Act (1990) Code of Practice on Litter and Refuse.

Grade A	Absent; no evidence of litter anywhere
Grade B	Trace; predominately free from litter apart from a few small items
Grade C	Some at intervals; widespread distribution of litter with minor accumulations
Grade D	Objectionable amount; heavily littered, with a number of significant accumulations

Table 3. 9

[4] For further details of the techniques used and data gathered are available from info@thames21.org.uk or 020 7248 7171.

Litter accumulations at any one time are not necessarily indicative of poor management or lack of civic pride in an area; they can be due to water flows depositing the litter in a particularly spot (e.g. the inside of bends in the river and inlets). As this is a snapshot survey, it should not be used to rank one local authority or community against another. Litter is variable throughout the year and these figures are purely intended to give an impression of the distribution and quantity of litter at this particular time. There is also no statutory duty on any organisation to remove litter from most of the areas surveyed and no criticism is intended. Finally, the data set in some boroughs with a short water frontage is very small and the Cleanliness Index generated would therefore be very strongly influenced by one or two unacceptable reaches.

Overall Results for Tidal Thames 2003 and 2006

	2003		2006	
Grade	No. of Reaches	% of Reaches	No. of Reaches	% of Reaches
A	2	0.5	6	1
B+	298	69.1	98	23
B			85	20
B-			55	13
C+	84	19.5	61	14
C			98	23
C-			11	3
D	47	10.9	21	5
Ungraded			52	
	431	100	435	100
Cleanliness Index		53		55

Table 3. 10

Approximately 57 per cent of the stretches surveyed were of the acceptable Grade B or above, with only six of the 435 stretches being awarded Grade A. However, 45 per cent of the stretches are of an unacceptable standard at Grade C or below and this includes 21 Grade D stretches (i.e. objectionable amounts of litter). This means that litter significantly affected approximately just under half of all stretches surveyed. Thames21 have been targeting the worst of these sites and reduced the number of Grade D sites by over half since 2002.

(26) Headline Indicator
Cleanliness index of the Thames foreshore by borough (Thames21)[5]

	2002		2006	
Borough	**Number of stretches**	**Cleanliness Index**	**Number of stretches**	**Cleanliness Index**

[5] The number of stretches is slightly different for 2002 and 2006 as some stretches fall in two boroughs and there has been an element of double counting. There are also extra reaches being counted that were not counted previously, for instance islands further up the Thames.

Hounslow	38	61	43	59
Hammersmith & Fulham	29	55	29	46
Kensington & Chelsea	9	67	9	56
City of Westminster	18	56	19	68
City of London	9	59	9	60
Tower Hamlets	43	41	42	37
Newham	30	57	30	47
Barking & Dagenham	14	61	14	60
Havering	23	63	23	60
Richmond	43	64	49	69
Wandsworth	30	48	32	58
Lambeth	12	54	12	71
Southwark	29	36	29	49
Lewisham	3	33	3	29
Greenwich	50	43	50	46
Bexley	35	51	35	61

Table 3. 11

Trend

There is no discernable trend

Analysis

It can be seen above that over half of all boroughs bordering the Thames have a Cleanliness Index (CI) above 50 (Average), with the London Borough of Richmond exceeding the desired minimum score of 67 (Good). Conversely, the foreshore in the London Boroughs of Lewisham, Tower Hamlets, Greenwich and Hammersmith and Fulham is unacceptable and bordering on the 'objectionable' classification. The foreshores in Southwark and Newham also scored below the overall CI score of 55. Combined, these unacceptable and 'objectionable' areas make up approximately 29 per cent of the total.

The natural flow regime and characteristics of the river combined with the wind conspire to create clusters of unacceptable stretches of the foreshore that may be many kilometres long and are often areas where plastic bags collate. More detail on the location of these clusters is available from Thames21.[6]

Observations made whilst carrying out this survey found that tyres, scaffolding poles, metal work and bicycles significantly contributed to the bulk of immobile items found on the foreshore. Moreover, on many of the stretches, the high numbers of immobile items were almost exclusively responsible for the low grades recorded. The source of some of this litter can be seen in concealed slipways and derelict riverside sites that are prone to fly-tipping and waterside construction sites. Supermarkets near the river continue to provide a seemingly inexhaustible supply of shopping trolleys.

[6] Thames21 is a partnership between ENCAMS, Port of London Authority (PLA), Environment Agency, British Waterways London, Thames Water and the Corporation Of London. Thames21 was set up to improve the environmental quality of Rivers and canals throughout Greater London. Thames21 also co-funds the PLA's Driftwood craft, operates a cleansing boat (Taranchewer) on the Paddington Arm of the Grand Union Canal, as well as many other projects. Thames21 also work with the London Probation Service, who directed by us go and clear areas of rubbish that regularly collect on slipways in London. Details of these can be found at www.thames21.org.uk.

Looking Forward

Thames21 delivered in excess of 100 events in 2006 with an estimated 4,000 people taking part in activities that ranged from river clean ups to graffiti removal and included access and educational days on to the Thames foreshore. The work undertaken by Thames21 is almost entirely delivered by volunteers giving a few hours on a day to clean a stretch of river. In September 2006, Thames21 launched its five-day Cleaner Thames Challenge campaign to clear the worst stretch of foreshore in Poplar. This was Thames21's biggest clean up in its history and attracted over 260 volunteers, taking away 20 cubic metres of predominantly plastic bags.

Canal Network

Monitoring of the canal takes a similar form to the Thames, but here the litter on the surface of the water, on the towpath and on the offside (the bank of the canal on the side without a towpath) are recorded separately, using the same grade definitions as on the Thames and assessed from a canal boat.

(27) Headline Indicator
Cleanliness index of the canal network by borough (Thames21)

This is a limited survey only covering 50 per cent of the Grand Union Canal and the whole of the Paddington Arm within Greater London.

Grand Union Paddington Arm Canal		
Totals Stretches	**NO.**	**%**
A	218	33
B	335	51
C	80	12
D	18	3
	651	100
Cleanliness Index	**72**	

Grand Union Canal-Norwood Toplock to Cowley		
Totals Stretches	**NO.**	**%**
A	52	18
B	177	61
C	39	14
D	20	7
	288	100
Cleanliness Index	**64**	

Table 3. 12

Trend

Data only exists for the Paddington Arm section of the Grand Union Canal to make a direct comparison with the previous report. The trend is of continued overall improvement of the canal, with a six-point rise in the cleanliness index to 72. The 12 per cent rise in stretches awarded Grade A is down to regular cleaning and diligence of Canal Keepers and contractors

Analysis

The Paddington Arm section of the Grand Union Canal from Bull's Bridge (Southall) to Paddington has an overall Cleanliness Index (CI) score of 72, with 84 per cent of towpaths, canal surfaces and offsides achieving desirable grades B or above. Approximately three per cent of all areas of the canal were awarded objectional grade Ds. A quarter of all the canal surface sectors

were awarded grades of C& D, which has the lowest CI score of 64. Towpaths and the offside scored highly with 73 & 79 respectively.

The Grand Union Canal from Norwood Toplock (Southall) to Cowley has an overall CI score of 64, with 79 per cent of all sectors achieving desirable grades of B and above. Towpaths have the highest CI score of 68, which has the least amount Grade Ds being awarded. Most Grade Ds were found on the offside, which make up ten per cent of its total. Again, the canal surface has the lowest CI score of 57, with only three per cent of this section being awarded a grade A and being totally free of litter.

Looking Forward

Thames21 is keen to foster community involvement to achieve its goals in a sustainable way and runs a few unique programmes, such as working with communities through its Adopt-a-River scheme There are 36 volunteer canal keepers some of which are adults with learning difficulties from 219 Lisson Grove Day Centre. These canal keepers provide a visible presence on the canals, reassuring other users, whilst picking up rubbish and removing graffiti. There are also 16 river keepers that do similar work on the River Cray in Bexley that do their best to stop fly-tipping, keep the river clear and report environmental crime. It is hoped that programmes such as these will be rolled out across London in future.

CHAPTER 4: Pollution

Introduction

Pollution can affect the health and quality of life of Londoners and its fabric (such as building soiling from air pollution). Pollution can take many forms, including air, water (and watercourses), land (soil) contamination, and noise.

The Mayor has a responsibility to address various types of pollution in London, including air and noise. The Mayor also works closely with other organisations, such as the Environment Agency and London boroughs, that regulate certain types of pollution or emission sources.

The different forms of pollution are discussed in this chapter under the sub headings of Air Quality, River Water Quality, Industrial Pollution Incidents and Noise. Within these, five headline indicators are addressed.

Air Quality

In many of today's modern cities, the main environmental health hazard to the population is exposure to air pollution and London is no exception. Air pollution affects the health and quality of life of people who live, work and visit London.

In 2005 it was predicted that particulate (PM_{10})[1] pollution in London caused 1,031 premature deaths and another 1,088 hospital admissions.[2] In the same year IPSOS MORI's annual London survey indicated that almost half of Londoners believed air pollution is a problem. Although pollution can have an immediate and discernable impact on health, it also has long-term impacts. $PM_{2.5}$ [3](a subset of PM_{10}) pollution is estimated to reduce average European life expectancy by up to eight months.[4] The effects on health of the major pollutants are described in more detail in the Mayor's Air Quality Strategy and the State of the Environment Report 2003 (Table 22).

Poor air quality particularly affects the most vulnerable in society, the very young, older people and those with existing heart and lung conditions, including asthma. Poor air quality can also have an indirect affect on the health of these groups as the perception of poor air quality may mean they are less likely to spend time outdoors – although poor outdoor air quality is likely to affect air quality indoors. This can have a negative impact on levels of physical activity and social cohesion.

The impacts of poor air quality on health are disproportionately felt in deprived areas. Deprived communities tend to be located in areas of below average air quality. Furthermore, there is a well-established association between deprivation and ill health, so deprived communities are likely to include a higher number of individuals who are vulnerable to the impacts of air quality on health.

Poor air quality is being addressed through the Mayor's Air Quality Strategy, 'Cleaning London's Air' launched in 2002. It contains a comprehensive set of policies and proposals to improve London's air quality to work towards meeting government and European Union targets. London

[1] Particulate matter with a diameter less than or equal to 10 microns.
[2] Mayor's Air Quality Strategy, Progress Report to March 2005, GLA, 2005.
[3] Particulate matter with a diameter less than or equal to 2.5 microns
[4] Thematic Strategy on air pollution, European Commission, 2005

boroughs are required to take the Mayor's Air Quality Strategy into account in their review and assessments of air quality and air quality action plans. The strategy and further information on the Mayor's actions are available at www.london.gov.uk.

There are close linkages between air quality and climate change. The pollutants responsible for these effects are often emitted by the same sources, such as road transport, gas use and industry. Some 'local' air pollutants can affect the climate. Climate change also influences the formation and dispersion of air pollution, and could lead to more frequent summer pollution episodes. The Mayor is working to address both effects together, to ensure that we minimise London's contribution to climate change, while improving air quality and its impact on Londoners' health.

Key Air Pollutants in Greater London

Air quality in London meets the National Air Quality Strategy objectives and European limit values, for all pollutants, except particulate matter PM_{10}, nitrogen dioxide, NO_2, and ozone, O_3.

The Mayor's policies focus on reducing emissions of PM_{10} and oxides of nitrogen, NO_x (which consists of NO_2 and nitric oxide, NO, which forms NO_2 in the atmosphere). Ozone is not emitted directly, but formed by reactions between sunlight and precursor pollutants. Ozone damages lung tissue and the cells lining the airways, causing swelling and inflammation. Ozone is a regional pollutant; precursor pollutants that go on to form the ozone that occurs in London can be emitted across the northern hemisphere and ozone episodes can cover thousands of kilometres. Action to reduce ozone needs to be coordinated on a regional, national and global scale. For this reason, and due to its complex role in atmospheric chemistry, objectives for ozone are not set in Local Air Quality Management (LAQM) regulations, and local authorities and the Mayor have no statutory duty to work towards meeting them. Ozone concentrations tend to be highest immediately outside London, as ozone can be depleted in the vicinity of roads due to its role in the oxidation of nitric oxide emitted from vehicles.

Concentrations of air pollution are monitored on a regular basis at many sites across London and this data is used to determine whether the government's national objectives are being achieved. Data is reported on the London Air Quality Network (www.londonair.org.uk). The monitoring data also helps us understand the impact of air pollution on human health and determine the sources of the pollution. Automatic air quality monitoring is undertaken on behalf of government, the London boroughs and Transport for London (TfL) at over 100 sites in London.

Sources of pollutants outside London contribute to the air pollution in the capital. In particular, sources from the rest of the UK, Europe and beyond can make a significant contribution to PM_{10} and ozone concentrations in London.

The Mayor's policies and actions assist in improving air quality and focus on reducing emissions. However, the way in which emissions relate to the pollution concentrations in London's ambient air is dependent on other factors including weather conditions, which can significantly influence air quality. The influence of factors such as weather conditions, make identifying the impact of measures put in place to improve air quality a complex process, for which computer models are usually used. The GLA produce the London Atmospheric Emissions Inventory (LAEI), which can be used in such models. The inventory is updated annually; the latest inventory provides details of emissions in 2003. Table 4.1 shows the total emission of six air pollutants in London in 2003.

(19) Headline Indicator: Total emissions (tonnes per year) of the main air pollutants in Greater London

Pollutant	Total emissions (tonnes / year) all sources	
	1999*	***2003***
Oxides of nitrogen (NO_X)	68,126	67,042
Particulate matter (PM_{10})	2,747	3,076
Sulphur dioxide (SO_2)	3,555	1,464
Carbon monoxide (CO)	173,381	100,437
Benzene	1,643	614
1,3-butadiene	430	117

Table 4. 1

Source: GLA; LAEI 2003 * GLA/TfL LAEI, version February 2002

Trend

It is not possible to discern any trend from the previous State of Environment Report, which used the LAEI 1999, as the inventories are not directly comparable due to improvements made to the inventory methodology to provide a more detailed account of atmospheric emissions and air quality in London.

Analysis

The sources of NO_x and PM_{10} emissions in Greater London are disaggregated further in Figure 4.1 and Figure 4.2 below.

NO_x emissions sources in Greater London 2003

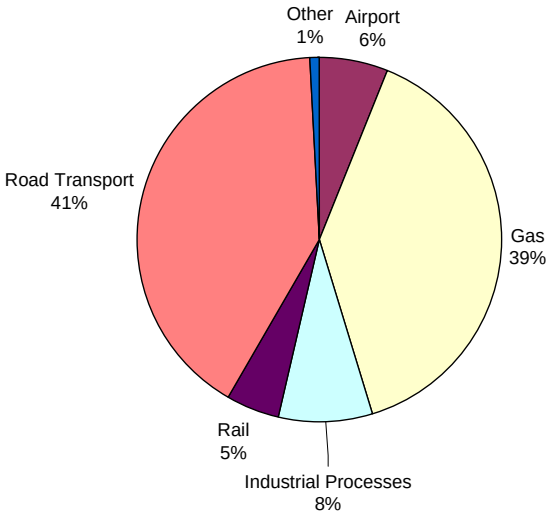

Figure 4. 1

Source: London Atmospheric Emissions Inventory 2003 (GLA)

PM_{10} emissions sources in Greater London 2003

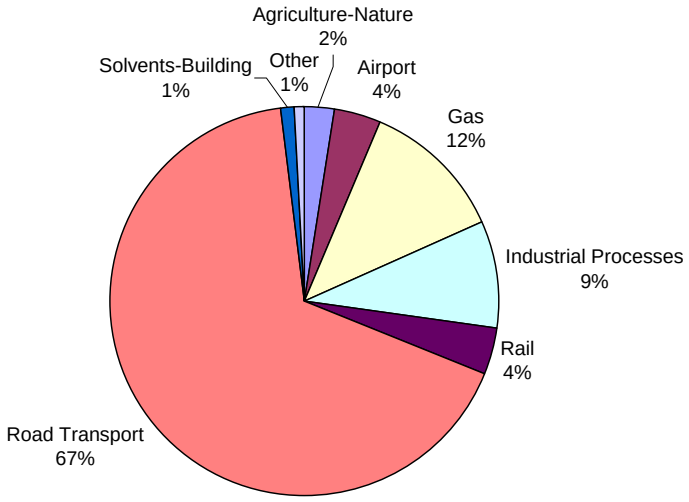

Figure 4. 2

Source: London Atmospheric Emissions Inventory 2003 (GLA)

Emissions from road transport

Road transport is a major source of pollutant emissions in London. In 2003, road transport emissions were responsible for 41 per cent of NO_x and 67 per cent of PM_{10} emissions. Vehicle emissions vary depending on type, model, age and use of vehicle. All new road vehicles are subject to increasingly tight European vehicle emission standards – often referred to as 'Euro Standards'. Consequently, emissions from road transport in the UK are expected to decrease in future years as the newer, less polluting vehicles penetrate the fleet, offsetting the predicted traffic growth. This trend of declining NO_x and PM_{10} emissions is expected to slow down considerably from about 2010, come to a halt around 2015, and then start to slightly increase as engine and fuel improvements are offset by continuing traffic growth.

Although transport is the largest source of air pollution emissions within London, other sources are also important, including activities at airports, commercial and domestic boilers and industry (see later in this chapter). Not every emission source affects London's air quality to the same extent. Sources which emit air pollution from high above the ground, such as chimney stacks or aircraft at height, may not affect ground-level air quality as much as emissions from road vehicles. Emissions from concentrated sources such as busy roads (which can carry thousands of vehicles an hour) have a greater impact on local air quality than emissions from sources, such as space heating, which are more dispersed.

Figure 4.3 shows the proportion of emissions from each vehicle type as a proportion of the total emissions in 2003, for Greater London and for central London alone.

Proportion of road emissions by vehicle type relative to total emissions occurring within Greater London and central London in 2003

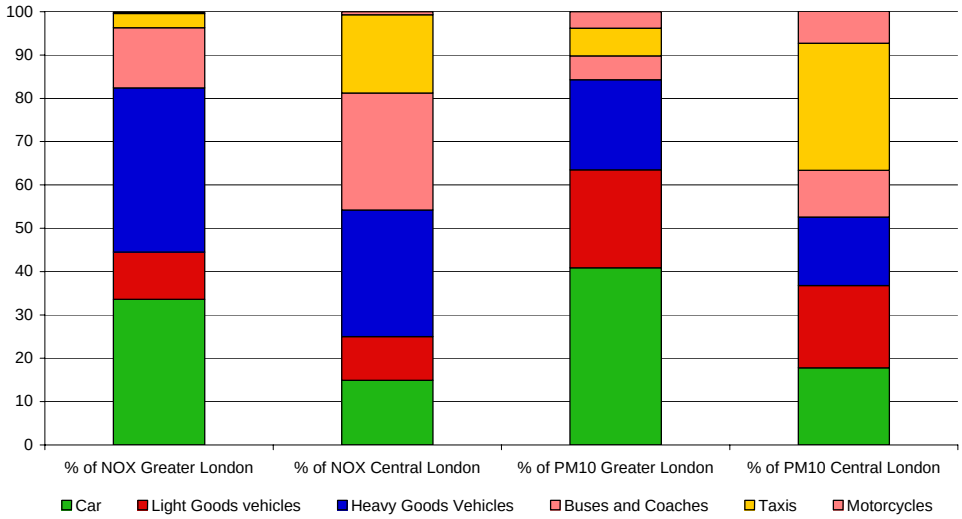

Figure 4. 3
Source: London Atmospheric Emissions Inventory 2003 (GLA)

In 2003, heavy goods vehicles, buses and coaches contributed 30 per cent of road transport PM_{10} emissions. These are the most individually polluting vehicles in London. Light good vehicles were responsible for another 23 per cent of road transport PM_{10} emissions. Due to the very high numbers of cars in London, these contributed 39 per cent of all road transport PM_{10} emissions in London (and 26 per cent of all PM_{10} emissions in London). Taxis were a significant source of PM_{10} pollution (29 per cent of road transport emissions) in central London.

In 2003, Heavy Goods Vehicles (HGVs) made the greatest contribution to NO_x emissions from road transport across Greater London and in the central London zone. The contribution of cars to NO_x emissions in Greater London is nearly as high as HGVs. This is not the case in central London where NO_x emissions from taxis and buses are greater than those from cars due to higher numbers of vehicles.

Transport Policies to Reduce Air Pollutant Emissions

The Mayor's Taxi Emissions Strategy seeks to reduce emissions from taxis by ensuring that they meet stringent Euro III standards for emissions of oxides of nitrogen (NO_x) and particulates (PM_{10}) by 2008. This is predicted to reduce emissions of NO_x and PM_{10} by over 35%.

The London Low Emission Zone (LEZ) will discourage the most polluting lorries, buses and coaches from entering London's streets. The Mayor and TfL recently consulted on the Scheme Order for the proposed LEZ. This proposes stringent emission standards from 2008, which will be tightened in 2012. The LEZ will also address emissions from heavy vans and minibuses from 2010. More information on the LEZ can be found at www.tfl.gov.uk/tfl/low-emission-zone/

Transport for London's Bus Improvement Programme works to improve emissions from buses; all London buses now meet a minimum Euro II emission standard and have a particulate filter, which reduces particulate matter emissions by 90 per cent.

Six new hybrid diesel-electric single-decker buses are being trailed in London, and the Mayor of London and TfL recently launched the world's first double-decker hybrid bus, and will be rolling out hybrid buses as part of the bus replacement cycle.

Following the successful trial of three hydrogen-fuel cell buses, which only emit water vapour; the Mayor of London has committed to take delivery of ten additional hydrogen fuelled buses. These initiatives are contributing to the long-term aim of a sustainable low carbon transport system.

Congestion Charging has reduced emissions of local air pollutants within the Congestion Charge Zone. More information is contained in Chapter 5. The Mayor is also developing

Emissions Influenced Congestion Charging proposals aimed at encouraging lower emission cars, with incentives for lower emission cars and higher charges for high polluters. This addresses London's contribution to both climate change and air pollution.

Emissions from regulated industrial processes

During the last half-century, industrial production in London has declined considerably, and the remaining industry has emitted less pollution as a result of better technology and increasing levels of control. Currently, the largest industrial operations (Part A processes) are regulated by the Environment Agency. In 1999, there were 70 Part A industrial processes, such as incinerators, chemical manufacturers or power stations, within the Greater London area. This reduced to 33 processes in 2003. In 2003, Part A processes in Greater London emitted eight per cent of total oxides of nitrogen (NO_x) emissions, and a significant proportion of sulphur dioxide (SO_2) and carbon monoxide.

The smaller Part A2 and B processes generally have less potential for environmental impact than Part A processes and are regulated by London boroughs. In 1999, there were 1,313 Part A2 and B processes within Greater London, this reduced to 1,187 in 2003. Around 60 per cent are petrol filling stations. Of the remainder, there are a large number of vehicle re-sprayers, cement and lime blending and packaging operations, concrete crushing processes, waste oil burning operations and incineration processes (mostly crematoria). In 2003 Part A2 and B processes emitted nine per cent of total PM_{10} emissions in London, and a significant proportion of sulphur dioxide (SO_2) and Benzene emissions.

Further data on emissions of other pollutants from industry can be found in the London Atmospheric Emission Inventory (www.london.gov.uk) and from the Environment Agency and Local authority public registers.

Air Pollutant Concentrations

Data from the air pollution-monitoring network in London makes it possible to look at the relative changes in pollutant concentrations over the last ten years[5] across a range of automatic monitoring sites and this is shown in Figures 4.4 and 4.5.

[5] November 1996 to November 2006. Data for 2006 is provisional

(19a) Sub Indicator: Relative Annual Mean Monitored Pollutant Concentrations

Relative Annual Mean Pollutant Concentrations (O_3, NO_x, and NO_2) Monitored at Several Sites in London

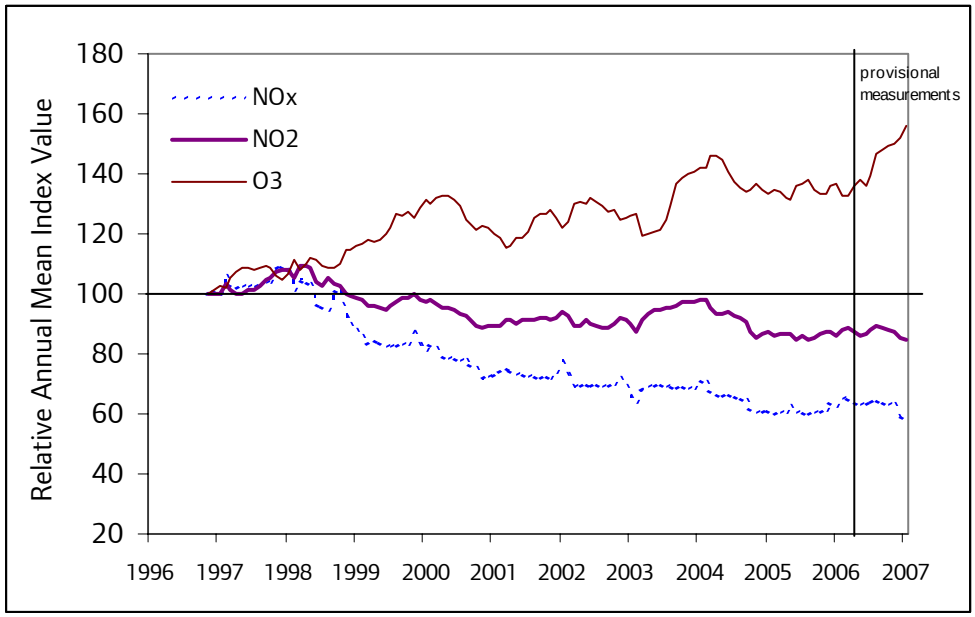

Figure 4. 4

Source: Environmental Research Group, King's College London

Relative Annual Mean Pollutant Concentrations (CO, PM_{10} and SO_2) Monitored at Several Sites in London

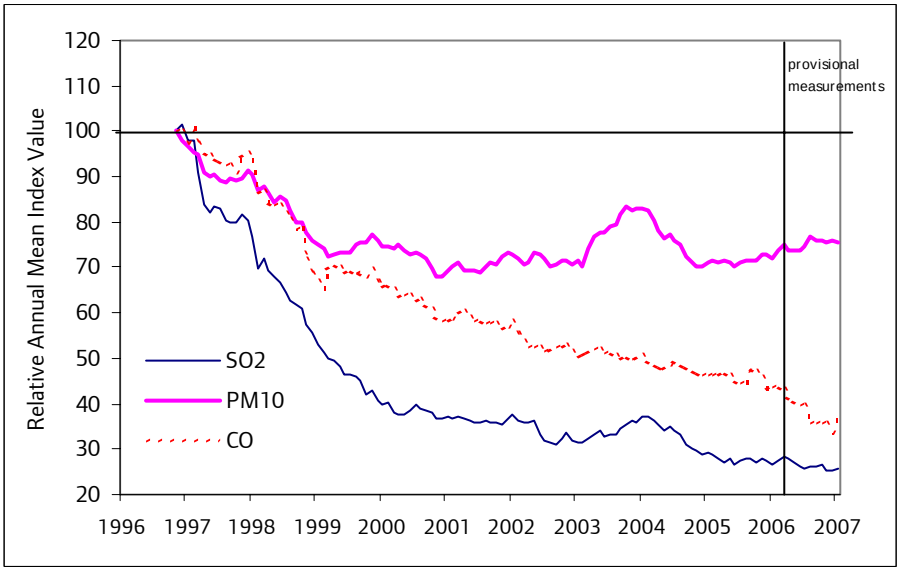

Figure 4. 5

Source: Environmental Research Group, King's College London

King's College Environmental Research Group derived the time series using data from long-term sites (both roadside and background locations are included) Six sites were used for the PM_{10} time series, seven for CO, O_3 and SO_2, and 16 for NO_x and NO_2. The time series consists of the relative running annual mean concentration, at monthly intervals labelled as time ended.

AirTEXT: Helping to manage the impact of air pollution on health

The Mayor is working with a borough consortium, sponsored by the European Space Agency, on the AirTEXT project. AirTEXT provides mobile or home phone alerts to people with heart or breathing problems, or their carers, on days when elevated air pollution is forecast in their part of London. The alert includes brief information on symptoms and health advice, allowing the participant to take measures to reduce likelihood of any impacts and manage their symptoms. This complements other work by the Mayor to tackle the sources of air pollution in London. See www.airtext.info for further details of the scheme.

Trend

The broad trends in annual mean concentrations between November 1996 and November 2006 are:

- NO_x concentrations declined by around 37 per cent and NO_2 concentrations fell by 13 per cent
- O_3 concentrations rose by 50 per cent
- PM_{10}, CO and SO_2 concentrations decreased by 24 per cent, 64 per cent and 75 per cent respectively, with the greatest reductions occurring prior to 2000.

Trends during the last 11 years show reductions in concentrations of many pollutants, aside from ozone.

Analysis

Though recent trends in air quality show that concentrations of key pollutants have reduced in the last ten years, it is important to recognise that air quality in London continues to breach the EU and national health-based targets, and affect Londoners' health and quality of life.

The pollutant trends shown in Figure 4.4 and 4.5 clearly illustrate the 2003 pollution episode experienced in London and across Europe, which was associated with the long, hot summer. The time series shows that during 2003, PM_{10} concentrations increased by 14 per cent, NO_2 concentrations were two per cent above those in 1996 and O_3 concentrations peaked at 146 per cent of 1996 values as a consequence of the 2003 episode.

Table 4.2 shows the number of London air quality monitoring sites in the Automatic Urban Monitoring network that exceed the national air quality objectives. The air quality objectives for NO_2, PM_{10} and O_3 are not being met in London, especially at roadside and kerbside monitoring sites.

Number of Automatic Urban Monitoring Sites in London exceeding the National Air Quality Strategy Objectives

National Air Quality Strategy Objective	2005	2006
PM_{10} daily mean > 50 μgm^{-3} on more than 35 days	2	2
PM_{10} Annual mean > 40 μgm^{-3}	1	1
NO_2 Annual Mean > 40 μgm^{-3}	17	15

NO_2 Hourly Mean > 200 μgm^{-3} for more than 18 hours	2	2
O_3 Daily maximum 8-hour running mean > 100 μgm^{-3} on more than 10 days	9	11
Other pollutants, including carbon monoxide and sulphur dioxide	0	0

Table 4. 2

Source: UK Air Quality Archive, www.airquality.co.uk

Looking Forward

While monitoring data can only show pollutant concentrations at particular points in space or time, computer models can be used to predict current pollutant concentrations in all locations across London and predict future concentrations by projecting pollutant emissions, chemical reactions, weather data, and information on geography. These predictions are checked against the monitoring results to ensure that the models are predicting to an acceptable degree of accuracy.

Maps of modelled air quality for NO_2 and PM_{10} for 2003 are shown in Maps showing predictions for the year 2010 for NO_2 and PM_{10} are shown in Figure 4.6 and 4.7.[6] Areas that exceed the National Air Quality Strategy Objectives are shown in yellow and red. The maps for both pollutants show predicted reductions in areas of excess, but some areas still exceed the objectives particularly near busy roads, in central London and around Heathrow.

The modelled 2010 ambient air quality projections take into account the key measures which affect emissions, where quantifiable, set out in the Mayor's Air Quality Strategy and the Mayor's Transport Strategy. This includes the impact of the Congestion Charge scheme, the proposed London Low Emission Zone, and bus and taxi emissions strategies. The projections also take into account the impact of other measures, such as the penetration of cleaner vehicles into the London fleet, arising from current national policies and EU legislation.[7]

[6] These air quality predictions are based on emissions data from the London Atmospheric Emissions Inventory for 2003 and 2010, and meteorological data from 2003.

[7] Further information on emissions projections in London is available in the LAEI 2003 Annual Report at www.london.gov.uk

Map of the modelled annual mean NO_2 concentrations (g/m^3)[8] in 2003, compared to the National Air Quality Strategy Objective of 40 g/m^3 (applicable from 2005)

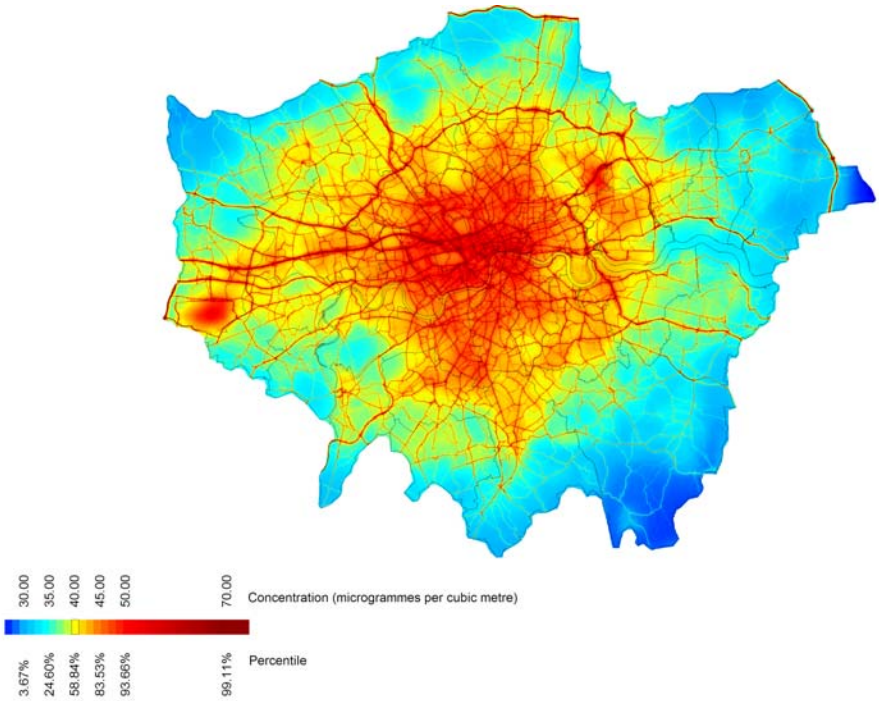

Figure 4. 6

Source: LAEI 2003, GLA 2006, OS data © crown copyright. All rights reserved (GLA) (LA100032379)

[8] One microgram (μg) is one millionth of a gram

Map of the modelled annual mean NO_2 concentrations (g/m^3) in 2010 incorporating measures from the Mayor's strategies, compared to the National Air Quality Strategy Objective of 40 g/m^3 (applicable from 2005)

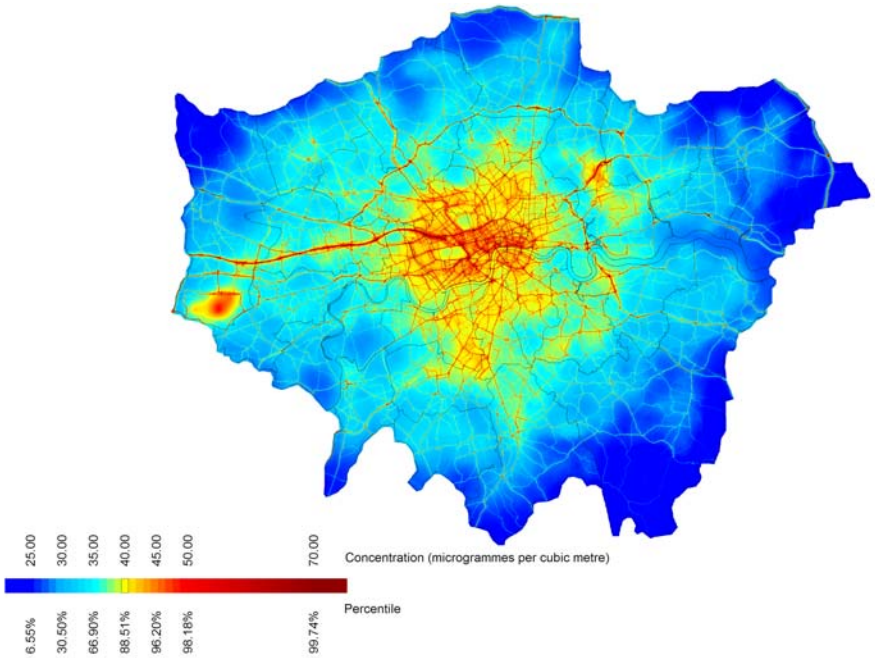

Figure 4. 7
Source: LAEI 2003, GLA 2006 OS data © crown copyright. All rights reserved (GLA) (LA100032379)

Map of the modelled number of excesses (days) above the daily mean PM_{10} concentrations of 50 g/m^3 in 2003, compared to the National Air Quality Strategy Objective, which allows 35 excesses (applicable from 2004)

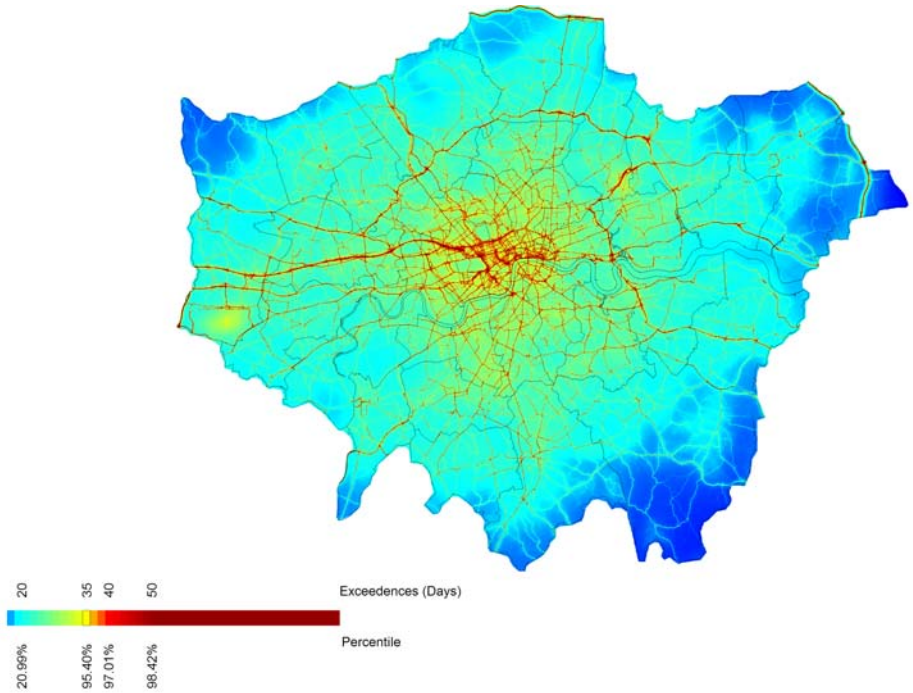

Figure 4. 8
Source: LAEI 2003, GLA 2006 OS data © crown copyright. All rights reserved (GLA) (LA100032379)

Map of the modelled number of excesses (days) above the daily mean PM_{10} concentrations of 50 g/m^3 in 2010 incorporating measures from the Mayor's Strategies, compared to the National Air Quality Strategy Objective, which allows 35 excesses (applicable from 2004)

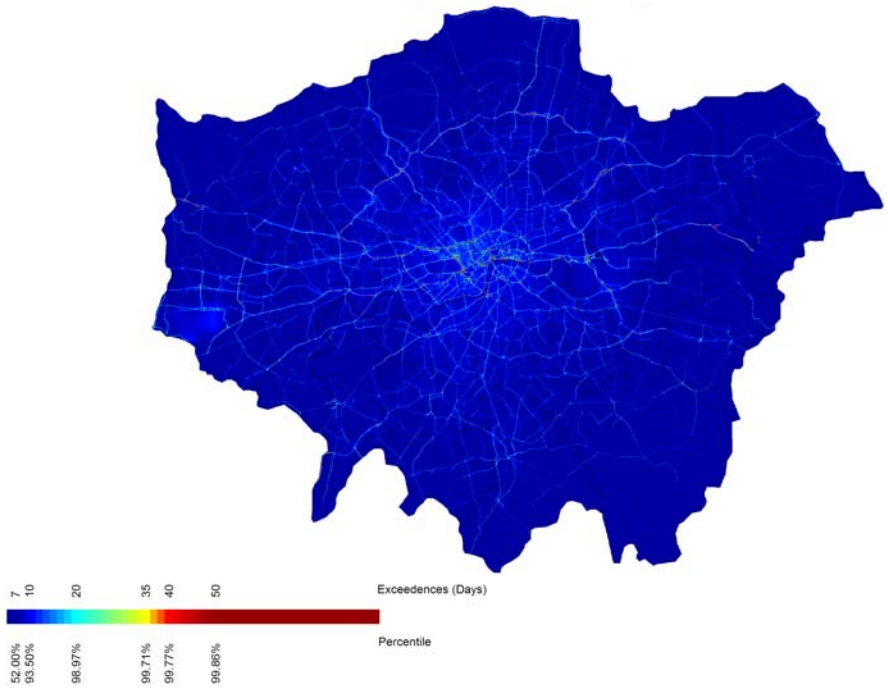

Figure 4. 9
Source: LAEI 2003, GLA 2006 OS data © crown copyright. All rights reserved (GLA) (LA100032379)

The area of Greater London which is predicted to exceed the National Air Quality Strategy Objectives in 2003 and 2010

Air Quality Objective	**Area exceeding the objective in 2003**		**Area exceeding the objective in 2010**	
	in km^2	as % of Greater London area*	in km^2	as % of Greater London area*
NO_2 Annual Mean	669	41	187	12
PM_{10} daily mean > 50 μgm^{-3} on more than 35 days	74.7	4.6	4.7	0.29
PM_{10} Annual Mean	5.6	0.35	0.65	0.04

* Total area of Greater London is 1,624 km^2

Table 4. 3
Source: Modelled ambient air quality (based on LAEI 2003), GLA 2006

Table 4.3 shows that the area of excess for both NO_2 and PM_{10} is predicted to reduce over the next few years. This should have the added benefit of improving the health and quality of life for people in London. Measures to improve air quality, put in place by the Mayor (see earlier in chapter for details of transport related policies), London boroughs and UK and EU government, are expected to contribute to this improvement in air quality.

Air Quality Management Areas (AQMAs)

Work to improve air quality is carried out by all levels of government. The EU has set 'limit values' for many air pollutants, which are designed to protect human health. In the UK, the government's National Air Quality Strategy sets health-based objectives (based on EU limit values) for ambient pollutant concentrations and provides the framework for Local Air Quality Management (LAQM). The objectives for seven pollutants are set in regulations for the purpose of LAQM, which means local authorities and the Mayor are required to work towards achieving them.

The LAQM regime requires all local authorities to periodically review and assess air quality in their areas. Where air quality is not expected to meet the national objectives, local authorities declare Air Quality Management Areas and produce action plans for improving air quality to work towards meeting the government objectives. Local authorities in Greater London must have regard to both government guidance and the Mayor's Air Quality Strategy when they do this. Local monitoring of air quality is important, as it is often the areas that are home to excluded and vulnerable communities that have the poorest air quality.

London boroughs are required to consult the Mayor on their review and assessments of air quality and air quality action plans. If a London borough clearly fails to carry out their LAQM duties, the Mayor may direct them to take steps in pursuit of these duties.

(20) Headline Indicator

Percentage of London area covered by Air Quality Management Areas

75 per cent of London (1,175 km^2) was covered by Air Quality Management Areas in April 2007 This compares to approximately 50 per cent of London (770 km^2) covered in 2003.

The process of Local Air Quality Management is at the stage where new AQMAs continue to be designated or expanded. This will mean that initially the trend in the headline indicator will be upwards. Designation of an AQMA means that boroughs recognise that there is a need to address poor air quality in those areas and action plans to improve air quality must be drawn up.

Location of Air Quality Management Areas declared in London (as of April 2007)

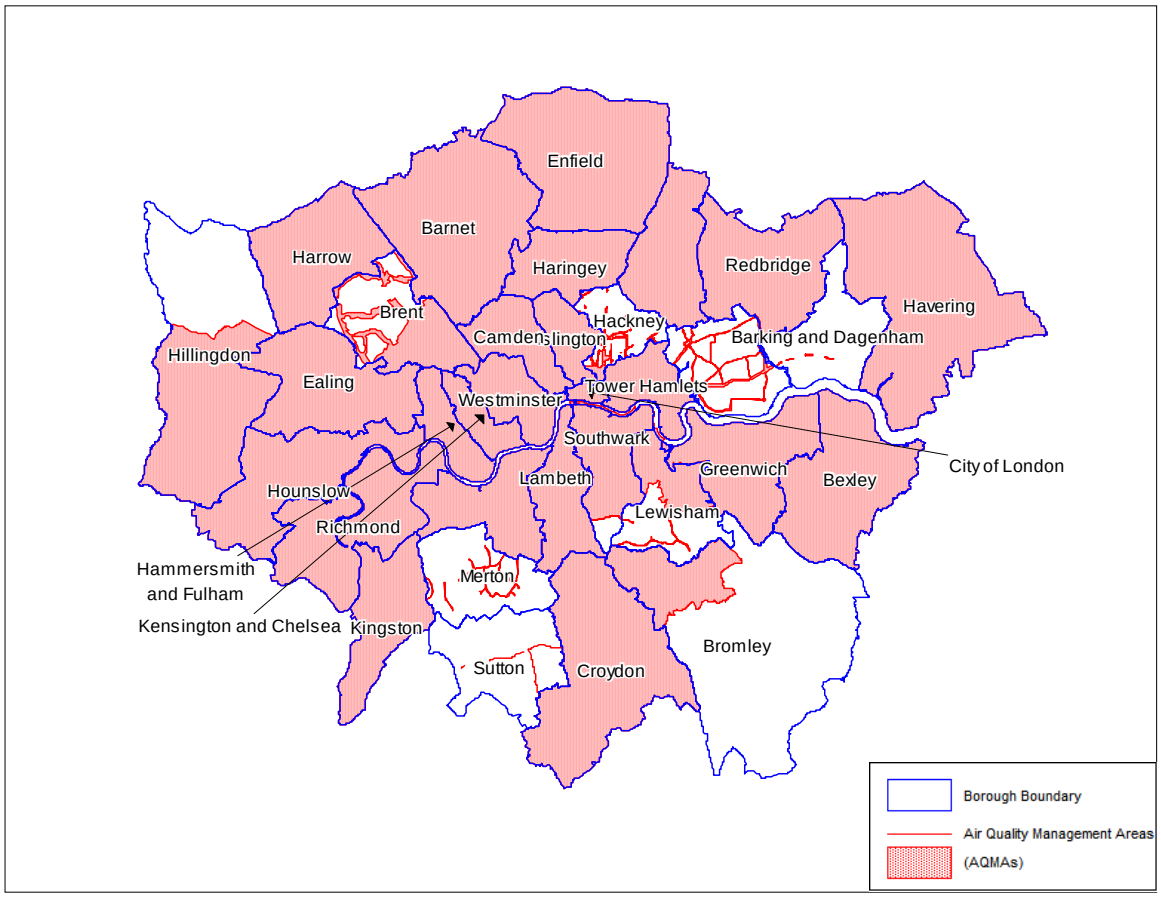

Figure 4. 10

Figure 4.10 shows the AQMAs in London, as of April 2007. More detailed information can be obtained from specific London borough review and assessment reports.

Trend

All London boroughs are now in their third round of review and assessment of air quality. All of the 33 boroughs have declared part or all of their boroughs AQMAs. Of these boroughs, 31 have air quality action plans in place to improve air quality and two are currently drawing up their action plans.

Since 2003 the London boroughs of Bromley, Havering and Redbridge have declared their entire boroughs as AQMAs. Redbridge have since put an air quality action plan in place and Bromley and Havering are currently drawing up action plans to improve air quality. Four boroughs, Bexley, Croydon, Hounslow and Islington, who had small AQMAs in 2003, have since decided to extend these to encompass their entire boroughs.

Analysis

Local authorities took different approaches to declaring AQMAs. The AQMA must cover all areas where the government objectives are unlikely to be met by their target dates and members of the public are likely to be exposed for a significant period of time. However, some local authorities

declared their entire areas as AQMAs they considered it to be a more effective approach for implementing borough wide policies.

Currently three-quarters (1175 km^2) of London is covered by AQMAs. This gives a broad indication of areas where action is needed to reduce air pollution towards the national objectives to help protect people's health, and the recognition and commitment by the boroughs to take appropriate action.

Review and assessment is a continuous process; new AQMAs can be declared at any point when the local authority identifies that the government's air quality objectives are unlikely to be met. The new and extended AQMAs declared since 2003 are likely to be the result of new evidence coming to light that indicates that the objectives will not be met as was previously thought. This could be due to more extensive monitoring data, or because pollution concentrations are not reducing as fast as was previously estimated.

Looking Forward

London boroughs' air quality action plan measures, Mayoral policies, as well as those made nationally and on a European basis, are expected to reduce the areas where pollutant concentrations exceed the national objectives. However this would not be reflected immediately in the AQMA indicator, as concentrations must remain below the objectives for a considerable period of time before an AQMA can be revoked. To reinforce these measures and engage with stakeholders, the Mayor's Air Quality Strategy is currently being revised.

A revised Mayor's Air Quality Strategy with bold and ambitious actions for the future is needed to build on the achievements of the first strategy. Transport is the largest source of PM_{10} and $PM_{2.5}$ emissions in London, and a significant source of NO_x and CO_2 emissions; and as such, will continue to be a major focus for action to improve air quality. Gas use in commercial and domestic sectors is also an increasingly important source, and is predicted to become the largest source of NO_x emissions in London by 2010, as it is for CO_2 emissions, which highlights the need to work holistically to address both air quality and climate change.

The review of the Mayor's Air Quality Strategy comes at a time of changing national and European context and the Mayor is lobbying national government and Europe to develop stringent standards for emissions controls and air quality.

River Water Quality

Rivers in London support a variety of wildlife. Rivers are subject to a number of pressures including pollution, low flows (caused by both abstraction and climate change) habitat degradation and recreation. The River Thames, despite its 'dirty' brown murky appearance (caused by the silt suspended in the water due to tidal movements) has very good water quality and is one of the cleanest metropolitan rivers in the world.

London's current sewer network, which was built by Joseph Bazalgette in the second half of the 19th century, was hailed as a major engineering achievement in its day and collects sewage and rainwater runoff together.

With the climate changing and the city expanding, the system is under pressure and 52 million cubic metres of untreated sewage and rainwater pollute the Rivers Thames and Lee each year - enough to fill the Albert Hall about 525 times. Of this, 32 million cubic metres comes from sewer network overflows, which provide the only safety valve to prevent the overloaded system from backing up and flooding homes and streets.

The discharges kill fish, create a higher health hazard for users of the river and damage the aesthetic appeal of the Thames, reducing its attractiveness to tourists.

Following improvements to sewage treatment works and the diversion of some industrial discharges from the river, salmon returned to the Thames in 1974 after 150 years. In the last 25 years, around 120 species of fish have been recorded. In September 2006, an otter was discovered on the banks of the Thames in central London, the first for around 100 years. Although the otter was found dead, its presence signals an improvement in water quality in the Thames in central London.

The Environment Agency monitors the health of rivers by looking at the water quality. A range of measures are used as part of their General Quality Assessment (GQA) scheme which is designed to measure progress in the water environment and the overall target is to maintain or improve river health. The GQA scheme provides a consistent basis for assessing water quality and enables comparisons to be made between different time periods and locations. Rivers are awarded one of six grades, from A to F, for both their chemical and biological quality. These are as follows:

A = Very good
B = Good
C = Fairly good
D = Fair
E = Poor
F = Bad

Chemical and biological assessments are carried out and the results are shown in headline indicators 15 and 16 below.

Chemical Water Quality

(15) Headline Indicator

Percentage of rivers in London where the chemical quality is classed as good or very good.

The GQA figures given in Figure 4.11 include the Thames and its tributary rivers in London, for the 3-year period 2003-2005. This includes all designated **freshwater** rivers that are within the GLA boundary.

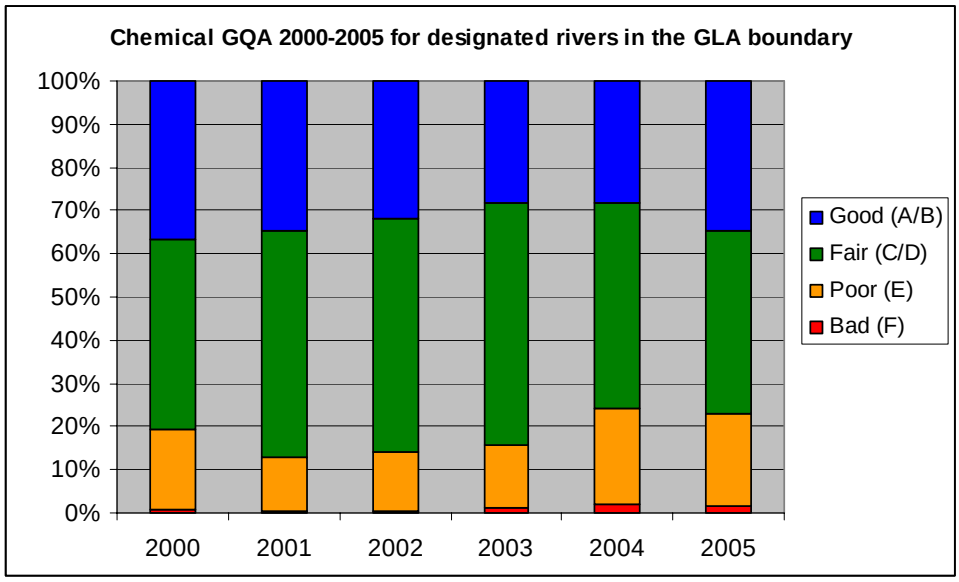

Figure 4. 11

Source: Environment Agency

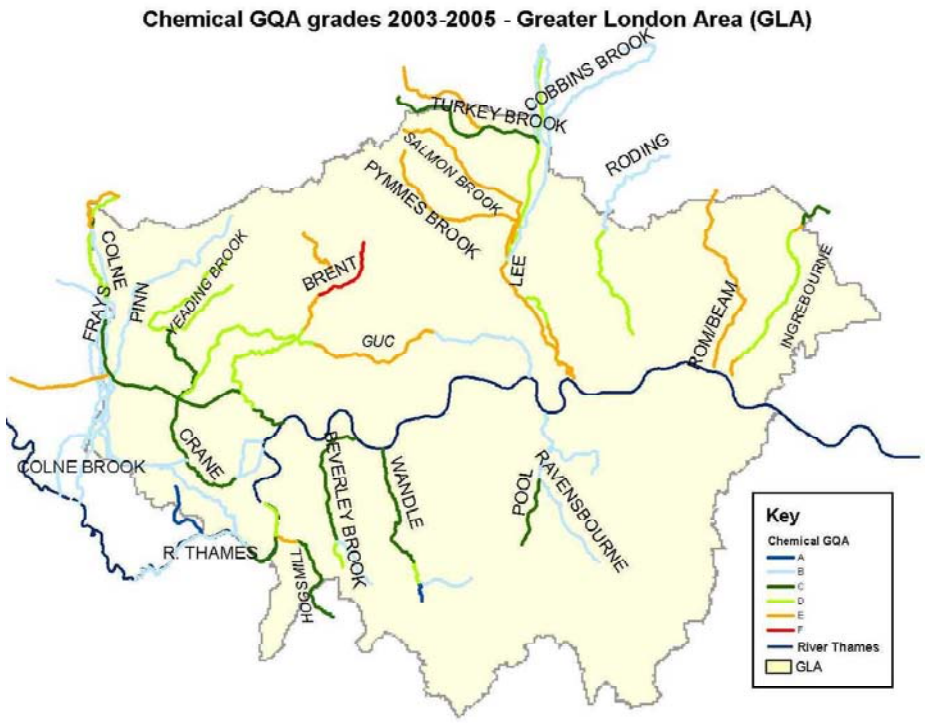

Figure 4. 12

Source: Environment Agency

Trend

Chemical river quality monitoring in 2005 showed an increase in rivers achieving 'very good' or 'good' chemical status from 28.4 per cent, in 2004, to 34.7 per cent. The chemical grades for 2005 showed a decline in rivers meeting 'fairly good' or 'fair' status, from 47.3 per cent, in 2004, to 42.2 per cent in 2005. An overall improvement in chemical water quality can be noted due to an increase in the rivers achieving higher grades, coupled with the decline in those only achieving 'poor' (21.6 per cent) or 'bad' quality.

Overall the trend in chemical water quality shows minor variations overtime, with the reaches meeting grade A and B criteria fluctuating around 30-40 per cent. The 2005 data indicates a slight improvement but this fits into the noted trend of fluctuating results. Future data will provide a clearer indication of any improvements in quality.

Analysis

Chemical water quality has been consistently poor in the Lower Lee area of the GLA. This is due to diffuse urban pollution[9] from urban areas and industrial sites within the catchment, sewer mis-connections and combined sewer overflows problems. Increased levels of silt are evident in the River Lee, which occurs as a result of urban run-off[10] concentrated into a small area during heavy

[9] **Diffuse Urban Pollution:** Diffuse urban pollution occurs when contaminants are deposited into rivers as a result of urban run-off. The main source of urban contaminants is from roads, including fuel and oil. The nature of diffuse pollution means that the source is not from a specific point, therefore it is difficult to control.

[10] **Urban Run-off:** Urban run-off is when contaminants are washed over land by rain. The nature of urban areas where surfaces are paved and concrete mean rainwater cannot permeate through and is therefore washed along the surface, and deposited into rivers.

rainfall. Silt accumulation is causing a decline in dissolved oxygen levels, and therefore low water quality. Poor water quality is also evident in the River Brent and the lower stretch of the River Rom/Beam. The latter demonstrates higher biological quality, therefore indicating that any problems appear to be short-term, and not affecting the biological quality of the river.

High chemical water quality is evident in rivers in the west of London, including the more rural River Colne, River Pinn and Longford River.

An overall improvement in water quality in London could be the result of a number of factors. These include pressures to clean up polluted surface water out-falls and deal with problems combined sewer overflows (CSO). Also the pressures to incorporate sustainable urban drainage systems into new developments should positively impact the chemical quality of water in the GLA, through reduced urban run-off.

Looking Forward

Water quality in the Lower Lee catchment should improve over the next few years from regeneration of the area as a result of the Olympics. For example, the development will lead to the removal of contaminated land in the area, adjacent to the river and an increase in sustainable urban drainage systems used in new developments in the vicinity.

Substantial improvements at most of London's sewage treatment works are planned over the coming years. The improved performance of these works will also help improve the quality of the rivers, particularly the River Thames, in the medium term. In particular, improvements are expected in the lower reach of the river Ingrebourne as a result of significant improvements in effluent quality, from riverside sewage treatment works. It is thought however, that some downgrades may be evident, in parts of London in the short-term due to awaited AMP4[11] improvements of sewage treatment works.

Additionally, in March 2007, the government announced that plans for a single 30km long tunnel to intercept sewage and rain water discharges along the length of the River Thames and transport the wastewater for treatment in east London would go ahead. It will be the largest such project ever carried out in this country.

In addition to improving the environmental quality of the Thames, the scheme will also help meet European obligations on sewage treatment. The project is expected to be delivered by 2019/20. The economic regulator Ofwat will be tasked with ensuring that it is delivered cost effectively. It is estimated that it will add around £37 to Thames Water sewerage bills by 2017.

Biological Water Quality

The GQA scheme for biology was introduced in 1995. It provides a measure of the water, based on monitoring the macro-invertebrates that live on the riverbed – these small animals include mayfly nymphs, snails, shrimps and worms.

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[11] **AMP4:** AMP4 is the 'Asset Management Plan' that covers the period 2005 to 2010. Asset management plans outline the environmental improvements water companies are required to make as part of the periodic review process. An example of one such improvement is 'to reduce the effects of eutrophication through further controls on discharges'.

(16) Headline Indicator

Percentage of rivers in London where the biological quality is classed as good or very good.

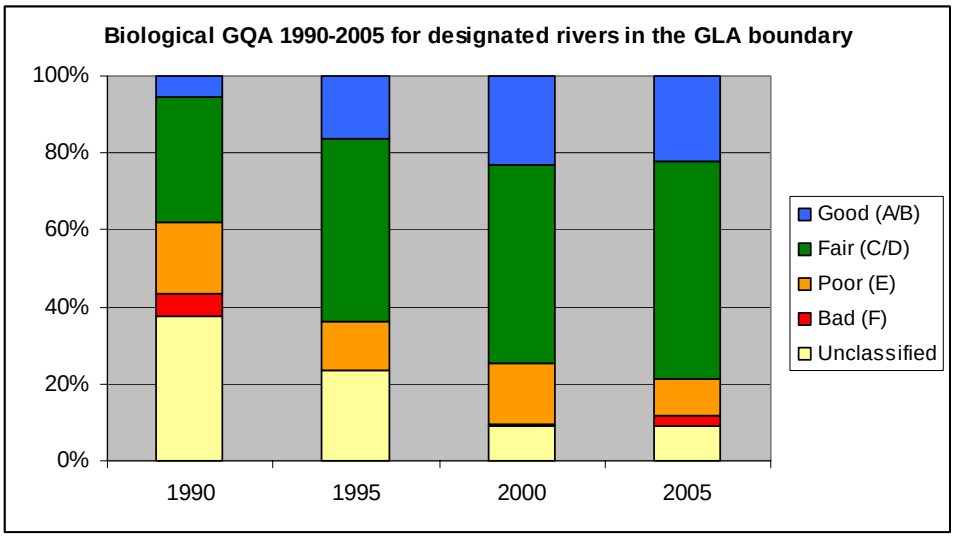

Figure 4. 13

Source: Environment Agency

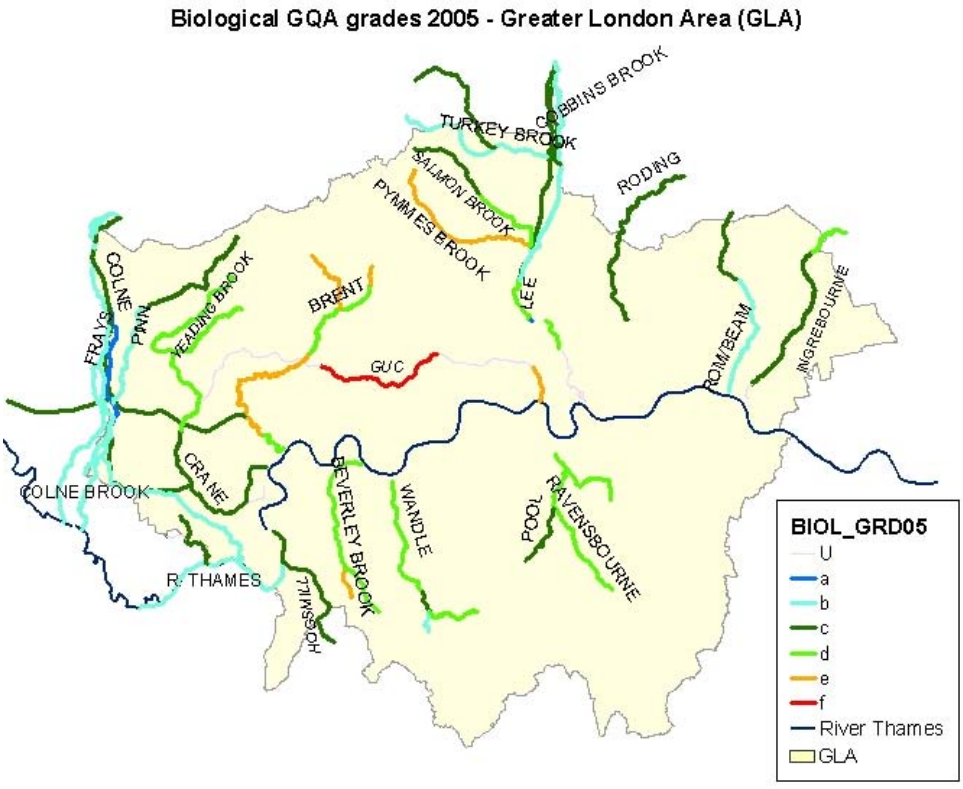

Figure 4. 14

Note: The GQA figures used in the chart above are for all freshwater rivers designated under the biological GQA scheme.

Source: Environment Agency

Trend

Biological river quality monitoring in 2005 showed that 22 per cent of designated rivers in the Greater London Area (GLA) were classed as 'very good' or 'good', 56.6 per cent of rivers were classed as 'fairly good' or 'fair', whilst 9.6 per cent were classed as 'poor' and 2.6 per cent as 'bad'. A further 9 per cent were unclassified. In comparison to biological grades from 2000, this shows a slight decline in the stretches reaching 'good' (grades A or B) status. But there is a significant improvement since 1990, when only 5.5 per cent reached grade A or B.

Analysis

The highest biological quality in 2005 is evident in the rivers to the far west of London. These high quality rivers include the River Colne, Colne Brook, Frays and Longford River. These are all situated in areas with lower levels of urbanisation, and therefore smaller and fewer sewage treatment works. The poorest biological water quality, grades E and F, occur in the River Brent, the Pymmes Brook and the Paddington Arm of the Grand Union Canal. These all occur in heavily urbanised areas.

Looking Forward

The main influences on biological quality are treated sewage effluent, urban run-off and periodic discharges of poor-quality water. Therefore, improvements to sewage treatment works, and the implementation of river restoration schemes to improve habitats and the shape of river channels (see Chapter 6, river restoration section) should lead to an improvement in the biological quality of rivers in London.

A Thames River Basin Plan will be produced in 2009 to satisfy the requirements of the EU Water Framework Directive and is expected to deliver further water quality improvements by 2015. River basin management plans will set out in general terms how the water environment will be managed. They will also provide a framework for more detailed decisions to be made. The Water Framework Directive (WFD) is designed to protect and improve the environmental condition of all waters. It applies to surface waters (including lakes, streams and rivers), groundwater, estuaries and coastal waters (out to one nautical mile). Its overall objective is consistent water management across Europe in order to:

- reduce pollution, prevent deterioration and improve the condition of aquatic ecosystems including wetlands
- promote the sustainable use of water
- help reduce the effects of floods and droughts.

Industrial Pollution incidents

The Environment Agency regulates pollution from major industry, including responding to complaints and reported incidents of pollution. Each incident is categorised according to its severity (see the box below). The category describes the impact of each incident on our water, land and air. The impact of an incident on each medium (water, land and air) is considered and reported separately.

Category 1 - the most serious impact on water, land or air

- persistent and extensive effects on quality
- major damage to the ecosystem

- closure of a potable abstraction (impact on water only)
- major impact on property (impact on land only)
- major impact upon amenity value
- major damage to agriculture and/or commerce
- serious impact upon man

Category 2 - significant but less severe impact on water, land or air

- significant effect on quality
- significant damage to the ecosystem
- non-routine notification of abstractors (impact on water only)
- significant impact on property (impact on land only)
- reduction in amenity value
- significant damage to agriculture and/or commerce
- impact on human

Category 3 - relatively minor impact on water, land or air

- minimal effect on quality
- significant damage to local ecosystems
- marginal effect on amenity value
- minimal impact to agriculture and/or commerce

Category 4 - no impact on water, land or air

Details of incidents reported since the previous State of Environment report are given in Appendix 4.1. A summary of this is provided in Table 4.3

(14) Headline Indicator

Number of pollution incidents in a year having a significant or major impact on air, land or water.

Number of pollution incidents in London having significant or major effects of pollution on air, land or water in the last five years for the 12 months up to the end of September

Period	Category	Air	Land	Water	Total
October 2005 to September 2006	Major	-	-	2	2
	Significant	12	10	19	41
	Total	12	10	21	43
October 2004 to September 2005	Major	-	-	5	5
	Significant	9	6	34	49
	Total	9	6	39	54
October 2003 to September 2004	Major	1	1	2	4
	Significant	5	8	22	35
	Total	6	9	24	39
October 2002 to September 2003	Major	1	1	1	3
	Significant	8	18	59	85
	Total	9	19	60	88
October 2001 to September 2002	Major	-	2	2	4
	Significant	18	30	54	102
	Total	18	32	56	106

Table 4. 3

Source: *Environment Agency*

Trend

Since October 2001 there appears a downward trend in the number of reported pollution incidents.

The most recent figures are for the year from 1 October 2005 to 30 September 2006. During this period the Environment Agency recorded 762 pollution incidents in London. Of these, 724 had an impact of no higher than a category 3. Of the remaining 38 incidents, six affected more than one of air, land and water.

Analysis

During the latest period one category 1 incident and six category 2 incidents were all caused by overflows of sewage into the River Thames from the combined sewerage system following periods of heavy rainfall. Four further events were caused by sewage overflows from blocked sewers.

One further category 1 incident occurred which involved the loss of oil from a sunken barge, and there were five category 2 incidents which were caused by oil pollution.

Finally eighteen category 2 incidents were attributed to either the burning or unsatisfactory handling and storage of waste materials.

Looking Forward

The Environment Agency will continue to monitor and where necessary take enforcement action against companies that cause serious pollution incidents.

Noise

Excessive levels of noise (unwanted sound) can affect quality of life. Potential effects of noise on human wellbeing can include nuisance, disrupted sleep patterns, hearing loss and stress-related health effects, which can be psychologicial, behavioural or physical in manifestation.[12]

Since the last State of Environment report, the Mayor has published his Ambient Noise Strategy, Sounder City, in 2004. Ambient (or environmental) noise is long-term noise from transport and industry, as distinct from noise caused by neighbours, construction sites, pubs or clubs, which are dealth with by local borough councils. The Mayor's strategy focuses on reducing noise through better management of transport systems, better town planning and better design of buildings.

Noise may contribute to inequalities in health. For example, many believe that higher levels of traffic noise are more likely to be experienced by socially deprived groups in areas which are more affected by busy roads. This was explored further in a study commissioned by the GLA[13]. This looked at the statistical relationship between noise from road traffic in London, as indicated by the London Road Traffic Noise Map produced for the Department for Environment, Food and Rural Affairs (Defra) and various population groups (by race, religion, age, gender, etc.). In particular, it looked at differences in the way homes of various groups are exposed to noise –

[12] Stansfield *et al*., 2000, Passchier-Vermeer and Passchier, 2000
[13] London Road Traffic Noise Map: Equalities Analysis" – produced for the GLA by Atkins, 2005

which groups live in the noisier areas and which in the quieter ones. For some issues there is little or no correlation with road traffic noise - for example, disability or gender. The strongest associations were found for race groups and those in social rented homes, flats and apartments (as opposed to houses) - who are more likely to live in noisier areas and less likely to live in quieter ones. One finding was that although those who are more deprived overall are more likely to live in areas of high road traffic noise, this does not appear to be due to income alone, as low income areas do not automatically equate to high noise areas. Typical noise levels are provided in Appendix 4.2.

Sound is also an important part of communication, culture and many other aspects of everyday life. A soundscape is the aural equivalent of landscape. It can be defined as how individuals or societies perceive the sounds around them – both positive and negative and both natural and artificial. A good soundscape enhances quality of life.Many parts of the city have their own distinctive soundscapes.

Indicators

No headline indicator was used in the last State of Environment report and the government does not at present include noise in its national list of 'Sustainable Development Indicators'. Defra has commissioned work to produce computer-generated noise maps of England. The first part of this work is for road traffic noise in London, completed in 2004, with other noise sources to follow. The following is an example of the London Road Traffic Noise Maps – it shows the noise levels averaged over a typical day for the whole of London using the European index 'Lden' (level day evening night).

London Road Traffic Noise Map

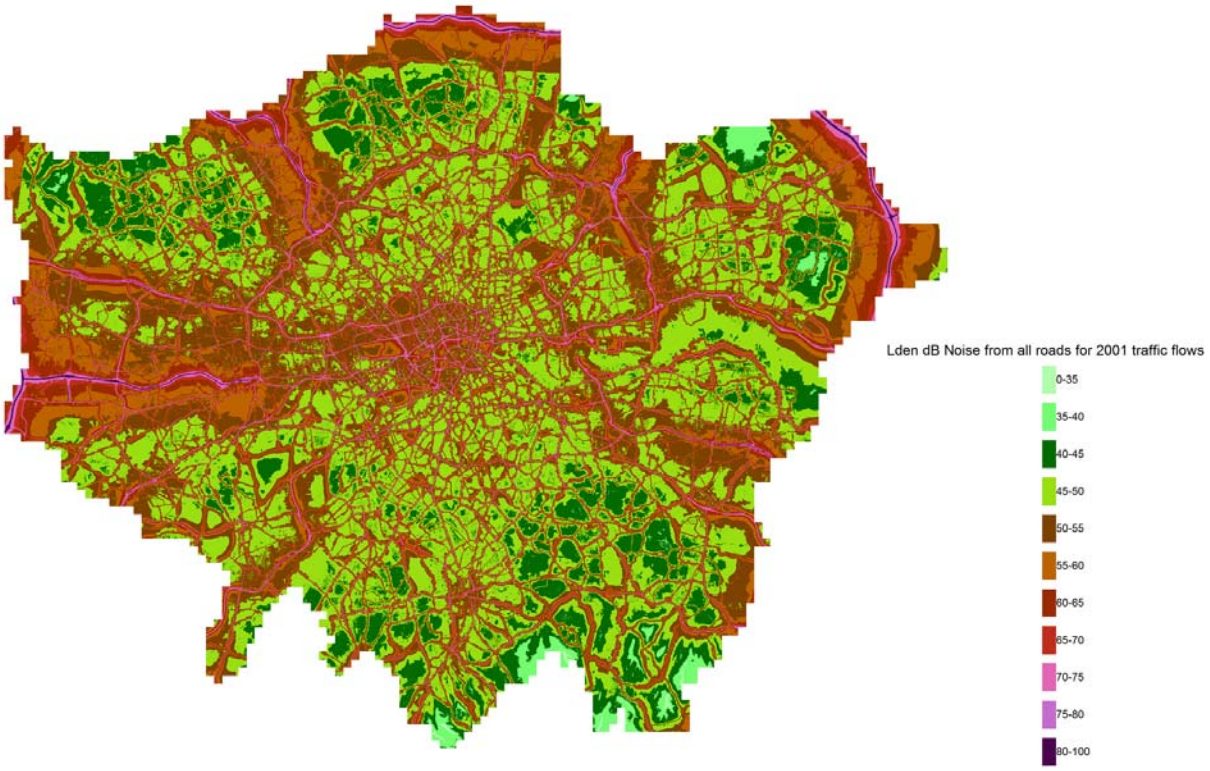

Figure 4.15

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Noise during the evening (7pm to 11pm) is penalised by adding 5 decibels and night time (11pm to 7am) by adding 10 decibels to reflect the greater sensitivities of people to noise during these periods. It was based on traffic flow data for 2001, the latest year available in 2004 when the maps were generated. Defra have set up a special website where local sections of the maps can be viewed by inserting a street name or postcode:
http://www.noisemapping.org/frames/Map.asp

European law requires such maps to be produced or updated by mid 2007 and then updated every five years. One of the outputs of this project will be the number of people whose homes are exposed to various levels of noise from each source. This could lead to the development of meaningful indicators of environmental change – for example, the proportion of the population of London exposed above a given level of road traffic noise. For example, based on Figure 4.15 the percentage of people living in buildings exposed to a maximum Lden (due to road traffic noise) greater than 65 decibels is 14.2 per cent.

Apart from measurements of noise levels and calculated noise maps, some other data are available on the state of London's noise environment. These include annual data on the complaints made to borough environmental health teams and data from general attitude surveys that include components on noise and other environmental problems.

The following sections provide examples of the types of information available at present. While some of the data on public perceptions of noise in London may be more extensive than the noise

measurement data discussed above, attitude data does not always make a very reliable indicator of changes to the noise environment over the long term because factors other than noise may also influence attitudes.

Noise complaints

The Chartered Institute of Environmental Health annually requests noise complaint data from local authorities in England and Wales, including the Corporation of London and the 32 London boroughs.

Noise complaints by type (London)

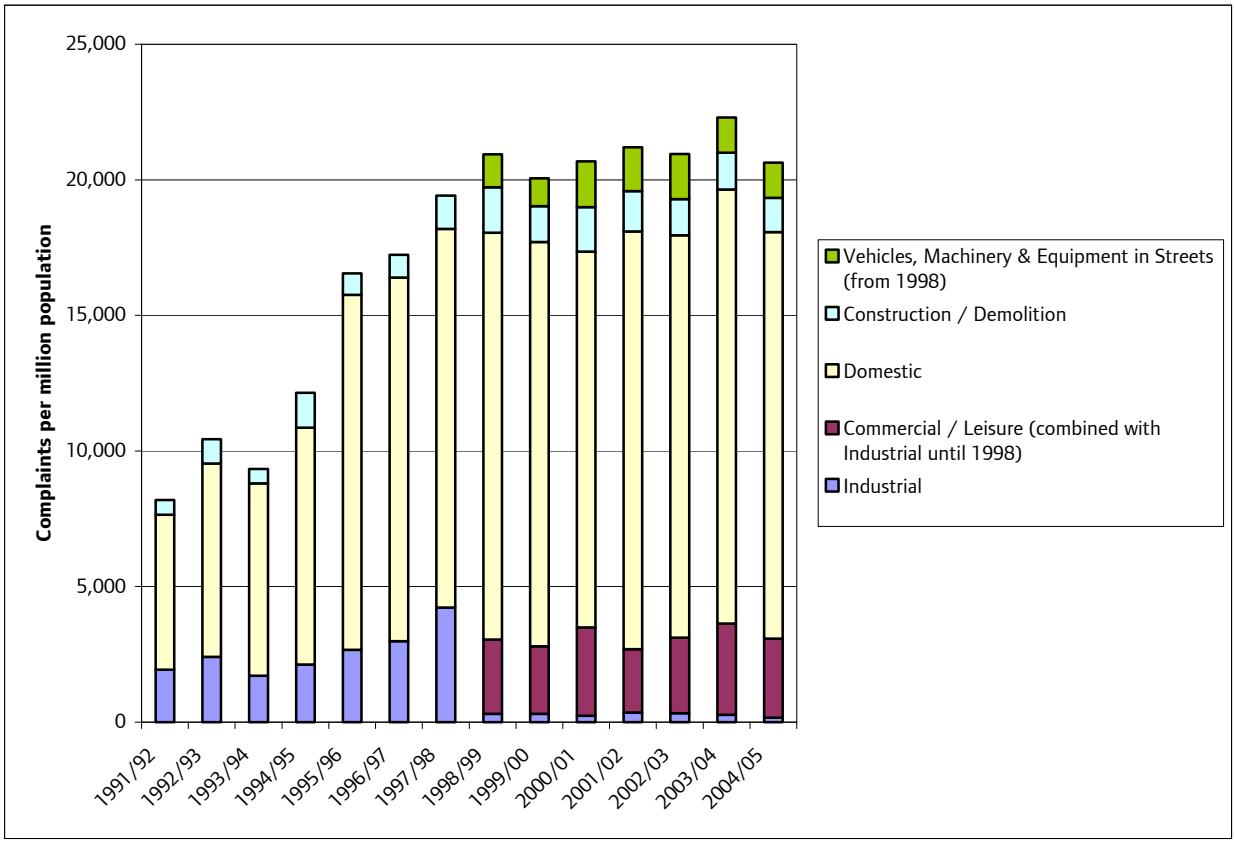


Figure 4.16
Source: Chartered Institute of Environmental Health (unpublished data)

Trend

It is not possible to identify a trend as response rates vary from year to year, and so data for different years are not directly comparable. Also, different boroughs in London may respond in different years. Figure 4.16 attempts to reduce this lack of consistency by looking at complaints per million people. The graph suggests that from 1998/99 there has been no obvious trend and that the majority of noise complaints remain to be from domestic sources.

Analysis

Not all complaints to local authorities about noise are found by the authority to be a nuisance (within the legal constraints under which the authorities operate).

Other issues need to be taken into account in interpreting complaints data. For example, if the quality of noise service offered by the authority improves, the number of complaints may increase, and if people receive a rapid response to complaints about one type of noise, more service requests may be received and handled on that subject than on others. On the other hand, people may complain less about sources of noise over which the local authority appears to have little influence.

The annual data on noise complaints collected by the Chartered Institute of Environmental Health (CIEH), while highly valuable, has historically been limited by the response rate and by a relatively limited breakdown of the cause of the complaints. The CIEH and Defra have recognised this and in 2006 the CIEH published revised guidance on the management of noise services[14*] with the support of Defra. A new scheme for gathering more comprehensive data on complaints is described in an appendix to the guide. In the new scheme, which CIEH are encouraging authorities to use from 2005/6 onwards, the main categories of complaint – as used in Figure 4.16– will be divided into subcategories. For domestic noise, the subcategories cover the most common sources: alarms (e.g. house, car or fire), barking dogs, other animals or birds, machinery (fixed and mobile), people noise, music, party, TV/radio, fireworks, vehicle noise, vehicle repairs and DIY. The domestic complaints will also be cross-referenced according to the type of dwelling (e.g. single family house/bungalow, purpose built flat/maisonette etc.). At the time of writing, the first data in the new format has yet to be published. From 2006/7, the CIEH has set up a website to encourage authorities to provide their data in electronic form, to encourage reporting and to facilitate collation, however it is anticipated that it will be some time before all local authorities are able to supply the more detailed data.

Some light is shed on the main causes of domestic noise complaints by a survey carried out by the National Society for Clean Air and Environmental Protection (NSCA) in 2005. This differs from the CIEH survey in that it seeks the opinions of environmental health officers themselves, rather than obtaining statistics from their authorities and some subcategories are also different. Officers from 26 per cent of English local authorities responded and the main cause of complaint was seen as amplified music, with barking dogs as the second most common cause. Very few London authorities responded and for that reason NSCA do not regard the figures for London as being capable of detailed analysis, but those responding again rated amplified music as the most common problem.

Looking Forward

Over the next two years or so, a number of actions are being taken to reduce ambient noise. Transport for London (TfL) is developing its Traffic Noise Action Programme, in accordance with Proposal 16 of the Mayor's Ambient Noise Strategy. The process of replacing existing road surfaces with quieter types, already well advanced, will continue. TfL's "Environment Report 2006" states that the proportion of the total Transport for London Road Network with lower noise surface material was 70 per cent for the year 2005/06[15].

The Mayor, through TfL, is supporting further moves towards hybrid diesel-electric buses and fuel cell buses, both of which are quieter than conventionally powered vehicles.

[14] Neighbourhood Noise Policies and Practice for Local Authorities – a Management Guide; CIEH, London, September 2006

*

[15] [http://www.tfl.gov.uk]

In response to the EU Environmental Noise Directive (2002/49/EC), central government will create new noise maps for aircraft, railways and industry in 2007. It is expected that the road traffic noise map of London will be updated at the same time. These maps will form the basis for noise action plans required in 2008 by the Directive. These will be commissioned by central government. In addition, government has stated that it will publish a National Noise Strategy in 2007. The Mayor's Ambient Noise Strategy will be revised as necessary following these initiatives.

Aircraft Noise

Complaints about aircraft noise at Heathrow are recorded by BAA plc (formerly British Airports Authority). From April 2005 to March 2006, 5,190 complaints were received (compared to 7,221 from 2001 to 2002). Of the total number of complaints, 3597 (4,843 for 2001/02) were from the nine boroughs/districts nearest Heathrow. Four of these boroughs (Hillingdon, Ealing, Hounslow and Richmond) are within the GLA area[16].

BAA plc operates a noise monitoring system at Heathrow. Amongst other controls, this is used to check that individual aircraft comply with departure noise limits and to fine those operators whose aircraft infringe the limits. The limits vary according to the time of day – the current departure noise limits are:

- daytime flights (between 7am and 11pm): 94 dB(A) L_{max}
- night flights (between 11pm and 11.30pm & 6am and 7am): 89 dB(A) L_{max}
- night flights (between 11.30pm and 6am): 87 dB(A) L_{max}

  where dB(A) L_{max} represents the maximum level of sound reached in 'A' weighted decibels.

The number of infringements reported for recent years are:

	2002/03	2003/04	2004/05	2005/06
Day infringements	77	82	15	42
Night infringements	201	113	117	168
Total infringements	*278*	*195*	*132*	*210*

Table 4. 4

The BAA Heathrow website suggests that the total number of noise infringements rose from 132 to 210 between 2004/05 and 2005/06 due to a number of events throughout the year that had a negative impact. These included the Gate Gourmet catering dispute and severe weather conditions which led to significant delays. Because more flights left after 23:00 when the noise limits are lower, this led to more infringements at night.

Aircraft breaking the departure noise limits are fined £500 for the first three decibels and £1000 beyond that. The money is used to fund community projects to mitigate and ameliorate noise. In 2005/06 fines totalling £121,500 were imposed.

Attitudes to noise

The last National Noise Attitude Survey was carried out in 2000 and is generally repeated on a ten year cycle. In 2002, the GLA carried out a survey of London households, currently there are

[16] Source: BAA Heathrow website – http://www.heathrowairport.com (About BAA Heathrow > Corporate Responsibility > Key issues and priorities > noise

no plans to update this survey. Both results were published in the last State of Environment report.[17]

The National Noise Incidence Survey (NNIS), (which was carried out in parallel with the National Noise Attitude Survey mentioned above and was described in detail in the last State of the Environment Report) compared noise levels measured outside dwellings in 1990 and 2000. However, each site is only measured over a 24-hour period. Also only outer London boroughs were sampled, because of the greater concentration of population in outer London.

In 2003/04, the GLA commissioned similar survey work in three inner London boroughs. Westminster council also independently commissioned a survey of its area following similar protocols in 2003. When NNIS results (for outer London) are compared with data for the inner boroughs in 2003 and 2004, collected by the GLA and Westminster, there are clear differences between the seven outer boroughs and the four inner boroughs. It is considered that these differences are not due to changes over time (which are generally small for a period of four or five years when averaged over the number of sampling points involved) but rather to structural differences between outer and inner boroughs.

Figure 4.17 shows the hour-by-hour noise pattern in decibels (dB) for outer and inner London, averaged over all the sites measured in each of the surveys. All these graphs show higher average noise levels for inner London than seen in outer London, together with a smaller difference between day and night time noise levels in inner London. When looking at other noise indicators, there is also some evidence of a slightly later decrease in noise level in the evening and increase in noise level in the morning for inner London than is seen for outer London.

[17] State of Environment Report 2003, page 69, figure 18.

24 hour time history of noise, inner and outer London.

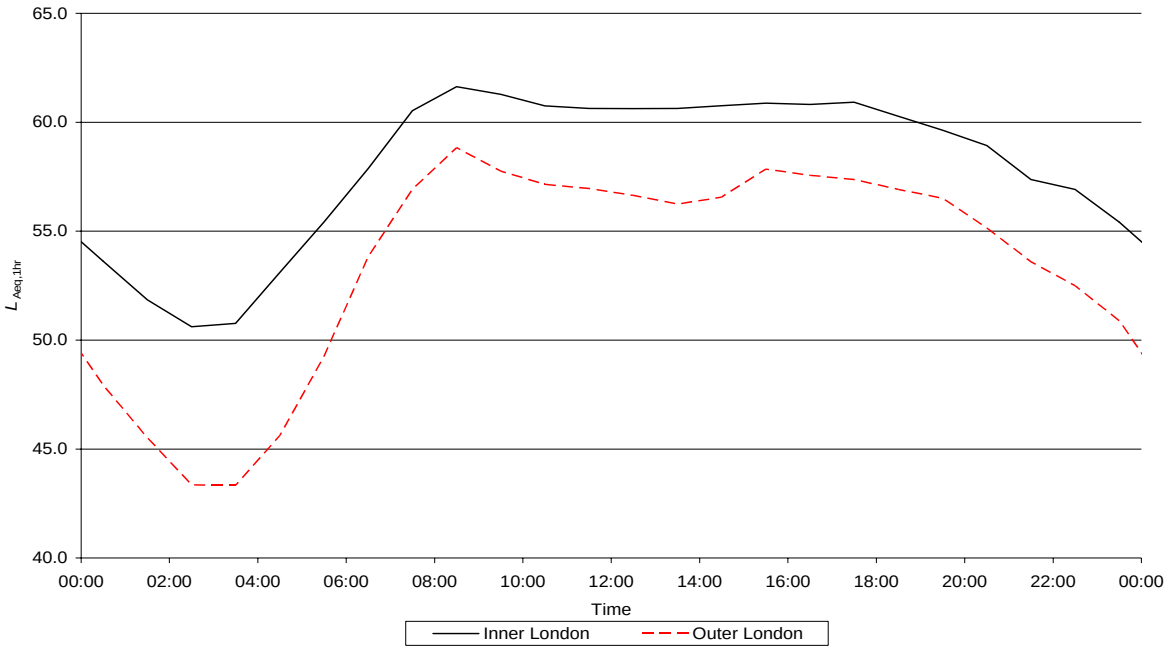


Figure 4.17

Sources: Building Research Establishment, 2002 Review of London Related Data from the 1990 and 2000 NNIS and, London Noise Survey - Four Inner London Boroughs: Analysis of Data from London Noise Survey Phase 1 (2004) and Westminster Noise Survey (2003).
note L_{Aeq}, 1hr (dB) is the average 'A' weighted decibels over one hour

Looking Forward

In a modern and growing city such as London, noise is a key quality of life issue. The GLA is implementing the UK's first city-wide environmental noise strategy and aims to be at the forefront of developing and influencing European and national policy

The London Plan has a policy (4A.14) on noise. In summary, the main points of the policy are to minimise the impacts of noise on or from new developments; to separate noise-sensitive development from major noises wherever practicable; supporting new technologies to reduce noise at source; reducing road traffic noise through highway management and transport policies; and, containing noise from late night entertainment and other 24-hour activities.

London's soundscape needs as much care as its townscape or landscape. Exemplary acoustic design is a vital part of making higher densities work for everyone. Whether it is tackling noise, or enhancing the quality of the sounds we need, companies, communities and government all have a part to play in developing and demonstrating innovative solutions.

For further information on the work being done by the Mayor, please refer to www.london.gov.uk for progress reports on implementing the Mayor's Ambient Noise Strategy and www.tfl.gov.uk for Transport for London's environment reports.

CHAPTER 5: Road Traffic Levels

Introduction

Traffic impacts on the environment through pollution from engine exhaust gases. It also contributes to noise pollution and poor air quality (see Chapter 4). Plants, animals and habitats are sensitive to vehicle pollutants. For example, nitrogen oxides from exhausts forms acid rain in the atmosphere that can damage the trees and soil. Run-off from roads may include pollutants such as fuel oils and seasonal road treatments that can pollute nearby watercourses. Roads can result in collision casualties and the severance of communities.

Up to two thirds of London's emissions that affect health (in particular nitrogen oxides (NO_x) and particulate matter (PM_{10})) come from road traffic. Levels of these are discussed in more detail in Chapter 4, which also provides information about measures implemented by the Mayor and Transport for London to reduce emissions from transport. The Department of Health estimates that there are between 12,000 and 24,000 early deaths each year in the UK resulting from poor air quality in our cities.

Vehicles also release greenhouse gases to the atmosphere that contribute to climate change. Transport (excluding aviation) accounts for about 22 per cent (9.6 million tonnes) of London's total CO_2 emissions.[1] CO_2 emissions from road traffic account for 80 per cent of these 9.6 million tonnes of CO_2 emitted from all forms of transport in London[2].

There is an ongoing need to reduce the environmental impacts of roads and to promote more environmentally friendly transport options such as cycling, public transport and walking. The challenge for London is to deliver a sustainable transport system, capable of supporting the success of the London economy and predicted population growth. Transport for London is addressing this challenge through energy efficiency, lower carbon technologies, and promoting sustainable transport modes.

Traffic congestion

Traffic congestion is a problem that affects pretty much every city in the world. It makes cities a worse place in which to live, work, visit, or do business. Congestion is inefficient. It wastes millions of hours of people's time. It means slower and unpredictable journeys, increased cost to business, and can encourage traffic through environmentally sensitive areas. It disrupts emergency services and public transport operations. It worsens vehicle emissions, creating poor local air quality and contributing to climate change. The consequent noise, disruption and severance suffered by local communities negatively impacts upon their quality of life. In essence, it makes the environment and travel unpleasant for everyone.

London's approach

London has been successful in achieving a modal shift away from the private car to public transport, cycling and walking. Since Transport for London (TfL) was formed in 2000, there has been a shift of five per cent away from car usage, saving 500,000 car journeys per day and an

[1] Climate Change Action Plan; GLA
[2] TFL: *Transport 2025*
http://www.tfl.gov.uk/tfl/downloads/pdf/T2025-new.pdf

estimated 210,000 tonnes of carbon dioxide (CO_2) emissions per year. For most major cities in the world pollution from road transport is their most significant problem in tackling climate change. In London it makes a much smaller contribution because of the extensive public transport network and TfL's success over the last six years in improving and expanding this. TfL has also worked to encourage people to make walking and cycling part of their regular journeys. Cycling in London has grown fast, up 83 per cent on red routes in the past six years. There are now an estimated 480,000 cycle journeys every day across London, around 30,000 more than a year ago.

This chapter looks at road traffic levels; the mode of transport and number of journeys, volume of traffic in different parts of London, and trends in car use and public transport as well as road casualties; to provide an overview of travel and transport in London and its impact on London's environment. More information regarding travel and transport in London can be found in the London Travel Report 2006[3]

Mode of Transport

Unlike other sectors, transport emissions in London have remained stable since 1990 despite the growth of London's population and economy. This is due to a combination of high long-term levels of public transport use and, since 2000, unprecedented investment in the public transport network, alongside the implementation of policies to combat congestion and manage traffic and technological advances.

Transport emissions per capita in London are 45 per cent lower than the UK average, but if reduction targets for CO_2 emissions are to be met it will be critical to ensure that as many trips as possible are carried on lower-carbon modes: either public transport or walking and cycling.

Table 5. 1 shows data on personal travel, journeys travelled and distance travelled per person in Inner, Outer and Greater London (for a map of these cordons please see Figure 5.1). In the previous State of Environment report, data from the National Travel Survey (2002) was used to look at distance travelled and journeys made per person, by mode and area of residence. It has not been possible to use the same data source this time for year on year trends in personal travel for Londoners. Instead, the London Travel Demand Survey (LTDS), a continuous household interview survey with a one-day travel diary, initiated by Transport for London, is shown in order to update the results of the 2001 London Area Transport Survey (LATS).

Provisional results, from the 05/06 survey, on trip rates (trips per person per day) for weekday trips by London residents, broken down by mode of transport, and by Inner and Outer London residents are shown, with comparable results from LATS 2001, in Table 5. 1.

[3] TfL; London Travel Report 2006, http://www.tfl.gov.uk/corporate/about-tfl/publications/1482.aspx

(22) Headline Indicator

Number of Journeys and distance travelled (per person per year)

Weekday trip rates and mode shares, by residents of Inner and Outer London									
									trips/ percentage
		Main mode of trip:							
	trips per person per weekday	Rail	Under-ground and DLR	Bus	Taxi and other public	Car and motorcycle	Cycle	Walk	all modes
2001 (Source: London Area Transport Survey)									
Inner London	2.68	*4.3*	*10.2*	*14.1*	*2.2*	*29.4*	*2.2*	*37.6*	*100.0*
Outer London	2.89	*4.6*	*5.1*	*9.9*	*0.9*	*51.9*	*1.2*	*26.3*	*100.0*
Greater London	2.81	*4.5*	*7.0*	*11.4*	*1.4*	*43.9*	*1.6*	*30.3*	*100.0*
2005/06 (Source: London Travel Demand Survey)									
Inner London	2.74	*5.5*	*10.9*	*17.3*	*1.2*	*23.3*	*2.1*	*39.7*	*100.0*
Outer London	3.02	*4.8*	*4.9*	*12.3*	*0.8*	*49.1*	*1.1*	*27.1*	*100.0*
Greater London	2.91	*5.1*	*7.1*	*14.1*	*0.9*	*39.5*	*1.5*	*31.8*	*100.0*
Note: LTDS results are provisional: walk trips in 2005/06 have been adjusted for seasonal variation All results are subject to sampling error and small differences are unlikely to be statistically significant.									

Table 5. 1

Trend

There is an upward trend in the use of more sustainable transport. An increase in bus mode share and a decrease in private road transport are also evident.

Analysis

London is unique amongst other mayor cities in achieving a modal shift from car use to other, more sustainable forms of transport.

The number of journeys in all areas has increased, as has the use of rail and bus. Use of underground and DLR has remained largely stable along with cycling. Walking has increased across all areas. The use of taxis, cars and motorcycles has decreased from 2001 to 2005/06.

Around 50 per cent of journeys in London are less than 2km. Many of these shorter journeys, such as trips to school, could be made on foot or by bicycle but are deterred by poor road crossing facilities, fast flowing traffic and a poor environment. Walking has obvious benefits for personal health in a society faced with the problem of increasing levels of obesity. More pedestrian crossings, widened footpaths, improvements to the public realm and traffic calming schemes to reduce vehicle speeds are being introduced. Around 80 per cent of journeys are less than 8km, many of which are an ideal distance for cycling. Investment in cycling has been focused at improving cycle parking, training, promotion and completing a network of routes that are along quieter roads or use off-road or on-road facilities. Although cycling in London has increased significantly since 2000, up by 83 per cent, it is still a very small proportion of the total trips.

Walking, Health and Social Inclusion

Regular walking can have significant benefits for personal health and fitness. This in turn can be beneficial to business and the economy by reducing sickness, absence and health care costs. Walking is the main option for increasing physical activity in a sedentary population. Regular physical activity can halt or reverse the decline in bone density at any age and is particularly important for older people. It can help them to stay flexible and maintain coordination reducing the risk of accidents, particularly falls.

A better environment for walking will help to create residential areas that are safer and better places for all of us. There will be more room for children to play safely and the pavement can become a place to meet as well as a place to walk.

Larger numbers of people regularly walking in an area can help to deter crime and vandalism. Improving the walking environment can help to foster a sense of community and concern for other people that is a vital part of building a London that is an attractive and desirable place to live.

Transport for London is working with the London boroughs and other relevant organisations to ensure the effective promotion and delivery of better conditions for walkers.

This work includes:

- The World Squares For All Project with the partial pedestrianisation of Trafalgar Square as the first stage
- The completion and promotion of six strategic walking routes together with riverside and canal paths
- Opening up railway arches and providing new footbridges across railways
- Removal of footbridges and closures of subways and replacement with surface level facilities
- Signing and security improvements

- Additional pedestrian phases at signalised junctions as well as new pelican and puffin crossings
- The development of best practice guidance on audits of pedestrian facilities and accessibility, including issues related to safety and the needs of disabled people
- A rolling programme of improvements to make the street environment more accessible, removing barriers and obstructions that make it difficult or unsafe for pedestrians to use the street.

Reducing the need to travel is also playing an important role in cutting congestion. A **travel demand management (**TDM) programme has been introduced which tailors individual solutions to reduce levels of travel, particularly by car. This has been integrated with a road safety programme and targeted at all schools in the city to produce individual school travel plans – encouraging parents and children to walk, cycle or take public transport. Monitoring has shown reductions in car use of around six per cent for schools that implement these travel plans. The TDM programme, is being rolled out to large employers located in congested areas of London and a large-scale pilot has been started in a residential area. Planning policy is being amended to require new developments over certain thresholds to have a travel plan in place to reduce car use. Furthermore, locating developments with a high level of trip generation in areas of good public transport accessibility and sufficient capacity, the use of parking restraint, encouraging mixed use developments and ensuring new development is public transport, walking and cycling friendly – will all contribute to reducing the need to travel by car and congestion.

Looking Forward

LTDS began in 2005/06, with the main fieldwork starting in September 2005. Sample sizes are planned to be 8,000 households each full year, but only 5,000 in the first year. Because of these sample sizes, which are much smaller than for LATS, full analysis of LTDS will depend on combining samples over more than one year. TfL plan to release a first results report in July 2007, when data for 05/06 and 06/07 are available. Results on travel distance, which depend on an analysis of the addresses of trip ends, will also be available later in 2007.

A major programme of continued investment in public transport, walking and cycling to provide attractive alternatives to car travel is outlined in Transport for London's Transport 2025.[4] It also includes promoting alternatives to the car through marketing, information and other travel demand management policies.

To improve air quality in London - which is currently among the worst in Europe - the Mayor confirmed the scheme order for designating Greater London as a Low Emission Zone (LEZ).

The objectives of the proposed Low Emission Zone are two-fold:

- To move London closer to achieving national and EU air quality objectives for 2010.
- To improve the health and quality of life of people who live and work in London, through improving air quality.

The Low Emission Zone aims to reduce air pollution by discouraging the most polluting vehicles from driving within Greater London. These are generally older, diesel-engine heavy goods vehicles (HGVs), buses, coaches, heavier vans and minibuses.

[4] www.tfl.gov.uk

TfL's £10bn Investment Programme includes major schemes such as LU improvements, and rail extensions and capacity increases, which will enable more people to switch from the car to public transport, thus reducing congestion and improving London's environment. While TfL recognises that there is still a long way to go to make London's transport system truly sustainable, it is laying the groundwork for this.

A Cycling City

The Mayor of London and Transport for London have increased investment in cycling by 50 per cent from £24 million in 2006/07 to £36 million in 2007/08. In 2000 investment in cycling stood at just £5.5 million. This money is being spent on improved cycle parking facilities, education and training, events and cycle promotion. 500kms of the London Cycle Network Plus - a network of signed routes for cyclists across the capital - has already been completed, and the full 900km network will be finished by the end of 2010. Transport for London has installed 10,000 cycling parking spaces across the capital in the past two years.

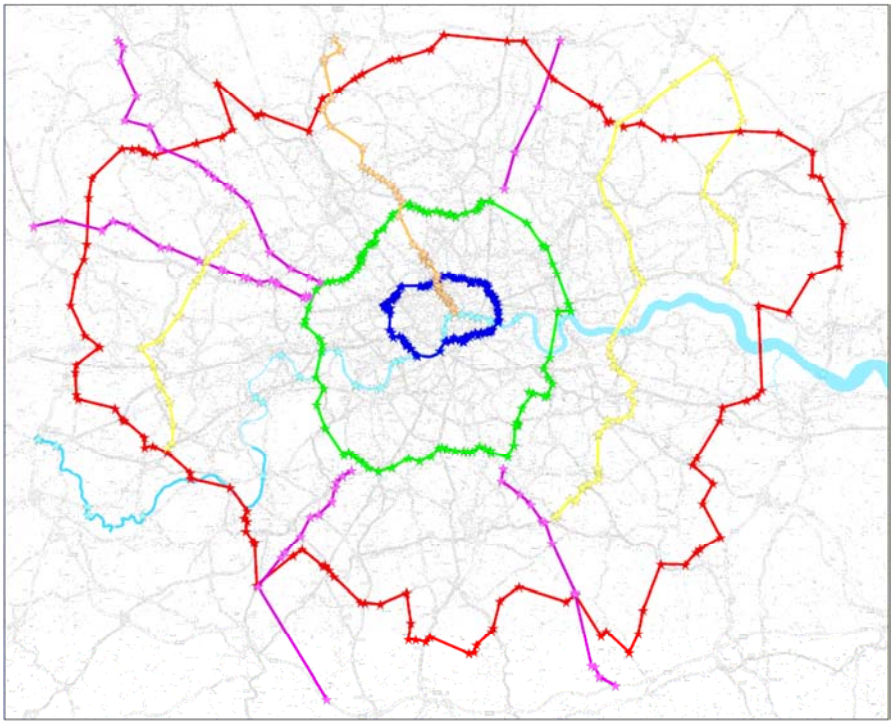
In 2007 the Tour de France is arriving in the capital for the first time in July.

Traffic movement across London

Transport for London monitors the level of traffic movement across three cordons (central, inner and outer or London) shown in

Figure 5. 1

The London boundary and Inner London cordons are surveyed approximately every three years, whilst the central London surveys are undertaken annually (since 2001).



Transport cordons in London

Figure 5. 1

(21) Headline Indicator
Traffic counts at London Cordons Since 1990

The following charts show the percentage change by vehicle type across all 3 cordons. The counts for the surveys since 1990, measured as combined direction 24-hour flows by vehicle type for thousands of vehicles are given in Appendix 5.1a, 5.1b and 5.1c.

Change in vehicle volumes across the Outer London Boundary Cordon between 2001 and 2004

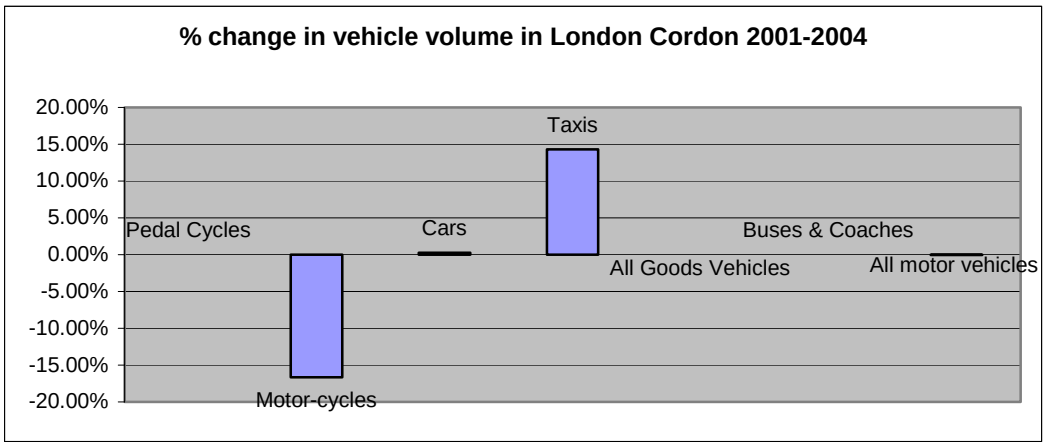


Figure 5. 2

Change in vehicle volumes across the Inner London Cordon between 2002 and 2005

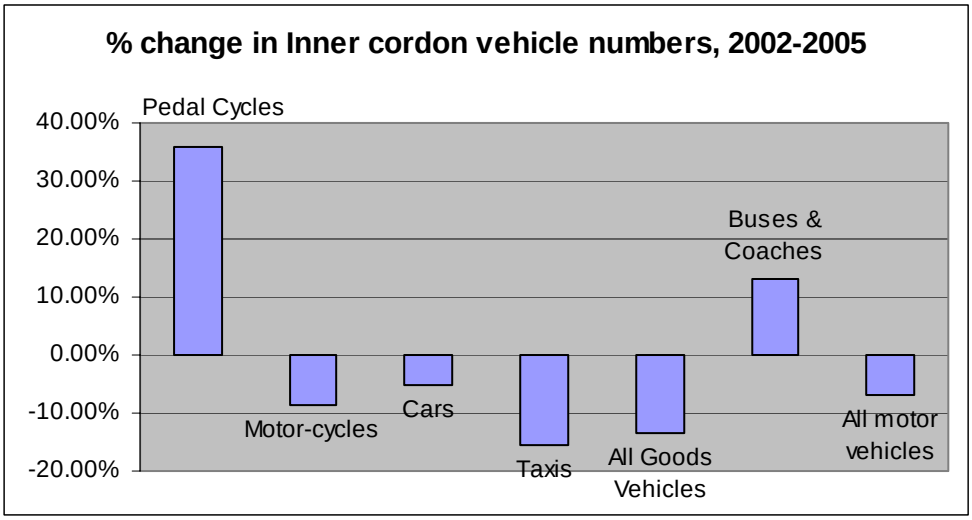


Figure 5. 3

Change in vehicle volumes across the Central London cordon between 2001 and 2005

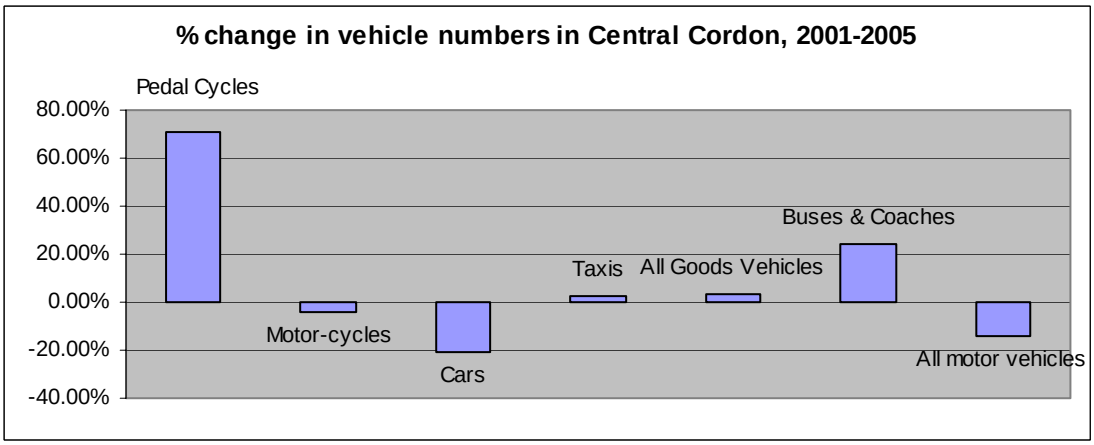


Figure 5. 4

Trend

The numbers of vehicles crossing inner and central boundaries were relatively stable throughout the1990s, while the outer boundary increased. Since 2000 the outer boundary has stabilised and the inner and central boundaries have notably decreased.

Analysis

Figure 5.2 shows the change in the numbers of vehicles, analysed by vehicle type, crossing the London Boundary cordon between 2001 and 2004. Most vehicle type categories had relatively stable volumes, although notably the number of motorcycles fell by just over 16 per cent.

Vehicle volumes crossing the Inner London cordon have fallen by nearly seven per cent between 2002 and 2005. Figure 5.3 shows that there was an increase of 36 per cent in the number of pedal cycles crossing the Inner cordon and a five per cent reduction in the number of cars.

The volume of vehicles crossing the Central London cordon fell by 14 per cent between 2001 and 2005. Figure 5.4 shows that the number of buses and coaches rose by 24 per cent and the number of goods vehicles fell by nine per cent. There was an increase of 70 per cent in the number of pedal cycles crossing the central cordon and a 21 per cent reduction in the number of cars. It is probable that most of this decrease is attributable to the introduction of the Central London Congestion Charge Scheme.

Congestion Charging

The Mayor and Transport for London (TfL) introduced congestion charging in central London in February 2003. A year later, traffic within the charging zone during charging hours was 15 per cent lower than it had been before the charge and the number of vehicles entering the zone had fallen by 18 per cent.

Congestion in the zone has reduced by 26 per cent since its introduction. The combined effect of the scheme and improved vehicle technology is that NO_x emissions within the charging zone fell by 13 per cent and total PM_{10} emissions fell by 15 per cent[5] (comparing annual average values for 2002 and 2003).

The western extension to the Congestion Charging Zone, which came into operation on 19 February 2007, is expected to bring further environmental benefits.

Congestion charging targets those who use their vehicles in congested areas. It means they have to pay towards the congestion they are causing and deters people from using them in such areas. Fewer vehicles moving in and out of the congestion charging area will result in reduced congestion thereby cutting traffic delays and improving journey time reliability within the charging area. Around 70,000 fewer vehicles entered the congestion charge area in 2006, compared to the 334,000 that entered each day before charging began. The success of the scheme led to a doubling of its area in February 2007.

Looking Forward

The policy framework set out in the London Plan and the Mayor's Transport Strategy is successfully addressing the growth challenges faced by London, which if not acted upon would lead to a growth in traffic levels. Continued investment in public transport, walking, cycling and measures to manage the demand for travel have created, and will continue to create, the conditions for a reduction in traffic levels in Inner and Central London, and a reduction in the rate of traffic growth in Outer London.

Making better use of the existing network through network management aims to optimise the use of the existing network. This includes utilising signal control technology to actively manage traffic and improve network resilience. Greater priority has been placed on coordinating road

[5] Transport for London, Central London congestion charging Impacts monitoring Fourth Annual Report, June 2006.

works and enforcing traffic and parking regulations, including the use of CCTV for remote monitoring, to ensure the smoother flow of traffic to the benefit of all road users. Loading and parking regulations have been reviewed on all strategic routes to ensure that they are effective and relevant. The Mayor has announced that he will consult Londoners on the proposal for higher CO_2 emitting cars to be subject to a higher charge within the congestion zone.

Trends in use of Public Transport

A safe, accessible, efficient, reliable, affordable and attractive public transport system is essential for London's vitality and well-being. A central aim of the Mayor's Transport Strategy is to improve the quality and expand the coverage of the public transport network.

Public transport is more space and energy efficient, more environmentally benign and more cost effective than attempting to meet transportation needs through increased private travel.

Figure 5. 5 shows the percentage change in public transport use since 2000/01, with figures given in Appendix 5.2.

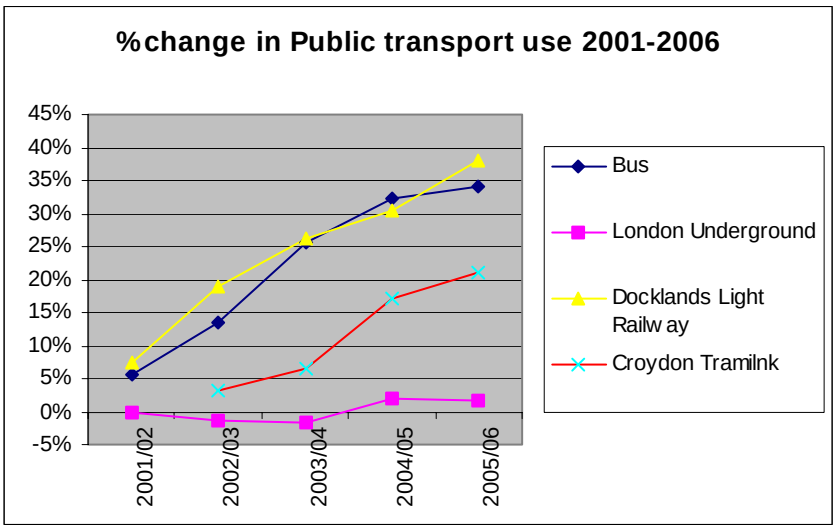


Figure 5. 5

Trend

Public transport use has continued to grow strongly, with bus, Docklands Light Railway and Croydon Tramlink networks experiencing strong growth in patronage. London Underground has remained stable since 2000/01.

Analysis

Public transport use increased during the 1990s, and this was predominantly due to increased usage of the London Underground network. The rate of growth of public transport usage has increased since 2000/1, although this has been largely driven by the growth in patronage on the bus network. The significant improvement in the quality and coverage of the bus network has helped to increase bus use by over 34 per cent between 2000/1 and 2005/6.

Improvements to public transport include increasing the capacity of the system, improving frequencies and introducing new routes. There is a focus on enhancing service reliability and quality through more robust scheduling and operational management, including the introduction of new accessible vehicles and improving information, especially real time information using communication technology to inform the traveller. On-road bus priority lanes and computer controlled priority at traffic signals has helped to improve bus reliability and improve journey times. There has been significant investment in enhancing safety and security including more transport dedicated policing, more customer facing staff, Close Circuit Television linked to help points and initiatives to design out crime. In addition, network integration has been a key theme – promoting the concept of more seamless travel through better interchanges and smart card ticketing.

Investment has focused on the bus network, including improving levels of reliability, enhancing security, information for passengers and the accessibility of the bus fleet. New routes have been introduced to areas of London where network coverage was less extensive and the frequency and robustness of schedules of existing services have been improved. Overall, operated bus kilometres have increased by around 27per cent since 2000/1. Bus priority measures, including bus lanes and traffic signal priority at junctions, have also maintained or improved reliability. The coverage of real time information at bus stops has been extended to more areas of London, and bus stop information has been simplified and enhanced to make it easier to understand. In addition the internet and mobile phone journey planning facilities have been introduced.

Fare incentives have been progressively introduced, such as free travel for under-16s and discounted bus, tram and tube travel for students.

Increased investment in walking and cycling projects is delivering safer road layouts, more crossing facilities, an expanded London Cycle Network and more cycle parking and cycle training.

Looking forward

The delivery of Transport for London's Investment Programme is beginning the process of turning around the consequences of the decades of under investment in the public transport network.

In the medium and longer term, Transport for London's Investment Programme is focused on improvements to the Underground and National Rail networks, and implementing new tram and bus transit schemes.

Maintaining improvements in the public transport system to provide the additional capacity to cater for London's growth, and to provide a viable alternative to car use will remain a critical task.

For further details and statistics please see the London Travel Report 2006.

Car Ownership

London has a large road network covering 14,700km[6]- over a third of the world's circumference. Despite London's extensive public transport network, the car remains an important mode of transport for many types of journey, particularly in Outer London. The road network also plays an important role for the delivery of goods and services within London. However, traffic congestion

[6] DfT Statistics - Roads

in London leads to longer and more variable journey times adding to the costs of doing business in the capital. While the car offers personal mobility, it can impose negative impacts on the quality of life and the environment with CO_2 emissions, poor local air quality, noise, collision casualties and the severance of communities.

Car ownership in London has remained relatively stable since 2000.

Table 5. 2 shows results from the London Travel Report 2006 (chart 3.3.1).

Car ownership in London, percentage of households with and without cars.

Year	No cars	One car	Two or more cars
2000	37%	43%	20%
2005	36%	45%	19%
Change 2000 to 2005	-0.9%	+1.9%	-0.9%

Table 5. 2

Changes between 2000 and 2005 are marginal with levels of car ownership in 2005 being almost unchanged (and fluctuations in intervening years probably within the survey error). The percentage of households with no cars fell slightly, from 37 per cent to 36 per cent, while among households with cars, those with one car increased (from 43per cent to 45 per cent) and those with more than one car decreased (from 20 per cent to 19 per cent).

A key objective for improving bus services is to attract car users to public transport, particularly in Outer London. Improving traffic conditions for cyclists will make it a more attractive alternative for certain journeys with the added financial benefits as well. These measures, with land use planning to reduce the need to travel could lead to a reduction in car use and therefore car ownership.

Casualties from transport accidents

The Mayor's Transport Strategy aims to reduce traffic congestion and improve safety by increasing travel by public transport, walking and cycling. A safe environment on London's streets is essential if that strategy is to succeed.

- Table 5.3 shows the numbers of road casualties by mode, noting severity, for 2001–2005 and percentage change. The previous State of Environment Report gave data for 2000 – 2001.

(23) Headline Indicator
Road casualties in London and % change

Mode of Travel	Fatal			Serious			Slight			Total		
	2001	2005	% change	2001	2005	% change	2001	2005	% change	2001	2005	% change
Pedestrian	128	89	-30%	1,676	1,135	-32%	6,339	4799	-24%	8,143	6,023	-26%
Pedal Cyclist	21	21	0%	444	351	-21%	2,857	2523	-11%	3,322	2,895	-13%

Powered Two-wheeler	71	44	-38%	1,215	801	-34%	6,634	4297	-35%	7,920	5,142	-35%
Car	63	54	-14%	2,063	935	-55%	18,969	13,790	-27%	21,095	14,779	-30%
Taxi	0	0	0%	31	18	-42%	361	308	-15%	392	326	-17%
Bus or coach	6	3	-50%	256	126	-51%	2,192	1,705	-22%	2,454	1,834	-25%
Goods vehicle	4	1	-75%	90	51	-43%	887	552	-38%	981	604	-38%
other vehicle	6	**2**	-67%	**27**	**19**	-30%	**154**	**206**	34%	**187**	**227**	21%
Total	**299**	**214**	**-28%**	**5,802**	**3,436**	**-41%**	**38,393**	**28,180**	**-27%**	**44,494**	**31,830**	**-29%**
% of Total	1%	1%		13%	11%		86%	89%				

Table 5. 3

Trend

In 2005, 26,742 road traffic collisions in London were reported in *Collisions and Casualties on London's Roads 2005*.[7] This represents a 29 per cent decrease on the figure for 2001. These 26,742 collisions resulted in 31,830 casualties of whom 214 were killed, 3436 were seriously injured and 28,180 were slightly injured.

Analysis

Between 2001 and 2005 the number of pedestrian casualties decreased by 26 per cent and the number of fatal pedestrian casualties fell by 31per cent. The number of seriously injured pedestrian casualties decreased by 32 per cent and the number of slight pedestrian casualties decreased by 24 per cent. In 2005 pedestrians accounted for 42 per cent of all fatalities and 33 per cent of all serious injuries, a similar proportion to 2001.

Between 2001 and 2005 the number of pedal cycle casualties decreased by 13 per cent, although the number of fatal pedal cycle casualties did not fall. The number of seriously injured pedal cycle casualties decreased by 21 per cent and the number of slight pedal cycle casualties decreased by 11 per cent. In 2005 pedal cycle accounted for ten per cent of all fatalities and ten per cent of all serious injuries, compared to seven per cent and eight per cent respectively in 2001.

Transport for London runs campaigns to increase safety awareness for all road users, including cyclists, and while cycling numbers have risen by 83 per cent the number of cyclists killed or seriously injured on London's roads has fallen by 28 per cent. Transport for London is investing £2.8 million in cycle training through the boroughs this year. Before 2000, when Transport for London was created, there was no support for cycle training in London.

Road Casualties in Greater London by Age Group & Gender

Statistics are also available for the age groups and gender of casualties. The pattern reflects how accessibility and mode of transport are affected by the age and gender of the road user and this is shown in Table 5.4.

[7] TfL London Road Safety Unit

Road casualties in Greater London for 2001 & 2005 by gender.

Mode of Travel	Gender				Total		
	Male		Female				
	2001	2005	2001	2005	2001	2005	% change
Pedestrian	4,693	3,454	3,450	2,569	8,143	6,023	-26%
Pedal Cyclist	2,595	2,277	727	618	3322	2,895	-13%
Powered Two-wheeler	7,121	4,603	799	539	7920	5,142	-35%
Car	11,117	7,908	9,978	6,871	21,095	14,779	-30%
Taxi	277	221	115	105	392	326	-17%
Bus or coach	863	625	1,591	1,209	2,454	1,834	-25%
Goods vehicle	860	541	121	63	981	604	-38%
Other vehicle*	136	174	51	53	187	227	21%
Total	27,662	19,803	16,832	12,027	44,494	31,830	-29%
% of Total	62%	62%	38%	38%	100%	100%	

Table 5. 4

* Other vehicle: these are subject to the interpretation of the police and include tractors, disabled carriages, three wheeler motorcycles etc. They are a relatively small number - 0.1% of all casualties.

Road casualties in Greater London for 2001 & 2005 by age group.

Mode of Travel	Age group									
	0-15		16-24		25-59		60+		Unknown	
	2001	2005	2001	2005	2001	2005	2001	2005	2001	2005
Pedestrian	2,308	1,383	1,271	1,040	3,080	2,488	1,033	689	451	423
Pedal Cyclist	423	283	510	426	2,056	1,860	118	88	215	238
Powered Two-wheeler	89	56	2,055	1,320	5,406	3,439	74	69	296	258
Car	1,262	727	4,476	3,083	12,609	8,618	1,461	1,071	1,287	1,280
Taxi	8	1	24	23	269	240	46	38	45	24
Bus or coach	210	143	196	120	905	709	839	629	304	233
Goods vehicle	17	12	139	76	742	442	43	28	40	46
other vehicle	12	14	15	20	123	121	24	19	13	53
Total	4,329	2,619	8,686	6,108	25,190	17,917	3,638	2,631	2,651	2,555
% of Total	10%	8%	20%	19%	57%	56%	8%	8%	6%	8%

Table 5. 5

Table 5.5 shows that child casualties (aged under 16 years) decreased from 4,329 in 2001 to 2,619 in 2005, a fall of 40 per cent. For child casualties, 53 per cent were pedestrians, 28 per cent were car occupants and 11 per cent were pedal cyclists, similar proportions compared to 2001. For young adults (16 to 24 years) the number of casualties decreased from 8,686 to 6,108, a fall of 30 per cent. The number of adult casualties (25 to 59 years) decreased from 25,190 to 17,917, a fall of 29 per cent. For older road users (60 years and over) the number of casualties decreased by 28 per cent, falling from 3,638 in 2001 to 2,631 in 2005.

Table 5.4 shows that in both 2001 and 2005, males accounted for 62 per cent and females for 38 per cent of the total casualties in London. Females accounted for 66 per cent of bus or coach occupant casualties in 2005, similar proportion to 2001, highlighting the greater dependence women have on public transport. Males accounted for 90 per cent of powered two-wheeler casualties, and 79 per cent of pedal cyclist casualties, similar to the proportions in 2001.

Transport for London surveys have found that there is a significant link between road casualties and social deprivation, with the relationship being especially strong for children. Those living in deprived areas are three times more likely to be involved in a road accident than children living in other areas.[8]

Looking Forward

TfL is continuing programmes of work focusing on:

- **Engineering -** making roads safer - traffic calming, cycling lanes, pedestrian crossing
- **Education -** road safety training - Kerb Craft for children, speed awareness for driver, specific campaigns such as HGV driver training to be aware for cyclists
- **Enforcement -** police enforcement will continue.

Transport 2025 - Transport challenges for a Growing City recommends the transport policies and investments needed to support the growth and development of London as a world-class sustainable city. The three transport objectives are:

- **Support economic development –** by improving public transport and managing the road network to reduce traffic congestion
- **Tackle climate change and enhance the environment –** by reducing CO2 emissions, improving air quality, reducing noise, and improving the urban environment
- **Improve social inclusion –** by making transport more accessible and secure for users.

For further information on these objectives and the strategies that support them, please refer to Transport 2025 on www.tfl.gov.uk

The GLA Bill being considered at the time of writing by parliament includes provisions for the Mayor to produce a health inequalities strategy for London. This strategy will provide guidance on how to address the inequalities around road traffic accidents.

[8] Transport T025 – Transport for a growing world city, pg 46

CHAPTER 6: Land Quality and Land Use

Introduction

London's population is forecast to grow from 7.3 million in 2001 to 8.3-8.7 million in 2026[1] and this will inevitably place pressure on its environment. Land is needed to support our homes, industries, schools, hospitals and transport networks. Land is used to generate energy, grow crops for mineral resources and to bury waste. Land is also a vital habitat for plants and animals; it is used for leisure and recreation as well as to simply enjoy.

Two thirds of London's 1,600 square kilometres is occupied by green spaces or water. Around a third of this is private gardens, another third is parks or sports-use and the remaining third is wildlife habitat. In addition to the green belt, which forms 22 per cent of London's land and helps prevent the spread of urban areas, London is unique in designating nearly ten per cent of London's area as Metropolitan Open Land (MOL)[2] within the built environment, protecting spaces such as Richmond Park and Hampstead Heath. The area and proportion of Green Belt and MOL by borough are shown in Table 6.1.

The wide variety of open spaces in London makes a valuable contribution to the quality and character of the capital's environment, providing places for people to connect with nature, for healthy exercise and for the community to meet in and to use. A selection of the use of open spaces is provided in this chapter alongside river restoration. In the past, urbanisation in Greater London put great pressure on our rivers as they were heavily modified to enable maximum use of land. River restoration has a key role in urban regeneration and renewal. Restored rivers positioned in the heart of London's urban fabric make a huge contribution to improving the quality of life for the people of London, its wildlife and the city as a whole.

The planning and management of open spaces face a number of challenges and increasing pressures. For example maintaining quality of open spaces against particular problems such as vandalism and a lack of investment. The future development of London as a 'Compact City' will have implications for the use and preservation of open space. The increased demands and needs placed on open spaces as a result requires appreciation of the value and benefits that they contribute to sustainable living and the quality of the urban environment.

The London Plan sets out the spatial development strategy for land-use in London. The plan, which protects the environment by resisting development on green belt and MOL, anticipates growth in London's population and the implications this has for housing. In particular, the plan argues that new residential development needs to achieve higher densities to maximise use of scarce land. London has remained consistently above the national average in the share of its homes that are built on previously developed land thereby playing a key role in meeting the agenda for sustainable communities.

The UK Sustainable Development Strategy 'A Better Quality of Life' sets out the importance of environmental protection alongside economic growth and social progress. The Mayor has stated that London's economic growth should be accommodated with the city's current boundaries, without the erosion of open land.

[1] Further Alterations to the London Plan

[2] Metropolitan Open Land is unique to London and protects strategically important open spaces within the built environment. It is the same as green belt in terms of protection from development.

The impacts of climate change and a greater understanding of how our lifestyles affect the natural infrastructure of water, air, soil and biodiversity alongside the need for new homes and new technologies need to be taken into account when making decisions on land use in order to ensure a sustainable future for London.

Green Belt and Metropolitan Open Land

The best known initiative to safeguard open land from erosion was the green belt legislation that was introduced after the Second World War - as a direct consequence of the growth of suburban house building in the 1930s.

The inclusion of land within the green belt ensures that countryside is close to the built-up parts of London. It provides recreational opportunities, protects and promotes the landscape and biodiversity, promotes the improvement of damaged and derelict land, and helps to retain agricultural land. The green belt is a permanent feature, with the prime purpose of preventing urban sprawl and preventing neighbouring towns from merging into one another. Its boundary should only be changed in exceptional circumstances.

The designation of Metropolitan Open Land (MOL) is unique to London and has its origins in the 1976 Greater London Development Plan. The designation protects strategically important open spaces within the built environment, such as Richmond Park, Wimbledon Common, Hampstead Heath, Hackney Marshes, Oxleas Wood, Hyde Park and Mitcham Common. MOL is the same as the green belt in terms of protection from development. The MOL designation applies to open spaces that are of more than local importance.

MOL designation performs three valuable functions:

- protecting open space to provide a clear break in the urban fabric and contribute to the green character of London
- protecting open space to serve the needs of Londoners outside their local area
- protecting open space that contains a feature or landscape of national or regional significance.

MOL may include open-air facilities, especially for leisure, recreation, sport, arts and cultural activities and tourism, which serve the whole or significant parts of London, as well as features or landscapes of historic, recreational, nature conservation or habitat interest of value at a metropolitan or national level. It may also form part of a green chain.

Green belt, Metropolitan Open Land and green corridors form the structure of the strategic network of open space in London. Smaller, more locally important, open spaces form a wider network. The boroughs where they are of value or have the potential to be of value to local communities protect these.

Green belt forms 22 per cent of the area within the Greater London boundary, whilst 9.6 per cent of Greater London is Metropolitan Open Land. Table 6.1 shows the actual area of Green belt or Metropolitan Open Land in each borough.

(1) Headline Indicator

Area of green belt and MOL in Greater London 2007

Area of Green Belt and Metropolitan Open Land by Borough					
Borough	**Area of Green belt (hectares)**	**Area of MOL (hectares)**	**Total (hectares)**	**Borough Area (hectares)**	**% of Borough Area**
Barking and Dagenham	522	138	660	3766	17.5%
Barnet	2301	653	2955	8646	34.2%
Bexley	1075	631	1706	6405	26.6%
Brent	0	322	322	4310	7.5%
Bromley	7672	625	8297	14966	55.4%
Camden	0	376	376	2173	17.3%
City of London	0	0	0	314	0.0%
Croydon	2287	305	2592	8625	30.1%
Ealing	336	871	1207	5535	21.8%
Enfield	2981	508	3489	8193	42.6%
Greenwich	1	1118	1119	5021	22.3%
Hackney	0	254	254	1900	13.4%
Hammersmith and Fulham	0	145	145	1711	8.5%
Haringey	62	448	510	2949	17.3%
Harrow	1081	327	1408	5031	28.0%
Havering	5995	108	6103	11408	53.5%
Hillingdon	4991	83	5074	11535	44.0%
Hounslow	1178	830	2008	5642	35.6%
Islington	0	13	13	1481	0.9%
Kensington and Chelsea	0	77	77	1235	6.3%
Kingston upon Thames	634	500	1134	3713	30.5%
Lambeth	0	120	120	2717	4.4%
Lewisham	0	296	296	3521	8.4%
Merton	0	965	965	3749	25.7%
Newham	0	306	306	3854	7.9%
Redbridge	2056	88	2145	5626	38.1%
Richmond upon Thames	133	3068	3201	5859	54.6%
Southwark	0	486	486	2980	16.3%
Sutton	638	527	1164	4371	26.6%
Tower Hamlets	0	149	149	2150	6.9%
Waltham Forest	843	212	1055	3869	27.3%
Wandsworth	0	722	722	3511	20.6%
City of Westminster	0	447	447	2196	20.4%
Total GLA Area	34785	15720	50505	158965	31.8%
Total GLA Area* (as reported in SOER 2003)	34708	15238	49946	-	31.5%

Table 6.1

Source: GLA 2007 State of Environment Report 2003

Trend

It is not possible to discern a trend between the figures in this report and the previous State of Environment Report from 2003 some of the figures produced for the first report were incorrect as they did not always take into account borough boundary changes, particularly those between the outer boroughs and the surrounding counties.

Between April 2004 and December 2006 a total of 79ha of green belt and MOL was granted planning permission in London. Most of this,
58ha was due to changes of use of open space, for example, agriculture to playing fields or a cemetery. A further 11.5ha was changed to non residential built development mostly educational or health facilities and 9.3ha was due to changes to residential use - totaling 391 residential units, the majority (286) is the redevelopment of existing built sites e.g. disused hospitals in the green belt, of the remaining 105 units 96 are within a single development.

This means approximately undeveloped 2ha of green belt & MOL has been lost to residential development over the period April 2004 – December 2006.

Analysis

The largest outer boroughs (Bromley, Havering and Hillingdon) have the largest areas of green belt, followed by Enfield, Barnet, Croydon, Redbridge, Hounslow, Harrow and Bexley. The boroughs with the greatest areas of MOL are Richmond, Greenwich, Merton, Ealing, Hounslow and Wandsworth. To obtain a picture of the total area of the boroughs protected under either green belt or MOL designation, the two figures were combined and expressed as a percentage of the whole borough area. This is included in Table 6.1. The area protected by green belt or MOL combined exceeds one fifth of the area of the borough in 19 of the 33 London boroughs. In Bromley, Havering and Richmond, more than half is protected. The total area protected is almost one third of the land area of London.

Not surprisingly, the City of London has no protected Green Belt or MOL and, in increasing order, the other boroughs with the lowest percentages are Islington, Lambeth, Kensington and Chelsea, Tower Hamlets, Brent, Newham, Lewisham, Hammersmith and Fulham, all with less than ten per cent of their areas protected as MOL or green belt.

These Inner London boroughs are home to some of London's most deprived and excluded communities. The mental and physical health outcomes in these communities are some of the poorest in London. Local people in these areas would benefit from greater access to green space for physical activity and recreation.

Looking Forward

There is always a risk that green belt land, particularly close to the urban fringe, will be allowed to deteriorate, with the hope that it will then be taken out of green belt designation and development is subsequently permitted. However, Policy 3D.8 and Policy 3D.9 of the draft Further Alterations of the London Plan demonstrates the Mayor's continued support for protection of green belt and Metropolitan Open Land.

Where green belt land is of poor quality, steps should be taken to improve it. The Green Arc is a strategic initiative that aims to improve the quality of the landscape and its accessibility in the urban fringe, providing new countryside areas with a wide range of potential benefits, such as for wildlife, recreation, education and health. Sub-regional and cross-borough boundary working through the Green Arc partnership initiatives are supported by the Draft Further Alterations to the London Plan (FALP) (September, 2006). The partnerships involve a wide range of organisations across three regions, London, East of England and South East England.[3]

[3] www.greenarc.org for more information

River Restoration

River restoration plays an important role in urban regeneration and the creation of sustainable urban communities through delivery of a wide range of social and environmental benefits. Historically, London's growth put pressure on the river environment, modifying rivers by straightening, encasement in concrete straitjackets or being buried underground. River restoration seeks to recreate a more natural structure in rivers and so creating a more attractive landscape providing the opportunity to experience the sights and sounds of a living river.

Increasing the capacity for flood storage is a key issue especially in view of London's changing climate. The impacts of climate change, including severe storms, can make it more difficult to control rivers, especially during high flows. A more effective way to prevent damaging flooding is to allow rivers to flood in places where this will do the least harm, such as in open spaces. Defra's 'Making Space for Water' (March 2005) emphasizes the importance of restoring rivers to manage the risk of flooding. Reinstating flood plains provides a natural increase in the flood storage capacity of the whole river, which contributes to flood protection downstream. Slowing down the speed of water during flood events is also important as it reduces the risk of plants and animals being washed away.

Enhancing the structure of the river encourages a diversity of aquatic life especially fish. For example, forcing river flow over ridges of pebbles or rocks helps the oxygenation of water; establishing gravel beds improves conditions for spawning; and deeper pools serve as fish refuges in dry spells. Enhancing degenerated urban landscapes can also bring economic benefits, making the area more attractive to business, in turn providing employment for local people. Improvements to London's rivers also contribute to fulfilling the aims of the European Commission's Water Framework Directive to bring all rivers into a good condition.

The GLA works in partnership with the Environment Agency (lead partner), London boroughs and other stakeholders on river restoration. Much progress has been made in river restoration since the last State of the Environment Report, in accordance with the Blue Ribbon Network in the Further Alterations to the London Plan and the Mayor's Biodiversity Strategy. Some striking results have been achieved, transforming desolate concrete channels into attractive, babbling streams, which often become the centrepiece of local parks. These are listed under Indicator 5 below. Also shown are tidal river restorations for north and south London.

(5) Headline Indicator

Length of non-tidal river restored per year

River restoration and improvements, achieved or underway, 2003-2007

Full river restoration or significant improvement has been achieved in over 6km of watercourse since 2003:

Restored:	1.97km
Partially restored	0.15km
Significantly improved e.g toe boarding[4] removal):	4.3 km
Total	6.42km

1.17km was recorded as restored for 2001/02 in the previous State of Environment report.

[4] Toe boarding is a low wall built in the river channel to prevent erosion of the riverbank, usually make of timber.

Trend

It is very difficult to identify a precise trend due to the way in which work is carried out. Full restoration can take a long time, spanning five or more years, from exploring the feasibility and options for a site through to completion.

It is clear though, from the tables above and the case studies below, that much work has been done and good progress has been made.

A further 1.3km is at the feasibility study or design stage and several other potentially exciting schemes are now under discussion. Further details are given in the tables following.

North London

Non-tidal rivers			
Catchment	**Location**	**Works undertaken or in planning stage**	**Length of river restored or planned**
River Brent	River Brent Park, Stonebridge Park, Wembley	Straightened river in concrete channel restored to a natural form, with many improvements to the surrounding park. Phase 2, which will restore another 0.7km, is awaiting funding.	1km completed, a further 0.7km planned.
Moselle Brook	Lordship Recreation Ground, Haringey	Feasibility study underway to restore c.400m of the stream, which currently runs in an underground pipe.	400m (at feasibility stage)
Salmon's Brook	Montague Park, Enfield	Designs underway to naturalise 250m of river and increase flood storage. Work scheduled for 2009-11	250m (at design stage)
River Roding	Redbridge, near Ray Park, Woodford.	Partial restoration of River Roding north of Ray Park, with increased flood storage and creation of floodplain meadow. Plans are also afoot to create two backwaters near Ray Park, for completion in 2006-08.	50-100m completed.

River Beam	Beam Washlands Dagenham	Banks of Beam River and Wantz Stream excavated to encourage establishment of reed beds. Ponds excavated nearby to improve habitat for great crested newts, as mitigation for recent flood defence works.	

Tidal stretches of North London tributary rivers			
River Roding / Barking Creek	Mill Pool, Barking town centre	3-level intertidal terracing of 30m riverbank, with redesigned seating area	30m intertidal terracing completed
River Roding / Barking Creek	Newham, Cuckold's Haven	Improved riverside viewing area with disabled access, seating, planting and interpretation.	
River Roding / Barking Creek	Barking, near A13 - Lower Roding Regeneration Project	Improved flood storage at Barking Barrier, incorporating retreated flood defences, creating new intertidal habitat, riverside seating area, information boards, and a new footpath, linked to a new housing development.	50m retreated flood defences completed
River Roding / Barking Creek	Barking, Creekmouth	Tidal backwater developed, with 0.1ha tidal mudflat and 0.9ha of saltmarsh habitat, 15,000m^3 additional flood storage, improved public access including new footpath with disabled access and seating.	250m approx completed.

South London

Catchment	**Location**	**Works undertaken**	**Length of river restored**
River Ravensbourne	Ravensbourne, Bromley, upstream of Hayes Lane	Restoration of 100m stream linked to improvements to weir to encourage fish migration and improved public safety.	100m
	Ravensbourne, Central Lewisham	Partial restoration of river channel where it flows through a built-up area, including bank improvements and planting, with further improvements in stretch through adjoining park.	60m
	Quaggy River, Sutcliffe Park, Kidbrooke	Watercourse in underground pipe restored to an open stream, with meandering course, large flood storage pond, extensive wetland habitat, footpaths and boardwalk.	800m
	Quaggy River, Lee High Road	As part of a redevelopment project, concrete wall removed and replaced with a more natural bank and wetland habitat, together with in-channel	90m

		improvements.	
	Spring Brook, Downham	Toe-boarding removal and re-meandering of stream, with wetland habitat creation.	800m
River Wandle	Morden Hall Park	Toe-boarding removal to improve habitat for water voles and encourage establishment of aquatic plants.	3km toe boarding removal.
	South Wimbledon	Removal of weir and changes to the riverbed to improve habitat for fish.	As result of weir removal, habitat has improved for 500 m upstream
	Spencer Road wetland	Habitat improvements for water vole in River Wandle and adjoining wetland.	

Table 6. 2

Analysis

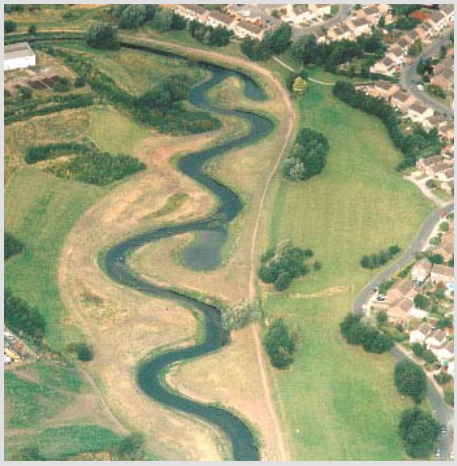
Following the publication of 'A Stepping Stone to Urban Regeneration – Highlighting the Opportunities in South London' (2002), a strategy for the north London Thames tributaries has been developed. This document, 'Bringing your rivers back to life - a strategy for restoring rivers in North London' (2006) highlights stretches of north London's watercourses suitable for restoration. Launched at the 'Cracking the concrete' conference in June 2006, attended by over 100 delegates from local authorities, government, statutory agencies, the private sector and voluntary bodies; it highlighted the benefits of river restoration. It also explored some of the challenges that must be overcome to bring rivers up to a suitable standard for public access to the water's edge.

Full river restoration involves the creation of a natural channel with a meandering course and earth banks in place of a straightened concrete channel or culvert. This is the most desirable outcome. However, sometimes the opportunity is constrained by a lack of open land to create meanders, proximity of roads or buildings and other impediments; in these cases a partial improvement may be the only practical option. This may involve in-channel works, such as creating a two-stage channel with shallow edges, where aquatic plants may become established, and a deeper area in the middle where fish can thrive. Even in commercial sites it is possible to create attractive river corridors, albeit in a more restricted space, so that people can celebrate, rather than ignore, the riverside.

Case Study: Sutcliffe Park

The River Quaggy used to flow in a concrete pipe under Sutcliffe Park in Kidbrooke, South London. In order to reduce flood risk further downstream, the Environment Agency worked with the local community, to develop plans for increasing flood storage whilst also improving the landscape of the park. The Quaggy was restored to a natural, meandering stream, with a large flood storage pond and extensive wetland habitat. Since the restoration, the number of visitors has increased by 73 per cent, with more people benefiting from the opportunity for healthy walks and contact with nature.

Case Study River Brent Park, near Wembley Stadium



Before After

The River Brent used to flow in a straightened concrete channel, fenced off by high railings from the surrounding park. The Environment Agency and Brent council worked with Groundwork west London and the local community in developing ambitious plans for the site. To date approximately 1km of river has been restored, together with reed beds and marginal planting as well as a wide range of access and recreational improvements and some inspirational public art.

Looking Forward

One of the most ambitious schemes is for the Lea Rivers in the Olympic Park, which will provide an inspirational setting for the 2012 Olympics and a wonderful legacy after the games in the Olympic Park.

The Olympic and Paralympic events will be based in the Bow Back Rivers area just west of Stratford, an area crossed by many rivers and canal navigations. These include the River Lee Navigation, Waterworks River, Prescott Channel, Three Mills Wall River, Channelsea River, City Mill River, Pudding Mill River, Old River Lea and Bow Back River. All of these rivers have been progressively turned into urbanised channels to facilitate navigation, flood and flow control and built development. They have also been poorly maintained for many years, offering little value for people or wildlife.

The outline planning permission for the Olympic and Paralympic Games includes the provision to transform many of these degraded river channels into more natural watercourses, with more natural river banks and beds, marginal waterside planting to enhance the wetland habitat, and even

reopening culverted stretches. New footpaths and bridges will improve access. These proposals represent the exciting potential to achieve a world-class example of urban river restoration.

Recreational Open Space

This includes areas such as playing fields and sports grounds, including those in schools and industrial sites, football pitches, golf courses, country parks and allotment gardens.[5]

Table 6.3 gives figures for average gain and average losses in open space from 2001-2003. These figures are based on data from ordnance survey up to September 2006. The figures previously reported in the last State of Environment report for 1998-2000 are corrected and provided in Appendix 6.1.

(4) Headline Indicator
Changes in area of recreational open space in each borough (hectares) from 2001 to 2003

	Average gain 2001-2003	Average loss 2001-2003	Average net change
Barking and Dagenham	-	-	0
Barnet	1	2	-1
Bexley	-	3	-3
Brent	-	4	-4
Bromley	-	1	-1
Camden	-	-	0
City of London	-	-	0
Croydon	1	-	+1
Ealing	-	-	-
Enfield	-	2	-2
Greenwich	1	1	0
Hackney	-	-	0
Hammersmith and Fulham	-	-	0
Haringey	-	-	0
Harrow	-	-	0
Havering	14	1	+13
Hillingdon	-	4	-4
Hounslow	-	-	0
Islington	-	-	0
Kensington and Chelsea	1	-	+1
Kingston upon Thames	-	-	0
Lambeth	-	-	0
Lewisham	1	-	+1
Merton	-	-	-
Newham	5	2	+3
Redbridge	-	2	-2
Richmond upon Thames	-	1	-1

[5] Buildings, such as stables, clubhouses and pavilions, associated with outdoor recreation are classified as Leisure and Recreational Buildings.

Southwark	-	-	0
Sutton	1	-	+1
Tower Hamlets	1	6	-5
Waltham Forest	4	-	+4
Wandsworth	-	-	-
Westminster (City of)	-	-	-
Total	**31**	**29**	**+2**

Table 6. 3
Note: All figures are in hectares
- indicates a figure less than 0.5 hectares
Source: Communities and Local Government

Trend

The revised figures for 1998-2001 show a lower overall gain than previously reported of 6 hectares (instead of 10H). For the period shown here there has been an overall two-hectare net gain of recreational open space.

Analysis

The largest gain shown here is in Havering and is primarily due to the gradual development of Havering's Community Forest land managed by Thames Chase. This publicly accessible recreational land has been developed over the last ten years and has come on stream gradually.

Looking Forward

Policy 3D.10 of the FALP states that boroughs should identify, promote and protect open spaces that are of value, or have the potential to be of value, local communities in their local development documents. The FALP states that boroughs should undertake open space strategies in order to better understand and plan for the benefits that they provide. Strategies should be based on an audit of the existing provision and an assessment of the needs of the community. The Mayor has produced best practice guidance, which provides more detailed advice to the boroughs on preparing an open space strategy. The strategy approach provides a robust framework for the protection of open space and supports the provision of new open space facilities where a deficiency has been identified. These strategies should inform the preparation of policies in borough local development documents and include an action plan to show how the aims and improvements will be carried out.

An audit on the progress of boroughs open space strategies was undertaken on behalf of the London Parks and Green Spaces Forum, Greater London Authority and Groundwork London (NJTLC Landscape Consultants: *SAUL Project – London Borough Open Space Strategy Audit,* May 2006). Results are shown in Appendix 6.2. The study showed that 12 boroughs had completed a comprehensive open space strategy with a further seven in the process of preparing one. A further nine boroughs had an alternative but more limited strategy, for example only covering one type of open space such as parks or allotments, which do not meet the standard set in the London Plan. Of the remaining boroughs, four did not have any open space strategy and one did not supply information.

Allotments, city farms and community gardens[6]

Allotments, city farms and community gardens are all forms of urban agriculture in London. They are valuable green spaces that can help improve people's quality of life by promoting healthy food, exercise and community interaction. There are now 16 city farms (one recently closed) and over 100 community gardens in the capital. Many are open to visitors or offer opportunities for volunteering, work training or education.

City farms and community gardens are community-managed projects working with people, animals and plants. They range from tiny wildlife gardens to fruit and vegetable plots on housing estates, from community poly-tunnels to large city farms.

Allotments

An allotment plot is a piece of land, usually about 250 square metres in size, which can be rented for growing fruit and vegetables. Most are generally owned by the local council with rent averaging around £50-£60 / year.

Allotments have had an important role at various times in London's history especially during wartime. Since the end of the Second World War, numbers have declined but now interest and demand has increased with renewed concerns for local food supply, healthy living, ecological diversity and sustainable cities.

Allotment gardening is still a very low-cost activity that contributes towards creating a much better environment in cities, supplying food according to people's preferences, and keeping people in contact with nature. It has social, health and educational benefits by linking with schools, stimulating interest in healthy eating and an understanding of where food comes from. The health benefits of allotment gardening include exercise while being directly exposed to nature as well as the longer term improvements resulting from a diet of fresh fruit and vegetables. Allotment and community gardening also reduces the environmental impact of food transport and food packaging. They have community benefits too, providing a social network for local residents and supporting diversity by for example, encouraging disabled groups to take plots.

Allotment holders are becoming more diverse in generation, gender and ethnic background, and this is reflected in allotment holders' ways of growing food and using the allotments. They can bring together many different strands of the community through a shared interest. A survey in a small number of west London boroughs put the proportion of women as high as 41 per cent, with women particularly well represented among younger plot holders.[7] Low Hall Farm, with 220 plots, is the biggest site in Waltham Forest and one of the most ethnically diverse, where produce from across the globe is grown, including Japanese spring onions and christophene (a squash from the Caribbean).

Thirty thousand Londoners rent allotments to grow vegetables and fruit and 14 per cent of households grow vegetables in their garden. Interest and participation in gardening is high and there is a shortage of allotment sites in Inner London boroughs where contact with nature is at its most pressured.[8]

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[6] http://www.london.gov.uk/assembly/reports/environment/allotments.pdf
[7] Women (re)construct the plot: the regen(d)eration of urban food growing, Susan Buckingham, 2002
[8] The Mayor's Food Strategy

Table 6.4 shows the number of allotment sites in each borough in 2006 as compared to 2003. Figures for 2006 are from The Environment Committee Report: *A Lot to Lose* (Oct 2006).

(3) Headline Indicator
Number of Allotment Sites in each borough

	Number of sites as reported in SoE (2003)	Number of sites as reported in A Lot to Lose (2006)	Trend
Barking & Dagenham	13*	15	+2
Barnet	50	50	-
Bexley	36	37	+1
Brent	23	23	-
Bromley	52	52	-
Camden	4	9	+5
Corporation of London	*no figures available*	0	-
Croydon	18	17	-1
Ealing	46*	59	+13
Enfield	31	36	+5
Greenwich	18	18	-
Hackney	9	9	-
Hammersmith & Fulham	*	2	-
Haringey	26	25	-1
Harrow	34	32	-2
Havering	29	26	-3
Hillingdon	37	37	-
Hounslow	34	30	-4
Islington	2	4	+2
Kensington & Chelsea	*no figures available*	0	-
Kingston upon Thames	13	22	+9
Lambeth	1	11	+10
Lewisham	37	36	-1
Merton	19	19	-
Newham	7	8	+1
Redbridge	25	25	-
Richmond	22*	25	+3
Southwark	8	19	+11
Sutton	36	37	+1
Tower Hamlets	8	7	-1
Waltham Forest	35	37	+2
Wandsworth	9	10	+1
Westminster	*no figures available*	0	-
Total	682	737	53 gain

Table 6. 4

** no figures available for 2003 report . 1997 figures used provided by NSALG & some later figures by Froglife.*

Trend

Although it appears that there has been an increase since the last State of Environment report it is likely that the earlier figures are less accurate than those returned for 2006, as this reflects the much more comprehensive survey. The national trend is of a decline in the number of sites since the end of the Second World War and comparison with the figures from the National Society of Allotment and Leisure Gardeners (NSALG) 1997 survey reflect this loss.

Analysis

The 2006 survey shows that London's 737 allotment sites are spread across 30 boroughs, with only the Corporation of London, Kensington and Chelsea and Westminster having none. The largest number of sites in purely statistical terms are found in the outer boroughs of Brent, Bromley and Ealing, and these also have the highest number of allotments per head of population. The boroughs with the smallest number of allotments per head of population are mostly in Inner London.

Prior to the 2006 survey, the last major survey of allotments was carried out on behalf of the NSALG in 1997. The survey identified over 36,000 allotment plots, in 769 sites, of which almost 31,000 were in Outer London. Data now shows that there are 737 sites, a *net* loss of 32 (10 sites lost, seven new established over ten year period), or 4.2 per cent across London. The majority of these losses were in outer boroughs such as Bexley and Hounslow, but provision has decreased in inner London too, for example, Lambeth losing three sites.

The survey found that the number of individual plots has decreased. Within the 20 councils for whom complete data was available, there were 20,786 plots, compared to 22,319 in 1996. In percentage terms, the loss of plots (6.9 per cent) has been significantly greater than the loss of sites. This could reflect the fact that sites are often 'chipped away' by a handful of plots at a time.

Plot sizes also seem to be reducing. In sites where there is high demand, it is increasingly common to split newly vacant plots, which suggests that the amount of allotment land that has disappeared is greater than the reduction of individual plots would suggest.

Looking Forward

There are now over 4,300 people waiting for allotments across the city – 3,000 more than a decade ago. Sites will have to continue to find ways of meeting this high demand, especially in areas that will see high-density housing developments. Although waiting lists in inner London are incredibly large, Wandsworth has 820, Camden 580, for example; some outer London boroughs do have vacancies.

To gain a better understanding of the provision and location of allotment sites, regular and thorough surveys are needed as well as the need to monitor plot size and numbers per site in order to understand the acreage of allotment provision and trend in London.

City farms

In 1972, the first city farm was established in Kentish Town. Over the years, more city farms became established in Greater London (as well as elsewhere) and almost all of these have survived through to the present day, although there have been a couple of farms lost, one of them as this report was going to print. The current list is shown in the Appendix 6.3.

City farms exist mainly in urban areas and are created in response to a lack of access to green space, combined with a desire to encourage strong community relationships and an awareness of gardening and farming. Figure 6.2 shows the location of city farms with Areas of Regeneration (previously referred to as Areas of Deprivation) in grey.

City farms and Areas of Regeneration in Greater London

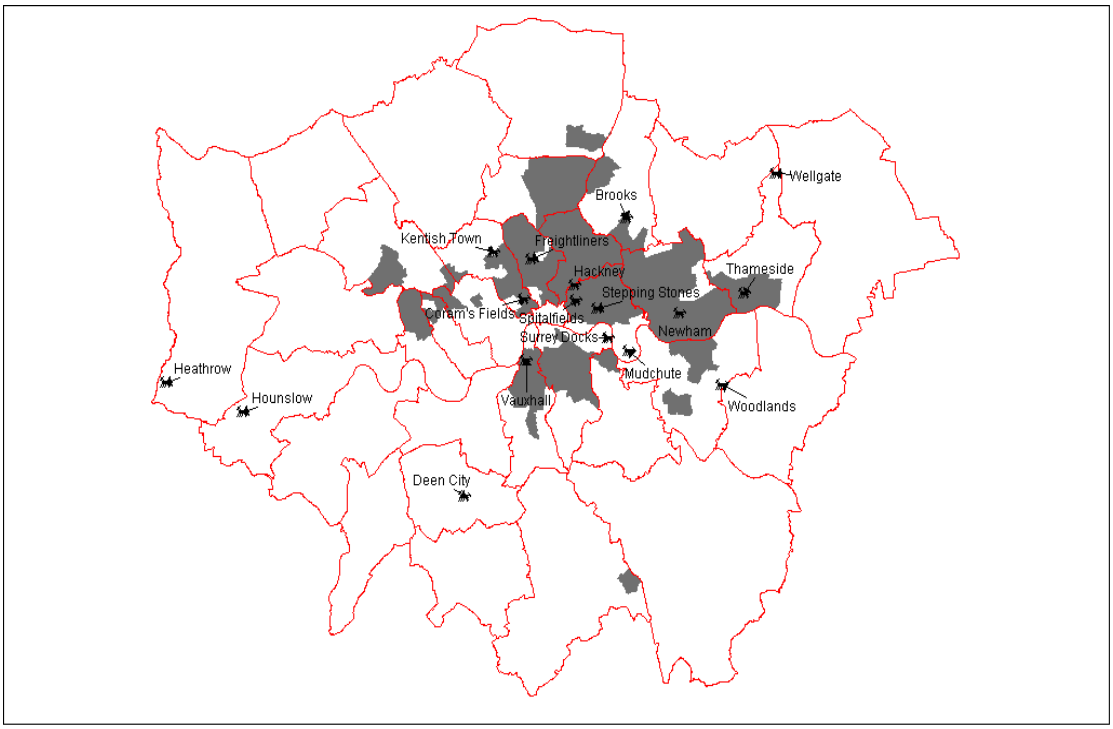


Figure 6. 1
Source: GLA 2007

These farms provide a meeting point for parents with young children, work for adults with learning disabilities, or a rehabilitation process for ex-offenders or recovering drug addicts. They also often include allotments for older people or people from ethnic communities, as well as many other people without access to a garden. Some, such as Mudchute, have nature trails and many have wildlife gardens with ponds offering contact with nature. More often than not the farms form a focus for the local community and are in areas of deprivation with a great mix of ethnic diversity.

There is a concentration of farms stretching either side of the Thames from central London eastwards into the Thames Gateway, including the two just to the north of the Thames Gateway at Brooks in Leyton and Wellgate. Tower Hamlets has three farms (they are well spaced through the borough) and a fourth, in Hackney, is only a few metres over the boundary.

Eleven of the sites could be thought of as the classic city farm in densely built-up London (Kentish Town, Freightliners, Hackney, Brooks, Spitalfields, Stepping Stones, Mudchute, Newham, Thameside (recently closed) Surrey Docks and Vauxhall). There is also one alongside the Wandle in South London (Deen City), one on the urban fringe near Romford (Wellgate), and an 89-acre community farm in derelict countryside near Shooters Hill (Woodlands).

Away from the concentration of farms from central through to east London, there are also two farms in the M4 corridor in outer west London. Hounslow Urban Farm has recently changed from being a centre for rare breeds to housing more exotic farm creatures, such as rheas and alpacas, whilst Heathrow Farm on the edge of Greater London at Longford specialises in taking children and adults with special needs.

The list also includes Coram's Fields, which has a collection of animals including farm animals, but is not classed as a farm. Apart from Hounslow, where there is a small charge for entry, all are free to visit while at Coram's Fields, all adults must be accompanied by a child.

Farms on the urban fringe usually consist of horse-grazing fields, arable land or intensive animal housing. They are rarely used to teach city children about animals and are usually hard to reach from central London. Cattle and/or sheep grazing has been introduced as part of conservation management in some wildlife sites, for instance at Walthamstow Marshes and Poor's Field at Ruislip Woods, but although education is a side-benefit, this is not the main purpose in these cases.

Large areas of London have no city farms – for example, north and north-west London stretching from Enfield through Barnet and Harrow to north Hillingdon and down through Brent to either side of the Thames west of Battersea. The other major area without a city farm is in south London to the south of the Thames Corridor. If it was not for Deen City Farm on National Trust land on the edge of Morden Hall Park, there would be nowhere in this area to see farm animals, apart from the sheep and cattle grazing at the London Wetland Centre at Barnes (where entry payment is required). One development is that Capel Manor College are proposing to open a training facility within the old farm site in Crystal Palace Park from September 2007. This will feature farm animals and will be accessible to the public at certain times.

The major Areas of Regeneration where there are no farms within easy reach are to the west of the Lea Valley through Haringey and into Enfield, and in north-west and west London through the north of Kensington and Chelsea and Hammersmith and Fulham into Brent and Ealing.

Farm animals can also be seen, in some parks (Maryon Wilson Park in Charlton, Horniman Gardens, Battersea Park and Queen's Park in Brent for example), and there are commercial farms in the green belt of boroughs like Bromley, Barnet, Hillingdon and Bexley, where farm animals can sometimes be seen from footpaths.

Proposals have been mooted over the years for new city farms, although it is much more difficult to start a city farm now because of the availability and cost of land. Many of the existing farms were started by volunteer effort at a time when odd pieces of land were lying empty. Some farms were purpose-built by local authorities (Newham and Hounslow for example), as a side-benefit of major developments (Surrey Docks), or by opening of an existing facility for community use (Woodlands). Others have just accrued odd buildings over the years and are now trying with very limited finances to upgrade or replace these, looking for any opportunity where finance might be available.

Freightliners Farm

To show the aim of a typical city farm in London, the manager of Freightliners in Islington has written the following description of his farm.

Freightliners Farm was founded in 1973 on wasteland behind Kings Cross station in London. The Farm owes its name to the railway goods vans originally housing the animals. It moved to its current site in 1978, and new purpose-built farm buildings were erected in 1988. The current site of half a hectare houses a barn, classroom, animal village, garden centre, solar dome, and a straw bale building. Animals include sheep, goats, cattle, pigs, chickens, ducks, geese and rabbits. Freightliners also host a nationally recognised community composting scheme.
© Freightliners Farm

The Farm is community-led and managed, empowering those involved through a sustainable approach. A voluntary management committee of local residents runs the farm. Their role is to ensure that the farm responds to community needs and adheres to its constitution. Freightliners Farm embodies the very essence of locally managed community projects/activities that contribute to successful regeneration through active community involvement. It offers a wide range of social, economic, environmental and educational activities:

- Public green space for informal recreation, ranging from adventure play to simply relaxation in a welcoming and informal space. A setting for both school visits and informal education activities.
- Education about food growing and caring for animals
- Adult education in the form of gardening, horticulture, animal husbandry, spinning and weaving, building, carpentry, and other basic skills
- After school and holiday play schemes
- Placements for people with physical and learning difficulties
- Community enterprise development and training (e.g. a café is under consideration), and garden centre activities

Yearly opera.

Derelict Land

Derelict land and buildings is defined as 'land so damaged by previous industrial or other development that it is incapable of beneficial use without treatment. Treatment includes any of the following: demolition, clearing of fixed structures, or foundations, and levelling. It includes abandoned and unoccupied buildings (including former single residential dwellings) in an advanced state of disrepair i.e. with unsound roof(s). It excludes land damaged by a previous development where the remains of any structure or activity have blended into the landscape in the process of time (to the extend that it can reasonably be considered as part of the natural surroundings), and where there is a clear reason that could outweigh the reuse of the site – such as its contribution to nature conservation – or it has subsequently been put to an amenity use and cannot be regarded as requiring development.

Table 6.5 shows the amount of derelict land and buildings by borough from 2001.

(2) Headline Indicator
Area of derelict land in each borough

Amount of derelict land and buildings by borough					
London 2001 to 2005					
Local authority	**2001**	**2002**	**2003**	**2004**	**2005**
					hectares
Barking & Dagenham	89	86	..	85	45
Barnet	41	40	40	-	-
Bexley	10	10	13	10	10
Brent	..	10	9	2	1
Bromley	..	-	..	-	..
Camden	-	-	..	-	-
City of London	1	..	-	-	..

City of Westminster	..	-	-	-	-
Croydon	16	13	14	1	1
Ealing	..	-	-	-	-
Enfield	..	..	30	-	-
Greenwich	107	126	42	29	-
Hackney	3	3	2	-	-
Hammersmith and Fulham	..	-	-	-	-
Haringey	..	-	..	-	..
Harrow	-	-	-	-	-
Havering	15	15	15	-	-
Hillingdon	3	5	5	-	-
Hounslow	5	..	1	-	-
Islington	-	..	-	-	-
Kensington and Chelsea	..	4	..	4	-
Kingston-upon-Thames	..	..	-	-	-
Lambeth	..	..	-	-	..
Lewisham	1	1	1	1	1
Merton	..	5	5	-	-
Newham	31	4	..	11	11
Redbridge	5	5	5	5	-
Richmond-upon-Thames	..	2	..	-	..
Southwark	1	4	..	1	1
Sutton	..	1	1	-	-
Tower Hamlets	7	4	..	3	4
Waltham Forest	2	1	-	-	-
Wandsworth	31	26	21	15	15

Table 6. 5
Note:
- nil or less than half the final digit shown
.. not available
Source: Analysis Team, Capital Finance Analysis, Communities and Local Government

Trend

Since 2001, as reported in the previous State of Environment Report, the amount of derelict land has dropped overall by almost 76 per cent, with over half of London's boroughs showing nil or less than half the final digit shown.

Analysis

One of the overarching objectives of the Mayor's London Plan is to accommodate London's growth within its boundaries without encroaching on open spaces. Policies seek to achieve this objective through an urban renaissance of higher density development that makes efficient use of land and protects open spaces. In 2000, when the GLA was created, 89 per cent of development was recorded as being on previously developed land. The Further Alterations to the London Plan sets a target that at least 96 per cent of new residential development should be on previously developed land, which is well above the national target of 60 per cent. The London Plan Annual Monitoring Report 3 (February, 2006) states that the 96% target was achieved in 2005/06. This puts London way ahead of other regions in the proportion of development on previously developed land.

The reduction in Barking and Dagenham from 89ha in 2001, to 45ha in 2006 is likely to be attributable to the redevelopment in the Dagenham Dock area of Barking Riverside into modern industrial land of previous industrial land as a result of Ford Motor Company changes in the Dagenham Plant.

In Greenwich the reduction reflects the industrial or military spoil decontamination and ongoing regeneration of four main sites, including Gallions Reach and the Greenwich Peninsula.

Looking Forward

East London Green Grid

The GLA has led work on producing a Green Grid for East London, which aims to provide new and existing East London residents and workers with a multi-functional network of strategic open space and in turn improved quality of life. It will create a network of interlinked, multi-functional and high quality open spaces that connect with town centres, public transport nodes, the countryside in the urban fringe, the Thames and major employment and residential areas.
As a living network of open spaces, river and other corridors connecting urban areas to the river Thames, the Green Belt and beyond, the Green Grid will:

- provide new and enhance existing public open spaces, reducing areas of deficiency
- provide public access along the major river and green areas
- provide a range of formal and informal recreational uses and landscapes, promoting healthy living
- provide new and enhance existing wildlife sites
- manage water collection, cleansing and flood risk with multi-functional spaces
- provide beautiful, diverse and managed green infrastructure to the highest standards for people and wildlife.

East London will be a major focus for regeneration and development over the coming 20-30 years, with the Olympic Park and Thames Gateway development. This area, specifically the land contained within the Thames Gateway, has suffered significant de-industrialisation over the last few decades, which have left a legacy of brownfield, derelict and underused land. The developments will provide a significant opportunity to radically improve the environment in east London.

A Thames Gateway Health and Green Environment Network has been established and the GLA is working with other partners on projects that demonstrate the benefits of high quality accessible green space to health outcomes in the Thames Gateway.

The Olympic Park itself will provide the largest new urban park in Europe in the last 150 years, a revitalised network of canals and rivers and much-increased biodiversity. Government has recently committed for all new developments in the Thames Gateway to be zero carbon by 2016, putting the gateway at the forefront of new environmental technologies.

CHAPTER 7: BIODIVERSITY

Introduction

Biodiversity is the variety of life on earth – all the species of plants and animals and their habitats. It also includes the genetic variation within species, which makes every individual slightly different. Over 150 nations signed up to protecting biodiversity at the Earth Summit in Rio in 1992.

London is a remarkably green city, with a great variety of wildlife habitats, from extensive areas of woodland, heath and marshes, to the River Thames and the more formal landscapes of the Royal Parks and city squares, as well as a huge area of private gardens. As discussed in the previous chapter, around two-thirds of London's land cover is occupied by green space and water, and of this about a third are private gardens. These green spaces are home to a tremendous diversity of wildlife, including over 300 species of birds[1] and 1,500 species of flowering plants. [2]

Maintaining London's biodiversity is crucial to the Mayor's vision of London as a sustainable world city. Having access to nature can have beneficial effects on well being, both in terms of physical exercise and mental health. People like different kinds of natural spaces - some people like to spend time near waterways and ponds, others like walking on heaths and others like watching birds around swamps and marshes. Maintaining biodiversity is about maintaining the health of the local environment and this in turn will make it a pleasant place for people to relax and spend time in.

The report on Environmental Justice in London[3] included access to natural green spaces and biodiversity as one of the 'key measures that needs to be considered in any work on environmental inequalities'.

Areas of green space can also have a moderating effect on water runoff, temperature and humidity in urban areas. These effects will become ever more important as part of our adaptation to climate change.

In 2002 the Mayor of London published 'Connecting with London's Nature'[4], the first statutory Biodiversity Strategy at regional level. The strategy sets two targets to measure the success of strategic objectives for biodiversity in London:

- No net loss of important wildlife habitat
- Areas of Deficiency in accessible wildlife sites are reduced.

These targets are directly addressed by two of the indicators below. Progress reports are produced that detail key work against the strategy to date, and implementation plans, which outlines forthcoming work.[5] The Mayor works with a range of partners to help deliver his Biodiversity Strategy. These include government agencies, such as Natural England and the Environment Agency, the voluntary sector, such as London Wildlife Trust and the RSPB, London boroughs and the London Biodiversity Partnership. The London Biodiversity Partnership has

[1] London Natural History Society, London Bird Reports (published annually)
[2] Burton R (1983) Flora of the London Area
[3] LSX, 2004. Environmental Justice in London: Linking the Equalities and Environment Policy Agendas, November 2004 http://www.lsx.org.uk/whatwedo/communities_page2604.aspx

[4] http://www.london.gov.uk/mayor/environment/biodiversity/index.jsp
[5] http://www.london.gov.uk/mayor/environment/biodiversity/documents.jsp

developed a Biodiversity Action Plan for London that takes into account the UK and England Biodiversity Action Plan.[6]

There are many pressures on London's biodiversity. The most imminent threat comes from the competition for land between wildlife habitats and the need to provide homes and places of work for London's increasing human population. Policies in the Mayor's London Plan ensure that biodiversity is taken into account in decisions affecting London's growth, and that important species and habitats are protected. Other threats come from climate change and pollution.

There are links between biodiversity and several other sections of this report. London's rivers (see Chapter 6) are valuable wildlife habitats, and river restoration and water quality (both Headline Indicators) have significant impacts on wildlife. Pollution levels (see Chapter 4) can also have impacts on biodiversity; the improving air quality in recent years in much of London has led to an increase in lichens, which are sensitive to pollution.

Indicators

The following provides an update of those indicators reported on in the first State of Environment report 2003. Repeated surveys can give a good indication of changes in habitats and this is shown in Table 7.1. Bird populations in London, as a general indicator of the quality of the environment, are also shown.

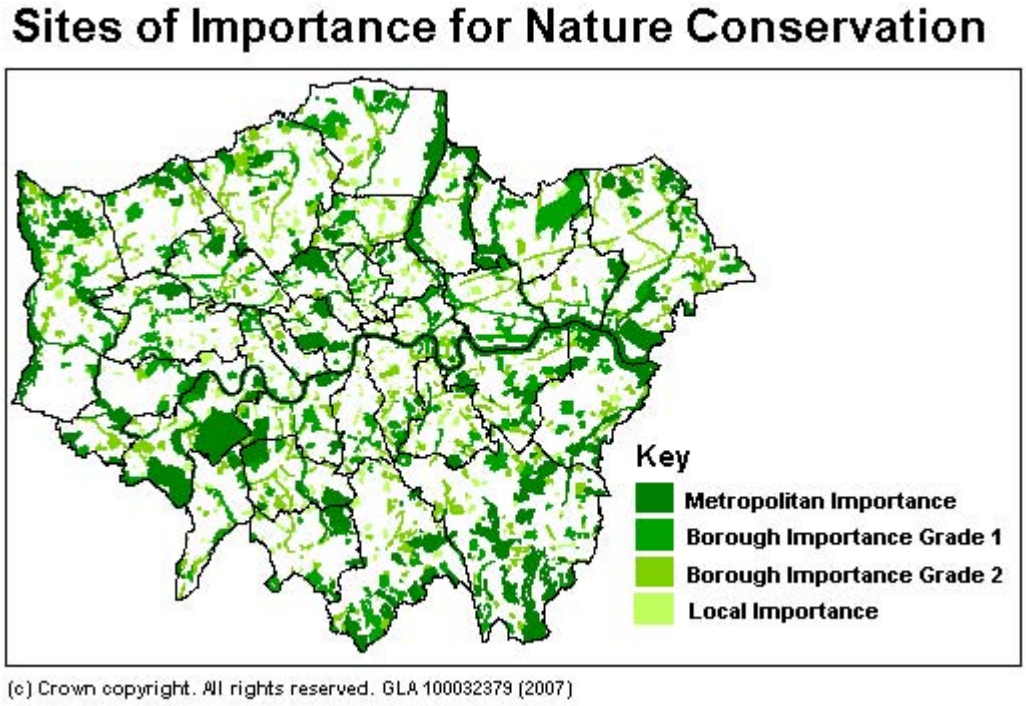
A new indicator has been introduced in line with the key aim of the Mayor's strategy to provide access to quality natural space for Londoners.

Wildlife Sites in London

Figure 7. 1 shows London's wildlife sites (or Sites of Importance for Nature Conservation) identified using procedures detailed in the Mayor's Biodiversity Strategy. There are four grades of site:

- **Sites of Metropolitan Importance:** these have London-wide significance and are identified by the Mayor.
- **Borough Grade 1:** identified by London borough councils
- **Borough Grade 2:** identified by London borough councils
- **Sites of Local Importance:** identified by London borough councils.

[6] www.lbp.org.uk



(c) Crown copyright. All rights reserved. GLA 100032379 (2007)

Figure 7. 1

Sites of Importance for Nature Conservation contain nearly all of London's important wildlife habitats, including those habitats that have been identified as priorities in national and regional biodiversity action plans. They also support most of the important species of plants and animals.

They also have a vital role in providing Londoners with access to nature and natural landscapes. This has been shown to have benefits for physical and mental health, and makes an important contribution to quality of life.

Indicator 18 shows the area for each grade of site in London, with an indication of changes since the last State of Environment Report.

The first line is a revised figure for the area at the beginning of 2003. The figures published in the 2003 State of the Environment Report have been corrected to take account of mapping errors and losses of sites prior to 2003.

The next two lines provide details of changes since the beginning of 2003 following the Mayor's rolling programme of open space and wildlife habitat survey. Reviews have been completed since the last State of the Environment Report in Bexley, Brent, Camden, Ealing, Harrow, Hillingdon, Kensington and Chelsea, Lewisham, Merton, Newham, Tower Hamlets and Waltham Forest. Less comprehensive reviews have been undertaken by other boroughs in relation to individual sites. Changes may include identification of new sites or parts of sites, deletion of sites or parts of sites, and change in grade. In many cases, such changes might not reflect any real change on the ground, but are the result of better information becoming available.

The Mayor's survey is the most comprehensive ever undertaken in most boroughs, and the wildlife value of many places has been identified for the first time. In every borough surveyed, the area of wildlife sites has increased following the review. A full breakdown by borough is shown in Appendix 7.1.

(18) Headline Indicator

Total Area of Wildlife Sites identified in London

London Total	Area of sites of importance for nature conservation (hectares)				
	Metropolitan	Borough grade I	Borough Grade II	Local	Total
Revised 2003 baseline	15646	7495	4550	1736	29426
Re-evaluation	257	174	434	146	1011
Actual change since 2003	0	12	5	-24	-7
Current area	**15903**	**7680**	**4989**	**1858**	**30430**

Table 7. 1

Trend

The total area of all grades of sites identified as being of importance to wildlife in London is 30,418 hectares, which is an increase of almost 1,000 since 2003. However, the vast majority of that change is due to better information becoming available through the Mayor's ongoing open space and habitat survey.

Overall, the target in the Mayor's Biodiversity Strategy, for no net loss of wildlife sites is being met.

While there are minor net losses at local level, this is offset by larger gains at grade I and II and there is no change in metropolitan sites.

Analysis

Losses of wildlife sites to development since early 2003 include rail-side habitat near Wembley (Brent) for the access road to the new Wembley Stadium, Airport Reservoir (Hillingdon) to the Heathrow Terminal 5 development, Paterson Park East (Southwark) for a school, Reede Road Allotments (Barking and Dagenham) and part of Normansfield Hospital (Richmond) for housing, and White City Woodlands (Hammersmith and Fulham) Bow Common Rough and Ben Johnson Road Rough (both Tower Hamlets) to mixed use redevelopment.

Gains of new wildlife sites include the flood relief works in Sutcliffe Park (Greenwich), the river restoration in Chinbrook Meadows (Lewisham) and habitat creation at Wandle Park and near Three Kings Pond (both Merton). Additionally, habitat creation or improved management in Tokyngton Recreation Ground (Brent), Kentish Town City Farm and St Pancras Gardens (both Camden), Forster Memorial and Mountsfield Parks (both Lewisham) and London Road Fields (Merton) has led to sites being upgraded.

Losses of wildlife sites are usually sudden, due to the redevelopment of part or all of a site or drastic changes in land management (such as ploughing, felling of woodlands or vegetation clearance). Nearly all such recent losses in London are due to development. Losses can also result from gradual declines due to inappropriate management or neglect. Gains can occasionally also be more or less immediate when new habitats are created. This is particularly true for wetlands, which develop wildlife value very rapidly. Good examples of this are Sutcliffe Park and Chinbrook Meadows, both of which created new Sites of Borough Importance more or less instantly. However, terrestrial habitats such as woodlands and grassland take much longer to develop their wildlife value, and most gains in wildlife habitat are therefore the gradual results of beneficial changes in land management. They are thus more difficult to recognise as changes than are the more dramatic losses.

Looking forward

Changes in policy and the implementation of a range of projects across the capital are likely to ensure the trend moves in a positive direction. Examples include:-

- Proposed Further Alterations to the London Plan include targets not only to protect existing habitats, but the creation of new wildlife habitats.
- The East London Green Grid providing a driving force for new and improved wildlife habitats in the Thames Gateway.
- The Mayor and key partners, including the London Biodiversity Partnership and borough councils have identified opportunities to improve access to nature in areas of deficiency, (see Headline Indicator 37). Implementing these should lead to enhancements in parks and open spaces that increase the number of wildlife sites, and the upgrading of others from Local to Borough Importance.

In future identifying and monitoring the trend in changes to wildlife sites should be easier as a new baseline for open space and habitats will have been established.

Areas of Deficiency in access to nature

A major objective and target of the Mayor's Biodiversity Strategy is to provide for better access to natural places in London.

To aid in the provision of access to nature, and to assist in measuring progress against the objective, the Mayor identifies Areas of Deficiency in access to nature. These are shown in Figure 7. 2 below.

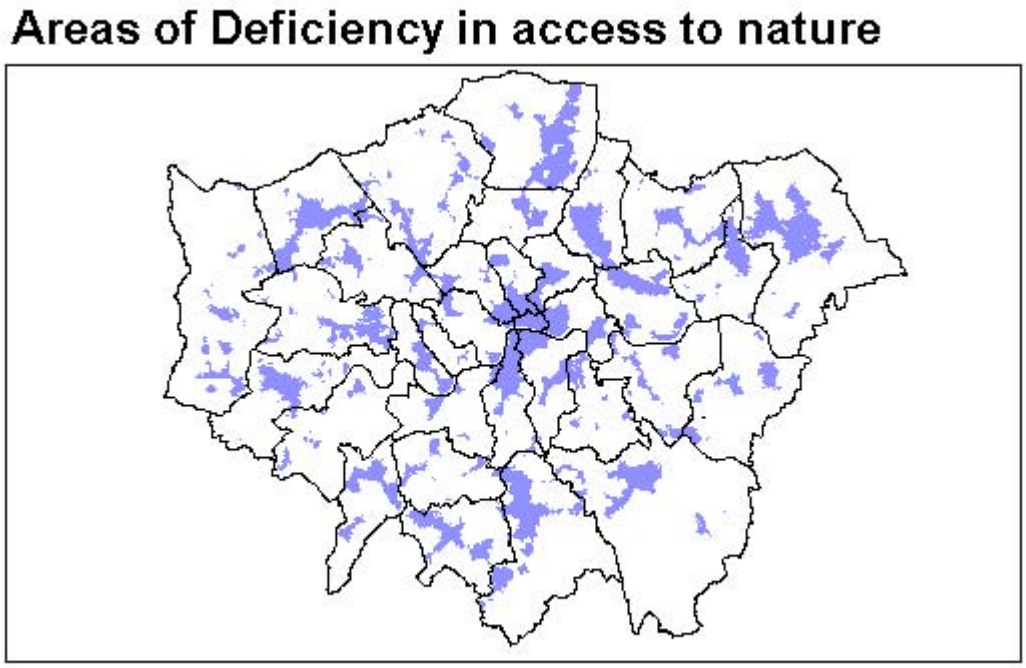


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Figure 7. 2

Areas of Deficiency in access to nature are defined within the built-up areas of London only, i.e. generally not in the green belt or Metropolitan Open Land. They are further than one kilometre actual walking distance from access points to wildlife sites identified by the GLA and boroughs as providing a significant experience of nature.

Walking access routes are used for two strategic reasons:
(i) Access on foot to a local area can substitute for access by motor vehicle to a more remote one, with consequent environmental advantages.
(ii) Many users of open space, such as parents with young children, the elderly and young people, may not have ready access to motor vehicles.

Table 7.2 shows the approximate percentage of each borough's built-up area that falls within Areas of Deficiency in access to nature. It does this by taking the total Area of Deficiency for that borough and dividing this by the total area of the borough less the area of green belt and Metropolitan Open Land.

(37) Headline Indicator

Table XX: Areas of Deficiency in Access to Nature by borough, 2006

	Total area (excluding River Thames) (hectares)	Area less Green Belt and Metropolitan Open Land (hectares)	Total Area of Deficiency in access to nature (hectares)	Percentage of non Green Belt and MOL as Area of Deficiency
All of London	156,870	106,997	24,962.4	23.3
Barking and Dagenham	3,601	2,943	659.1	22.4
Barnet	8,650	5,696	993.8	17.4
Bexley	6,046	4,340	666.5	15.4
Brent	4,309	4,010	718.4	17.9
Bromley	14,970	6,593	1,150.7	17.5
Camden	2,172	1,796	489.7	27.3
City of London	290	290	290.0	100
Croydon	8,622	6,063	1,723.1	28.4
Ealing	5,536	4,379	1,023.7	23.4
Enfield	8,188	4,699	1,822.9	38.8
Greenwich	4,721	3,602	522.4	14.5
Hackney	1,901	1,900	454.2	27.2
Hammersmith & Fulham	1,633	1,489	440.1	29.6
Haringey	2,949	2,439	375.1	15.4
Harrow	5,033	3,670	1,230.1	33.5
Havering	11,199	5,204	1,949.5	37.5
Hillingdon	11,536	6,483	872.0	13.4
Hounslow	5,581	3,655	752.8	20.1
Islington	1,481	1,468	483.9	33.0
Kensington and Chelsea	1,208	1,131	98.5	8.7
Kingston	3,715	2,581	757.3	29.3
Lambeth	2,673	2,555	844.6	33.1
Lewisham	3,500	3,205	402.7	12.6
Merton	3,750	2,788	402.3	14.4
Newham	3,610	3,252	981.8	30.2
Redbridge	5,625	3,562	640.9	18.0
Richmond	5,718	2,529	321.7	12.7
Southwark	2,877	2,391	697.7	29.2
Sutton	4,372	3,208	905.4	28.2
Tower Hamlets	1,970	1,849	659.0	35.6
Waltham Forest	3,871	2,814	916.1	32.6
Wandsworth	3,419	2,716	305.1	11.2
Westminster	2,144	1,697	370.8	21.8

Table 7.2

Trend

Areas of Deficiency were not included in the first State of the Environment Report as the mapping process had only just begun. It is therefore not possible to show a trend.

Analysis

The distribution of Areas of Deficiency across the London boroughs is governed not only by the amount of accessible wildlife habitat in and around each borough, but also by the pattern of distribution of accessible wildlife sites. For example, Kensington and Chelsea has the significant impact of Kensington Gardens, Holland Park, Kensal Green Cemetery and Brompton Cemetery being strategically placed around the borough, as well as Hyde Park, Wormwood Scrubs Park and Battersea Park close by. These keep Areas of Deficiency relatively low. Wandsworth's accessible wildlife sites are also spaced evenly across the borough.

Havering, on the other hand, has a large number of very good sites, but these are mostly in or near the green belt, or along the river valleys. This leaves a huge (1,868 hectares) area in the centre of the borough deficient in access to nature. Almost the whole of eastern Enfield, between the Lea Valley and the New River, is in an Area of Deficiency. It is heavily built-up from Edmonton northwards through Ponders End to the edge of Waltham Cross. There are a fair number of parks and other open spaces in this part of the borough, but many of these serve mainly as sports fields and areas for active recreation, although they have potential for ecological enhancement. A number of other outer boroughs are also surprisingly deficient in access to nature (Harrow, Waltham Forest, Kingston, Croydon and Sutton), and in each case it is because of the uneven scatter of wildlife sites, leaving very large areas with little in the way of accessible nature. Conversely, some inner boroughs are, like Wandsworth, better off than might be expected – for example, Lewisham and Haringey.

It should also be noted that what is termed a Site of Borough Importance in an outer borough with many good sites will tend to need a higher threshold than in other boroughs where there are fewer ecologically valuable sites. As Areas of Deficiency are defined around Sites of Borough Importance (as well as Sites of Metropolitan Importance), these will sometimes be found in an outer borough but not in similar area of an inner borough, because the latter has Sites of Borough Importance, which are of intrinsically lower value than what would achieve that grade in the London-edge borough.

Case Studies

1. Mountsfield Park, LB Lewisham

In Mountsfield Park in Catford, the natural value of an accessible site was improved, increasing the experience of nature. Here, the London borough of Lewisham instigated a range of improvements, including planting of native trees and shrubs, wetland creation and loggeries for stag beetles. As an old playground was due for renewal, the tarmac was broken up, allowing the natural flora to become established. A new playground was built elsewhere in the park. The site now provides sufficient experience of nature and the reduction in the surrounding Area of Deficiency can clearly be seen in Figure 7.3.

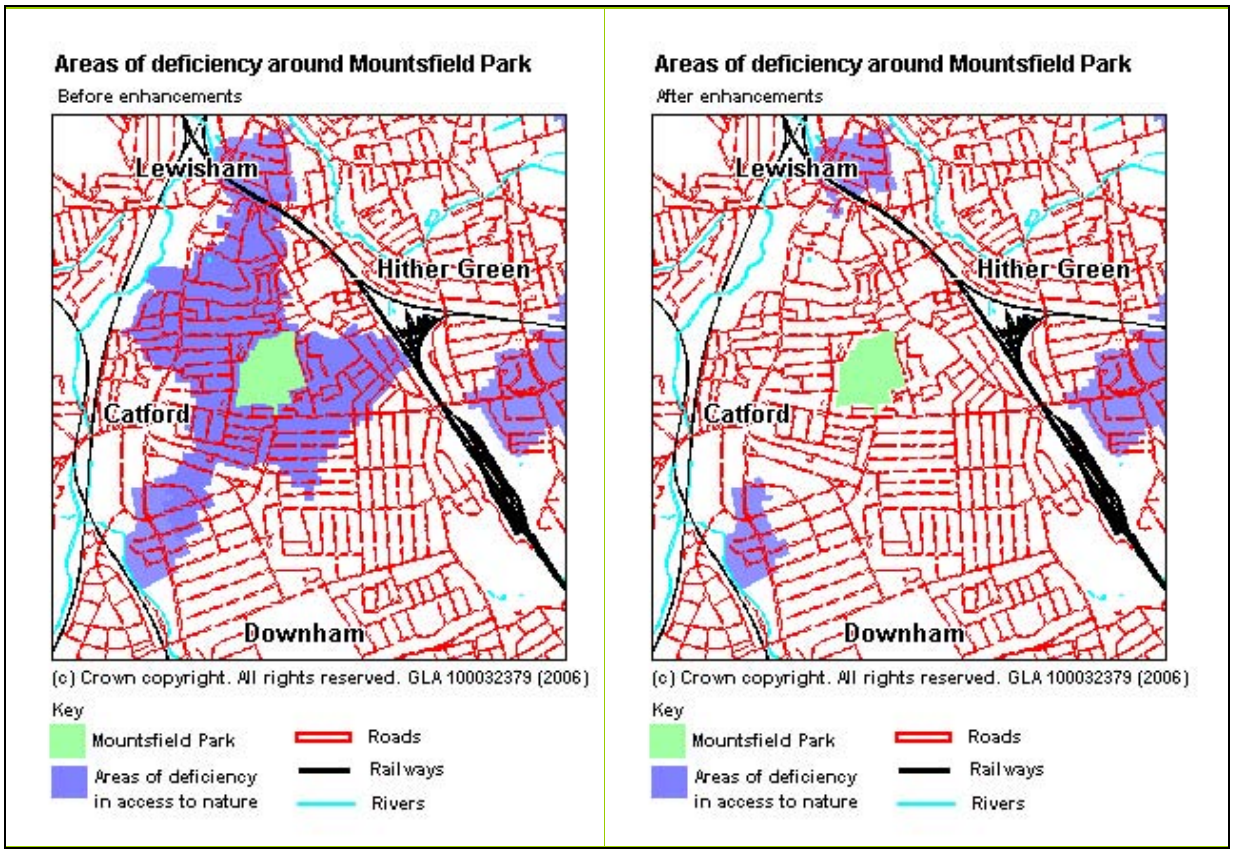


Figure 7. 3

Gillespie Park, LB Islington

The opening of the new Emirates Stadium for Arsenal Football Club provided an opportunity to improve walking access to Gillespie Park from the west. Before July 2006, the railway lines formed a significant barrier to access to the park from the west with the nearest crossing being to the south of Drayton Park station. As a result, an Area of Deficiency existed to the west of the lines. To connect the area of the old Highbury Stadium and Arsenal tube station to the new Emirates Stadium, a couple of footbridges were built across the railway lines. This significantly reduced walking distances to Gillespie Park and so removed 30 hectares from the Area of Deficiency here.

Looking Forward

The Mayor is actively working with the boroughs to reduce the Areas of Deficiency, and has published a London Plan Implementation Report, 'Improving Access to Nature' (in consultation at

time of writing) due for publication later in 2007, on improving access to nature for Londoners. This can be done by three means:

1. The natural value of an accessible site is improved, so that a place that previously did not provide significant experience of nature comes to do so.

2. New access points are provided to sites that already provide a significant experience of nature, or previously inaccessible sites are made accessible.

3. Improvements are made to walking access through the areas surrounding a site, bringing more parts of developed London into the one kilometre walking distance.

A number of other significant improvements in access to nature are in the pipeline, and it is hoped that that significant reductions in Areas of Deficiency will be reported in the next State of the Environment Report.

Bird populations in London

Trends in London's bird populations should provide an indication of changes to the local natural environment and so are included here as a headline indicator. They are sensitive to change for the following reasons:

- being high in the food chain, they reflect changes to the plants and animals in their food
- as birds move about, they sum up changes over large areas
- their short life spans mean that their populations quickly reflect environmental changes.

As changes to bird populations are sometimes due to widespread effects, such as differences in weather and changes in management of the countryside, it is necessary to compare London trends with those in the surrounding regions.

The results shown in Figure 7.4 are based on an analysis of bird population trends over eleven years, 1994 to 2005. They are nationally monitored through the 'Breeding Bird Survey' coordinated by the British Trust for Ornithology, Royal Society for the Protection of Birds, and Joint Nature Conservation Committee. The data looks at trends for the 26 commonest birds (see Figure 7. 4 below) in the capital and compares these trends with those in the surrounding government regions (the South-East and East of England). Results come from visits to over fifty selected areas in Greater London by volunteer ornithologists each year.

(17) Headline Indicator
Mean trend for 26 bird species in London, the South East and East of England, 1994 - 2005

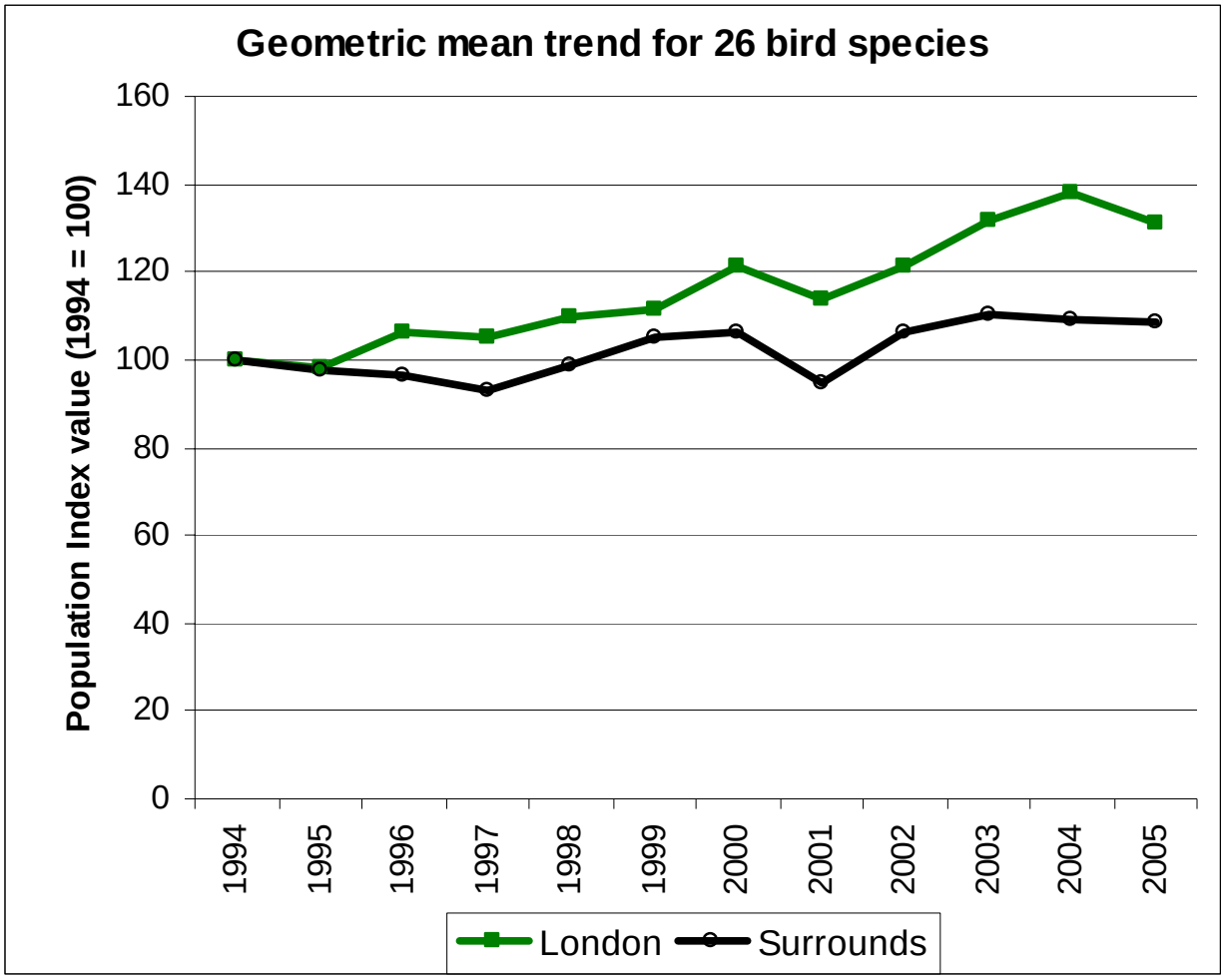


Figure 7. 4

Trend

The latest results from national bird monitoring show that birds are faring better in London than they are in the surrounding regions. On average, our more widespread bird species were some 33 per cent more numerous in London in 2005 than they were in 1994, whereas in the two surrounding government regions they were only 13 per cent more numerous.

Analysis

Of the 26 individual species, eleven are doing better in London than in the surrounds, but only three species are doing relatively worse in London. These include the house sparrow, which was down 65 per cent on its 1994 population level, although results from recent years suggest the decline could have ended.

Bird species doing better in London than in the surrounds

Eleven species indicate improving habitats in London in comparison with the surrounding region. Ten of these increased in both London and in the surrounds, but more in London (woodpigeon, wren, robin, blackcap, chiffchaff, blue tit, great tit, carrion crow, chaffinch and greenfinch). The goldfinch increased in London but not in the surrounds. The robin, wren and great tit are shown here.

Bird species doing worse in London than in the surrounds

Only three species indicate an unfavourable change in London in comparison with the surrounds: the feral pigeon, blackbird and house sparrow. The latter two are shown in graphs here.

The house sparrow has decreased steadily over the years in both London and its surrounds, and in 2005 was down 65 per cent on its 1994 population level. In the surrounding regions it was down 25 per cent over the same time period, so it has declined much more in London than in the surrounding regions. However, there was a slight upturn in 2003/4 and populations look to have improved slightly since the last State of the Environment Report. Research by the Royal Society for the Protection of Birds and others has still not been able to suggest why this is so.

The blackbird population did not change appreciably in London, but increased in the surrounds. The feral pigeon decreased in London, but not in the surrounds.

No apparent difference between London and its surrounds

For twelve species, London and the surrounding regions showed a similar trend. For these it appears that whatever is affecting the birds is acting across wide areas of lowland England, rather than being specific to the London area.

The moorhen, collared dove, green woodpecker, great spotted woodpecker, dunnock and magpie increased equally in the two areas and the swift, mistle thrush and starling decreased equally in the two. The mallard, and song thrush appeared to decrease somewhat in London whilst doing better in the surrounds, but this difference was not statistically significant. Jay populations showed no trend.

While birds might be good indicators of the general quality of our natural environment, there does not seem to be any common threads linking the species that show each trend in population. The three species that are doing relatively less well in London are typical of suburban and urban areas, but so are some of the species that are doing better in London than in the surrounds, such as the greenfinch.

It should be noted that trends among the 26 common bird species might not be indicative of the fate of our more rare species. Amongst woodland birds, recent studies of national population trends show that the more widespread species are increasing, but that the less widespread ones are declining.

The main exception to the general positive trend in London compared with its surrounds is the house sparrow, which has not only decreased in both areas, but also showed a considerably greater decrease in London. Despite the great decline of the house sparrow, the results for other species suggest that something is going better in London than in the surrounding regions. Not only is the average trend more positive in London than in the surrounds, the eleven species that have done better in London outnumber the three that have done worse.

Statistics

For readers who are used to estimates and their 95 per cent confidence intervals and tests of statistical 'significance', the table below provides these. The confidence intervals provide an approximate guide to the precision of the estimated trends and 'significance' a rough guide as to whether an apparent difference may be real. The real test, however, will come with the accumulation of more years of monitoring data.

Statistics on bird population change over the period 1994 to 2005

	London			Surrounding Government Regions		
Species*	**Annual % change***	**95% Confidence Interval**		**Annual % change***	**95% Confidence Interval**	
Greenfinch	**9.3**	7.2	11.3	**2.8**	2.3	3.3
Chaffinch	**9.2**	7.0	11.4	**2.1**	1.8	2.4
Chiffchaff	**8.6**	5.3	12.1	**3.5**	2.9	4.1
Great Tit	**7.6**	5.9	9.2	**1.9**	1.5	2.3
Blackcap	**7.6**	5.1	10.1	**3.5**	3.0	4.0
Green Woodpecker	**7.1**	3.8	10.5	**5.1**	4.4	5.9
Moorhen	**6.0**	2.7	9.4	**2.2**	1.2	3.1
Woodpigeon	**5.9**	4.5	7.3	**2.6**	2.1	3.0
Robin	**5.8**	4.5	7.1	**1.6**	1.2	1.9
Wren	**5.6**	4.4	6.8	**0.7**	0.4	1.1
Blue Tit	**5.2**	4.0	6.5	**1.0**	0.7	1.4
Great Spotted Woodpecker	**5.2**	2.2	8.4	**5.9**	5.1	6.7
Goldfinch	**5.2**	1.9	8.6	0.0	-0.7	0.8
Carrion Crow	**5.1**	3.6	6.6	**2.8**	2.2	3.4
Collared Dove	**4.3**	2.7	6.0	**4.4**	3.9	4.9
Dunnock	**2.8**	1.1	4.6	**1.2**	0.7	1.7
Jay	2.6	-0.3	5.5	0.0	-1.0	1.0
Magpie	**2.3**	1.2	3.6	**0.8**	0.3	1.2
Blackbird	-0.4	-1.2	0.5	**1.2**	0.9	1.5
Mallard	-1.0	-3.0	1.0	**2.3**	1.6	3.0
Swift	-1.3	-3.7	1.2	**-1.2**	-2.1	-0.2
Feral Pigeon	**-2.0**	-3.2	-0.8	0.4	-0.7	1.6
Song Thrush	**-2.3**	-4.3	-0.2	0.0	-0.5	0.5
Starling	**-2.7**	-3.9	-1.5	**-4.3**	-4.9	-3.7
Mistle Thrush	**-6.4**	-9.2	-3.5	**-3.7**	-4.5	-2.9
House Sparrow	**-11.0**	-12.0	-9.9	**-3.0**	-3.4	-2.5

Table 7. 3

*The changes in bold are statistically significant. For the species in bold the change differed significantly between London and its surrounds.

Chapter 1: Climate Change Appendix

Appendix 1.1: London Energy Partnership

Launched in 2004, the Mayor invited the partnership to endorse his Energy Strategy and provide a mechanism for the delivery of the Mayor's strategic policies by working with communities and businesses across London to build a strong sustainable energy sector that delivers social, economic and environmental benefits for London.

The aims of the partnership are to:

- assist in the delivery of London's carbon dioxide reduction, fuel poverty and security of supply targets for 2010, 2026 and 2050
- provide a single voice for sustainable energy in London and achieve a sea change in thinking about sustainable energy by key stakeholders
- enable a number of high-profile, Londonwide initiatives that deliver social, environmental and economic benefits
- create commercial and investment opportunities in sustainable energy and help to build London's green economy.

More recently, the partnership has been involved in the production of the Mayor's Climate Change Action Plan and is working with the Mayor to deliver real action towards a low carbon London. The partnership will take forward the key issues of energy services, fuel poverty, energy efficiency in housing and commercial and public sectors, renewable energy, combined heat and power and community heating and, by implementing major projects, securing funding, and effective communication.

Some recent successes of the London Energy Partnership include:

- Guidance and advice on setting up and delivering an ESCO – Energy Services Company - through the pilot Energy Action Areas, which showcase low carbon developments in London.
- Providing support to developers and London boroughs to achieve zero carbon developments through the 'Towards Zero Carbon Development' report.
- Working with the investment and finance community to bring about investment in sustainable energy technologies and overcome barriers to installing low carbon technologies in London.
- Highlighting the skills gaps for meeting London's carbon targets in the 'Skills for a Low Carbon London' report, and facilitating a task group to take forward recommendations that will bridge this gap.
- Completion of the London Wind & Biomass Study that has identified the potential for 50.34MW of large scale wind turbines in London and identified the potential resource of biomass available within London that would constitute 540-660Mwe of biomass generating capacity.
- Provision of site-specific support to London borough planners on the implementation of energy-related planning policy and provision of information to London's engineers and architects on information required in planning applications - as detailed in 'Planning Policy: making it happen'.
- Identifying, through the London Carbon Scenarios to 2026 report, what range of sustainable energy measures and technologies are required to meet London's carbon reduction targets by 2026, and how much this will cost to deliver.

- Establishing a London Energy Forum of over 1125 members who are committed to working together to achieve the Partnerships aims of delivering a low carbon London.
- Holding a series of Forums, workshops and events to raise awareness of sustainable energy in London and to engage stakeholders in the work of the London Energy Partnership.

Further details are available on the website: www.lep.org.uk. (as footnote)

Appendix 1.2: The London Hydrogen Partnership (LHP)

Launched in April 2002, to work towards a hydrogen economy for London and the UK. The partnership helps implement the Mayor's Energy Strategy and is linked to the Mayor's London Plan, and air quality, transport, economic development, municipal waste and ambient noise strategies in particular.

Partnership objectives:

- Support the development of a hydrogen economy for London – an overall energy infrastructure based on hydrogen as a principle energy carrier.
- Contribute to the growth of London's green economy through the development of hydrogen and fuel cell-related industry and employment.
- Improve air quality and reduce greenhouse gases and noise in London.
- Improve energy security for London.
- The Mayor has agreed to support the five-year transport programme developed by the London Hydrogen Partnership. This programme involves the operation of 70 hydrogen-fuelled vehicles by 2010/11 including 10-12 buses, working with Transport for London, London Fire & Emergency Planning Authority and the Metropolitan Police.
- The LHP is working to support and deliver plans to establish a Londonwide hydrogen energy infrastructure, including assessing the potential role and contribution of waste-to-H_2 routes towards a non-fossil hydrogen economy for London. Go to www.lhp.org.uk to view the LHP Waste to Hydrogen Report.
- The Stationary and Portable Applications Task Group is focusing on developing training and demonstrations for fuel cell combined heat and power projects, and portable generators.
- The London Schools Hydrogen and Fuel Cells Challenge will be launched in September 2007 and aims to introduce hydrogen and fuel cell technologies into the science curriculum, targeting pre-GCSE 11-14 students in London secondary schools. Students will learn about hydrogen fuel cell systems and their applications, and will experience hands-on experiments using fuel cell science kits.

Appendix 1.3: The London Climate Change Agency (LCCA)

Established in July 2005, the LCCA offers the Mayor the ability to deliver commercial sustainable energy projects on the ground across the capital. The LCCA is currently developing three types of projects: high profile flagship projects; retrofitting existing buildings to improve their energy efficiency; and the creation of a public/private joint venture energy services company – the London ESCO, in partnership with EDF – to design, build, finance and operate projects to provide energy services.

Appendix 1.4a: Total carbon dioxide emissions (from LECI)

Carbon dioxide emissions in London (kilotonnes)	2000	2003	% change 2000-2003

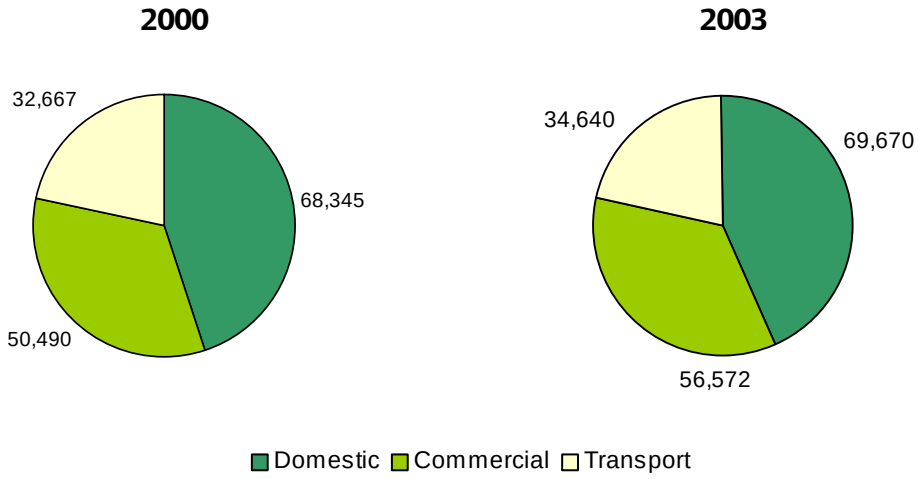
Total CO_2	40,324	43,665	8.3
CO_2 per capita	5.57	5.91	6.0

Source: GLA London Energy and CO_2 Emissions Inventory (LECI)

Appendix 1.4b

The following charts (X1 and X2) provide a breakdown of energy consumption and CO_2 emissions by sector.

Chart X1: Energy consumption in London by sector in 2000 and 2003 (MWh)



Appendix 1.4c

Chart X2: CO_2 emissions in London by sector in 2000 and 2003 (tonnes CO_2)

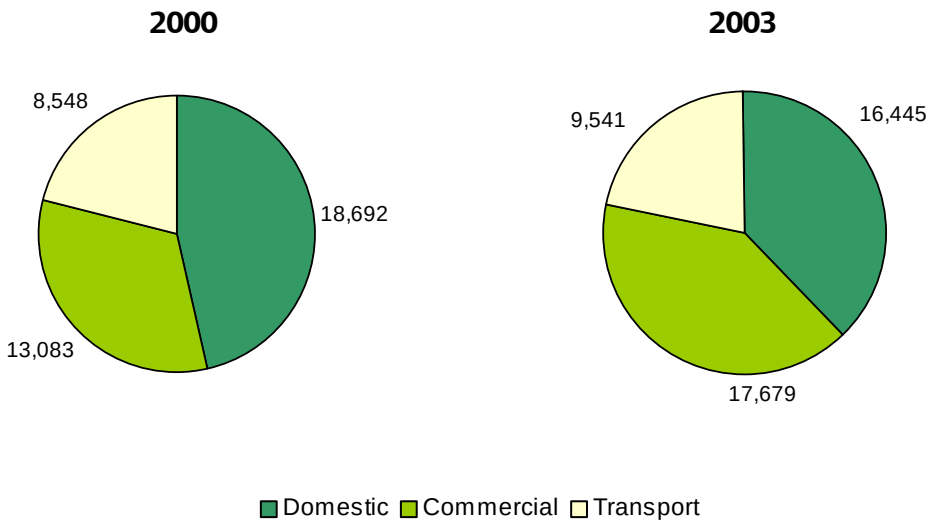
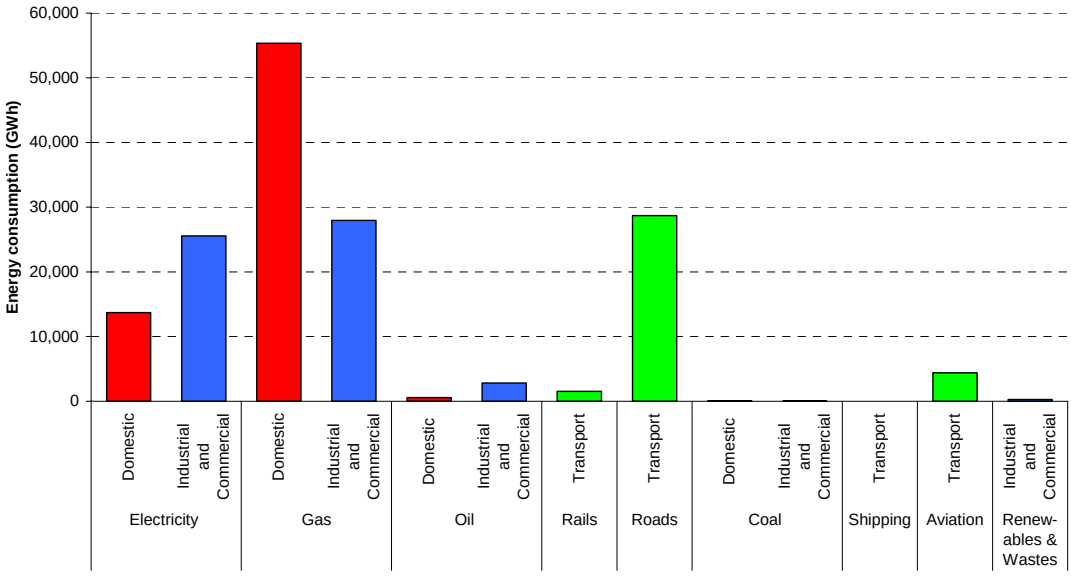


Chart X1 shows the breakdown of energy consumption across the domestic, commercial and transport sectors in London and the change in consumption across these sectors between 2000 and 2003. Energy use in the domestic sector, the largest energy consumption sector in London, has risen only slightly by 1.9 per cent to 69,670 MWh, increasing its share of the total to 43.4 per cent. Energy use in the commercial sector has risen by 12 per cent and the transport sector by only six per cent - a share of 35.2 and 21.5 per cent respectively.

Chart X2 shows the three key sources of carbon dioxide emissions and how they have changed from 2000 to 2003. LECI indicates emissions have increased by 11.6 per cent and 35.1 per cent respectively across the transport and commercial sectors, but domestic emissions have reduced by 12.0 per cent over the same period.

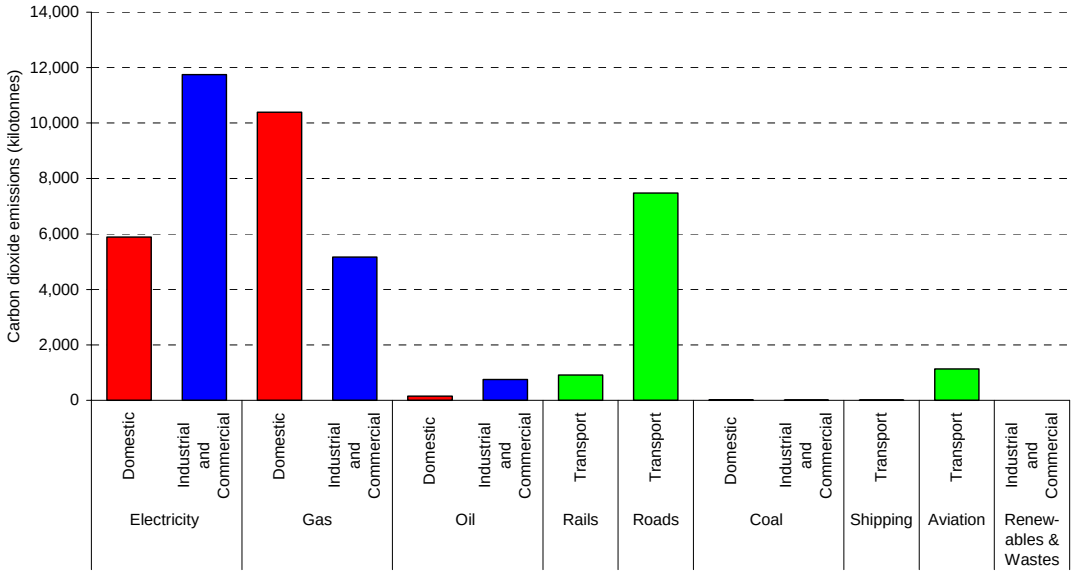
At 40.5 per cent, the commercial sector now makes up the largest single sector for carbon dioxide emissions in London (with the domestic sector at 37.7 per cent and transport at 21.9 per cent).

Appendix 1.4d: Energy Consumption by fuel and sector in Greater London in 2003



Source: LECI 2003

Appendix 1.4e: Carbon Dioxide Emissions by fuel & sector in Greater London in 2003



Source: LECI 2003

Appendix 1.4f: Table of Energy consumption & CO2 emissions by fuel and sector in Greater London in 2003

Fuel	Sector	Energy Consumption (GWh)	CO2 EmissionsKilotonnes
Electricity	Domestic	13,696	5,889
	Industrial and Commercial	25,541	11,749
Gas	Domestic	55,360	10,387
	Industrial and Commercial	27,947	5,169
Oil	Domestic	566	153
	Industrial and Commercial	2,792	753
Rails	Transport	1,533	917
Roads	Transport	28,691	7,478
Coal	Domestic	48	15
	Industrial and Commercial	23	7
Shipping	Transport	10	7
Aviation	Transport	4,405	1,133
Renewables & Wastes	Industrial and Commercial	267	0
Totals		160,879	43,661

Appendix 1.5: London Climate Change Partnership (LCCP)

The London Climate Change Partnership (LCCP) was formed in 2001 when it commissioned a study into the impacts of climate change on London, leading to the report *London's Warming: The Impacts of Climate Change in London (2002)*.

The partnership is led by the Greater London Authority (GLA) and is comprised of around 20 key stakeholders from the public, private and voluntary sectors. The aim of the partnership is to ensure that Londoners are prepared for impacts of inevitable climate change.

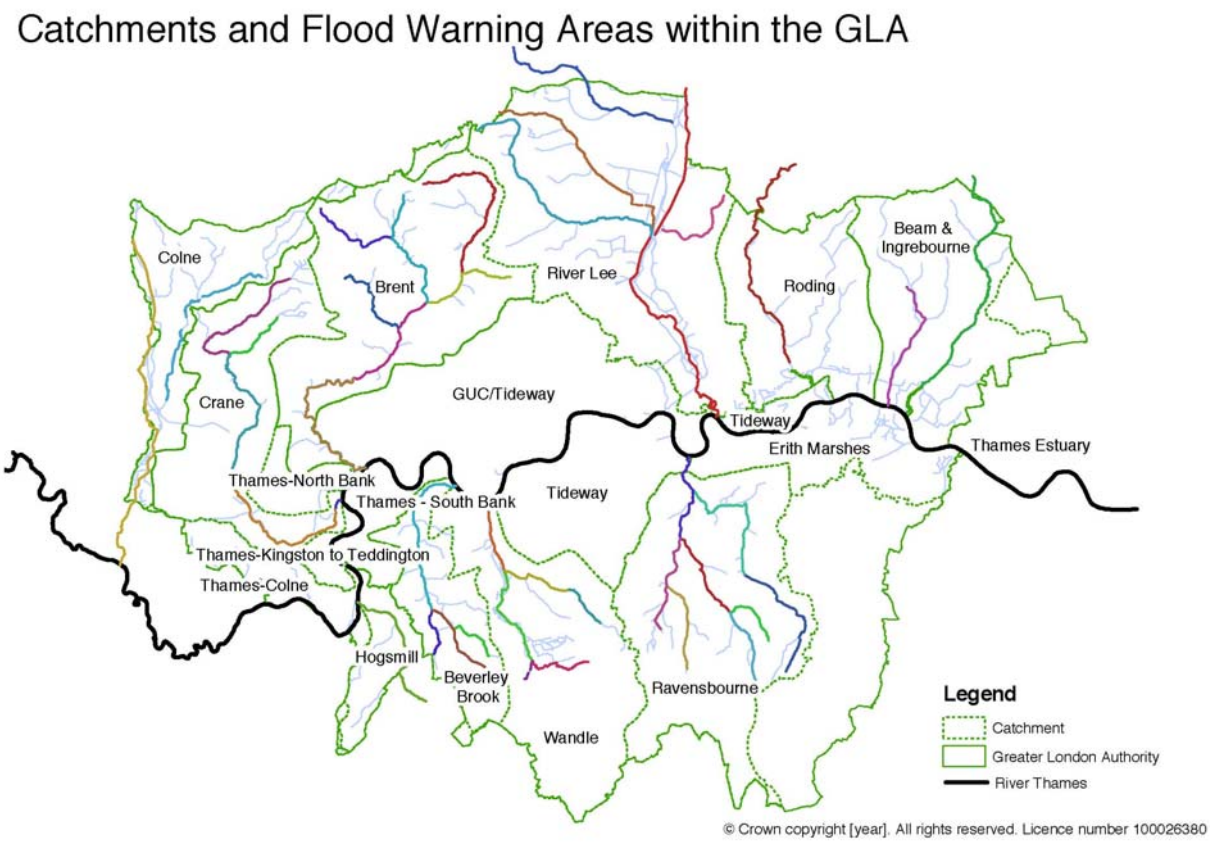
The partnership works closely with representatives from London's transport, financial services, development, and communications sectors. The partnership is also a member of the Three Regions Climate Change Group, which includes the South East and the East of England Climate Change Partnerships.

The roles of the Partnership are to:

- embed climate change adaptation into London's plans, policies and strategies
- increase the knowledge and awareness of adaptation risks and opportunities
- research and develop adaptation guidance and recommendations
- increase level of adaptation within new development and existing build
- embed adaptation into local planning authority operations.

The Partnership's publications are available to download from
www.london.gov.uk/climatechangepartnership

Appendix 1.6: River Catchments and Flood Warning Areas within London.



Source: Environment Agency

The different colours within the catchments represent the Flood Warning Areas the river is divided in to. To explain, take the river Brent that is completely within the GLA boundary, 1 catchment with 7 Flood Warning Areas. The Flood Watch will now be issued for the river Brent catchment, the details may point to a higher risk in a particular part of the catchment but the Flood Watch will be issued for the whole river length. In the past we often issued them on a Flood Warning Area basis progressively as an event got worse. This meant that on the national system it recorded up to 7 flood watches, although we did merge several if they were put out simultaneously. Now it will always be 1 Flood Watch with up to 7 Flood Warnings for the Brent catchment. Also, the tidal part of the Thames is split into 3 catchments; Tidal Thames from Teddington Weir to Putney Bridge, Tidal Thames from Putney Bridge to Thames Barrier, Tidal Thames from Thames Barrier to Dartford Creek.

Appendix 2: Resource Management, Waste & Recycling

Appendix 2.1: The Waste Hierarchy

The waste hierarchy (which was shown in Figure 2) is a concept that provides a framework within which the most desirable waste management options are set out. This section summarises some key projects and initiatives undertaken to ensure more waste is managed in line with the waste hierarchy.

Reduce!

Waste reduction and particularly waste avoidance or prevention is at the top of the waste hierarchy. Avoiding unnecessary waste, for example excessive packaging, reduces the demand for raw materials, which would otherwise have been extracted. This reduces emissions of carbon dioxide from fossil fuels and preserves carbon stocks in trees; it reduces transportation needs and associated fuel consumption and vehicle pollution. The knock-on effect of this saving is cumulative throughout the whole cycle, saving significant emissions of greenhouse gases, which would otherwise have been emitted right through to disposal of the material.

Nappy waste prevention was prioritised in the government's Waste Implementation Programme in May 2003. The Women's Environmental Network (WEN) has raised awareness about the environmental impact of nappies and encourages the use of washable cotton nappies. Twelve London boroughs offer a subsidy to householders to start using real nappies[1] and WEN is hoping to establish a Londonwide real nappy scheme.

Two to three per cent of the UK's household waste is estimated to be disposable nappies, approximately 400,000 tonnes of waste each year[2]. The UK deals with approximately three billion used nappies every year (nine million a day) at a cost of £40 million[3] therefore reducing nappy waste makes a significant contribution to London's sustainability. For more information, visit http://www.realnappiesforlondon.org.uk

Reducing Business Waste

The London Development Agency has received funding from Defra's Business Resource Efficiency and Waste programme (BREW) to support the implementation of the waste hierarchy.

Using this funding the LDA has initiated several projects which are having a real impact on London's sustainability, such as the **London Environmental Support Services** or LESS is the first stop shop for businesses looking for information or advice about resource efficiency, waste minimisation and sustainable waste management. LESS aims to raise companies' awareness of the financial benefits of managing their environmental impacts, encouraging them to access the wide range of support services available to them in London. LESS is targeted at all businesses – irrespective of their size or sector - although the service is anticipated to have greatest uptake from small- to medium-sized enterprises. For more information, visit www.less-online.com

[1] Capitalwastefacts Matrix, www.Capitalwastefacts.com [Accessed 4th January 2006]
[2] Life Cycle Assessment of Disposable and Reusable Nappies in the UK, Environment Agency, May 2005
[3] The Used Nappies Of Britain http://www.wasteonline.org.uk/searchresults.aspx [Accessed 4th January 2006]

The **National Industrial Symbiosis Programme** or NISP works with businesses to identify opportunities for companies to act together, to use resources more efficiently and so achieve business benefits that would not be available if they acted alone. Essentially, NISP is a dating agency for business, matching those with waste with others who can use it as a resource. For more information, visit www.nisp.org.uk

Reuse!

Reusing products and materials is almost as effective as waste reduction because it prevents the return of the carbon within the materials to the environment for as long as possible. Reuse also reduces demand for new raw materials and therefore reduces climatic impacts from this and associated materials transportation.

185 halls of residence in 24 universities and 22 London boroughs, housing approximately 40,000 students took part in a project led by CRISP and the Mayor of London to increase recycling and reuse amongst the student community. In addition to establishing recycling infrastructure, students donated unwanted items including kitchen equipment, clothes, furniture and electrical equipment to local charities for reuse. At the end of the summer term in 2006 the reuse project had diverted over 20 tonnes of materials from landfill. The project's success was recognised at the National Recycling Awards in Bournemouth winning the Best Partnership Project for Recycling 2006.

Source: Crisp www.crispej.org.uk

Compost!

Composting is a controlled aerobic process, which ensures that biodegradable materials are broken down in the presence of air and therefore produces carbon dioxide as opposed to the much more damaging methane generated under anaerobic conditions, such as landfill. Compost derived from organic kitchen and garden waste can be used as a soil improver, for plant bedding and landscaping, in topsoil manufacture and as mulch.

Just under 30,000 wormeries, composters and digesters have been provided by London's waste authorities over 2005/06 as Figure 6 shows.

The London Community Recycling Network have trained 109 Master Composters, a network of fully trained volunteers through their Compost Network[4] ensuring more Londoners can successfully reduce their waste by composting biodegradable waste at home or within their community.

[4] London Community Recycling Network www.lcrn.org.uk [Accessed 4th January 2006]

Figure 6 – Number of Wormeries, Composters and Digesters distributed by London boroughs in 2005/06

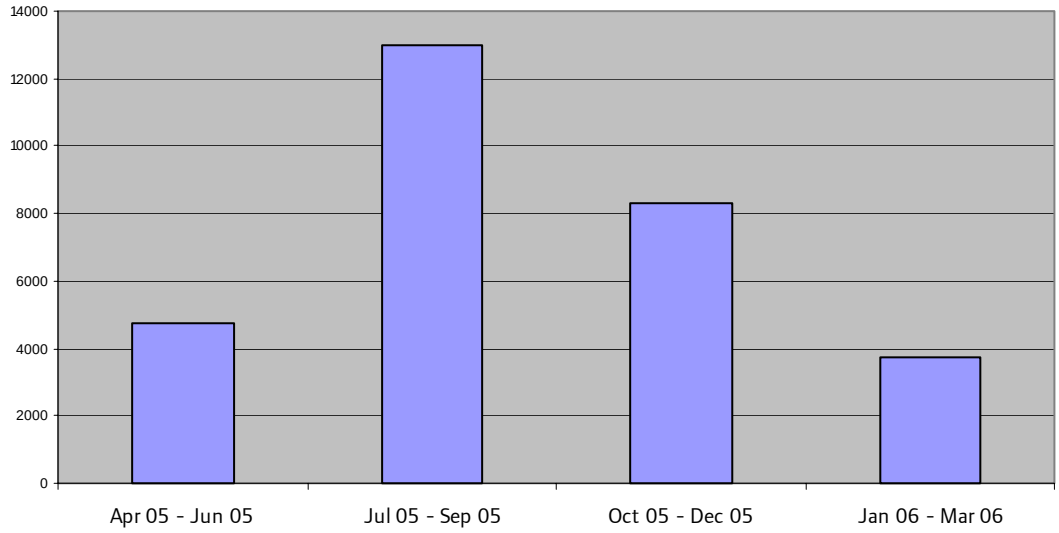


Figure 6
Source: WasteDataFlow

Recycle!

The amount that London's households recycle has risen steadily in recent years - from nine per cent in 2000/01 to 20.7 per cent in 2005/06 (compared to the English average of 11.2 per cent and 26.7 per cent respectively). However, given the fact that over 60 per cent of what we throw away can be recycled[5], there's room for improvement. With better services now available in every London borough, recycling has never been easier.

Avoiding conventional incineration

London's use of incineration with energy from waste for disposal of municipal waste (at an average of 19 per cent) is substantially higher than the UK average of nine per cent over the same period[6]. London's incineration capacity is provided by two facilities, LondonWaste in Edmonton and South East London Combined Heat and Power Limited (SELCHP) in Lewisham.

'Having regard to existing incinerator capacity in London and with a view to encouraging an increase in waste minimization, recycling, composting and the development of advanced conversion technologies for waste, the Mayor will consider these waste management methods in preference to any increase in [conventional] incineration capacity. Each case however will be treated on its individual merits. The aim is that current incinerator capacity will, over the lifetime of the [London] plan, become orientated towards non-recyclable residual waste'[7].

[5] Recycle for London www.recycleforlondon.co.uk [Accessed 4th January 2007]
[6] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]
[7] London Plan, Greater London Authority, February 2004 Policy 4A.1

Avoiding Landfill

In 2005/06 London landfilled 64 per cent (2,692,000 tonnes[8]) of its municipal waste and over 82 per cent (2,215,200 tonnes[9]) of this was deposited in landfill sites outside the Greater London area, predominantly in the East and South East of England with just 16 per cent being landfilled in sites within London (436,414 tonnes[10])[11].

London simply cannot continue to rely on landfill as a waste management method. A report for Defra[12] concluded that the reliance on landfill in the UK could reflect the relative abundance of potential sites as a result of past mining and quarrying activity and a greater acceptance of new waste technologies as an alternative method of waste disposal in countries such as Sweden and Denmark. However, the abundance is fast becoming scarce.

London's ability to landfill its own waste is extremely limited and sites within London have just four further years of landfill life at current rates of disposal[13]. Of sites on which London relies heavily outside the Greater London area, capacity in the South East equates to around five years of remaining life at current landfill deposit rates[14]. In the East of England, landfill capacity is unevenly distributed, however, sites in Bedfordshire and Essex, which have traditionally had the highest inputs (including significant amounts of waste transferred from London) now have only between one and three years of remaining capacity at current input rates[15]. For this reason, through the London Plan, the Mayor has committed to reducing London's reliance on landfill, particularly on sites outside Greater London by achieving self-sufficiency targets.

Achieving self-sufficiency

The amount of municipal waste arising in 2020 in London is projected to be 5.7 million tonnes. The Mayor has set targets for the amount of this waste that is to be managed in London (4.6 million tonnes or 80 per cent) by 2020 and indicated the types of facilities that will be required to achieve this target (Figure 7). Given the currently high reliance on landfill and conventional incineration London faces a significant challenge to develop the necessary infrastructure. However, it is also an exciting opportunity to recover materials and energy through new waste technologies and in doing so increase employment and skills within the green industries sector.

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[8] Defra National Statistics: http://www.defra.gov.uk/environment/statistics/wastats/archive/mwb200611.xls [Accessed 2nd January 2006]
[9] Landfill deposits of MSW arising in London 2005/6 extrapolated from WasteDataFlow, www.wastedataflow.org [Accessed 13/12/06]
[10] Landfill deposits of MSW arising in London 2005/6 extrapolated from WasteDataFlow, www.wastedataflow.org [Accessed 13/12/06]
[11] Note there is a 1.5 per cent discrepancy because the total municipal waste figure includes hazardous waste while the tonnage landfilled does not.
[12] Reducing the reliance on landfill in England, National Audit Office for Defra, July 2006
[13] "London: Landfill Capacity and Site Deposits 2004/05" http://www.environment-agency.gov.uk/commondata/103196/1520010?referrer=/subjects/waste/1031954/315439/1434288/1434293/1489077 [Accessed: 030307]
[14] "South East - Remaining landfill capacity and life expectancy 2004/05" http://www.environment-agency.gov.uk/commondata/103196/1579568?referrer=/subjects/waste/1031954/315439/1434288/1434293/1489079 [Accessed: 030307]
[15] "East of England: Distribution of remaining landfill capacity 2004/05" http://www.environment-agency.gov.uk/commondata/103196/1538086?referrer=/subjects/waste/1031954/315439/1434288/1434293/1489075 [Accessed: 030307]

Figure 7 - London's municipal waste by management method 2020
Note: Due to some pre-processing before recovery, the total adds to more that 100 per cent

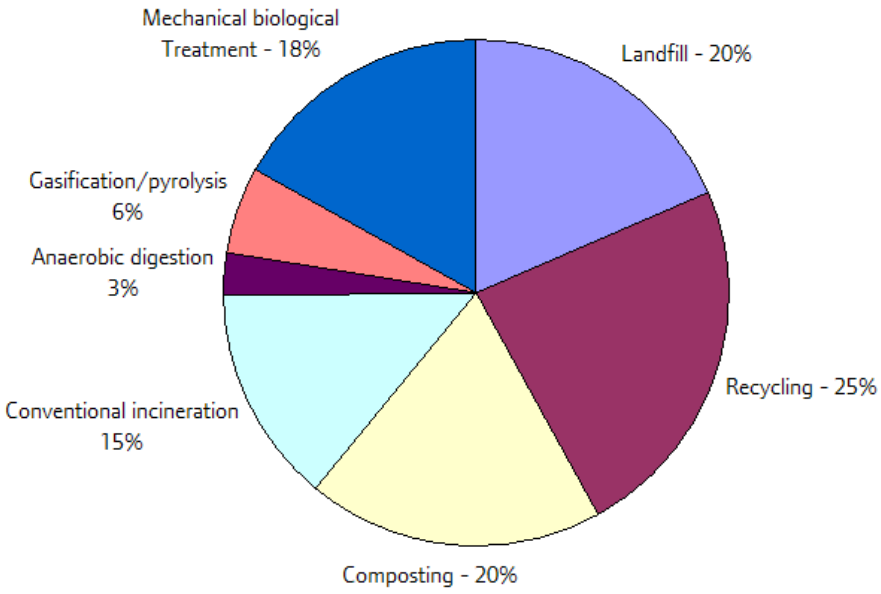


Figure 7
Source: The London Plan: Spatial Development Strategy for Greater London. Housing Provision Targets, Waste and Minerals Alterations, Mayor of London, December 2006

A number of new waste technology plants are being developed across London for example:
* Veolia is planning an autoclave in Rainham to meet Tower Hamlets' needs.
* The East London Waste Authority has developed two bio-material recycling facilities through major new facilities at Jenkins Lane and Frog Island
* Novera is developing a gasification plant in the London borough of Havering

Advanced energy recovery!

The Mayor's top priority for reducing carbon emissions in the Climate Change Action Plan[16] is to move as much of London as possible away from reliance on the national grid and on to local, lower-carbon energy supply. This approach is often termed 'decentralised energy' and includes combined cooling heat and power networks, energy from waste using non-incineration based waste technologies and on-site renewable energy, such as solar panels. The Mayor sets a goal in the Climate Change Action Plan[17] to enable a quarter of London's energy supply to be moved off the grid and on to local, decentralised systems by 2025, with more than half of London's energy being supplied in this way by 2050. To achieve emissions savings from decentralised energy requires vigorous and immediate action at both local and national level.

[16] Action today to protect tomorrow: The Mayor's Climate Change Action Plan, Greater London Authority, March 2007
[17] Action today to protect tomorrow: The Mayor's Climate Change Action Plan, Greater London Authority, March 2007, page xxii

The Climate Change Action Plan[18] goes on to suggest that taking the target of a 60 per cent reduction by 2025 from the 1990 baseline, energy supply would need to emit 13.8 million tonnes less CO_2 per annum by 2025. This means decentralised energy would need to meet 25 per cent of London's energy demand and radical reductions in the carbon intensity of the national grid would be required.

In the current environment[19], a saving of 7.2 million tonnes is achievable by 2025, and 15 per cent of this is to be met by an increased contribution from energy from waste using non incineration based waste technologies. The treatment of residual waste streams could produce a whole new market in bio and synthesis gases that are either partially or entirely renewable (depending upon the feedstock) and liquid fuels – turning non-recycled waste into London's largest source of renewable energy, which can be used for heating and cooling homes and workplaces and for transport.

Close the recycling loop!

Managing waste within London and in line with the waste hierarchy is not the end of the story, however. The government's Sustainable Development Strategy[20] and Mayor's Municipal Waste Management Strategy[21] recognise the importance of sustainable consumption and production. Developing products that incorporate recycled materials and stimulating markets for green products ensures that fewer materials are sent to landfill.

It can also make a positive contribution to tackling climate change because the processing of recycled materials often requires less energy than using virgin materials. Boosting green procurement amongst London's business community supports the development of the recycled products market and stimulates the growth of green businesses, jobs and training opportunities.

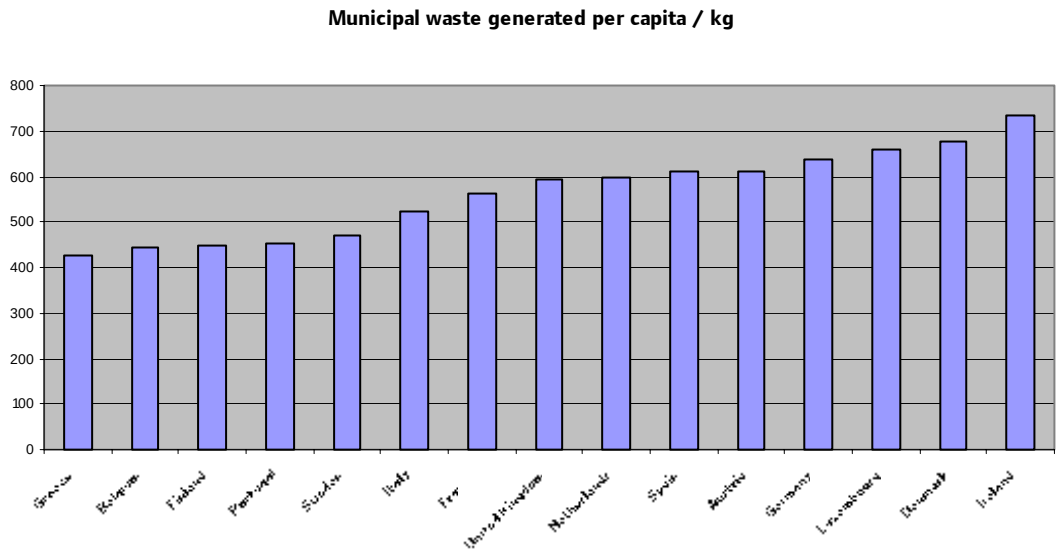
The Mayor's Green Procurement Code was launched up in 2001 to support London's businesses and organisations to buy products made from recycled materials. Since its inception, the Mayor's Code has made great progress in increasing recycled content product procurement among the Mayor's Code's members and in stimulating the development of markets for recycled materials.

The combined purchasing power of Mayor's Code signatories diverted 394,453 tonnes of materials from landfill and saved 175,000 tonnes of CO2 emissions in 2005/06. Over £379 million has been spent on recycled products through the Mayor's Code, delivered by London Remade, since its launch in 2001. London organisations spent £158 million on recycled products in 2005/06 alone[22].

The Mayor will be launching a new Green Procurement Code in April 2007. The focus of the Mayor's Code will remain on procurement but be expanded to cover other aspects of green procurement (i.e. recycled content products plus additional green procurement aspects such as water and energy efficient products), indicators will be used to assess signatories' green procurement performance and the Mayor's Code will become a mark of excellence in green procurement activity.

[18] Action today to protect tomorrow: The Mayor's Climate Change Action Plan, Greater London Authority, March 2007, page 107
[19] Action today to protect tomorrow: The Mayor's Climate Change Action Plan, Greater London Authority, March 2007, page 108
[20] Securing the Future - UK Government sustainable development strategy, 2005
[21] Rethinking Rubbish in London: The Mayor's Municipal Waste Management Strategy, Greater London Authority, September 2003
[22] The Mayor's Green Procurement Code: Year 4 purchase report 2005/06, London Remade, November 2006

Appendix 2.2 - European comparison of municipal waste generated (kg) per head 2003



Source: Eurostat[23]
Note: In December 2002, the EU Waste Statistics Regulation (EC 2150/2002) was published in the Official Journal of the European Communities. The regulation requires Member States to provide the Commission with information on the generation, recovery and disposal of waste every two years. Some adjustments to the UK data reported to Eurostat have been made to make the data more comparable to previous presentation of waste information. For more information please go to: http://www.defra.gov.uk/environment/statistics/waste/wreuwastestats.htm

Appendix 2.3

The LATS system works by setting allowances on the amount of biodegradable municipal waste that waste disposal authorities can send to landfill. These allowances are tradable, so that authorities that currently rely on landfill can buy additional allowances if they expect to landfill more than the allowances they hold. Similarly, authorities with low landfill rates can sell their surplus allowances.

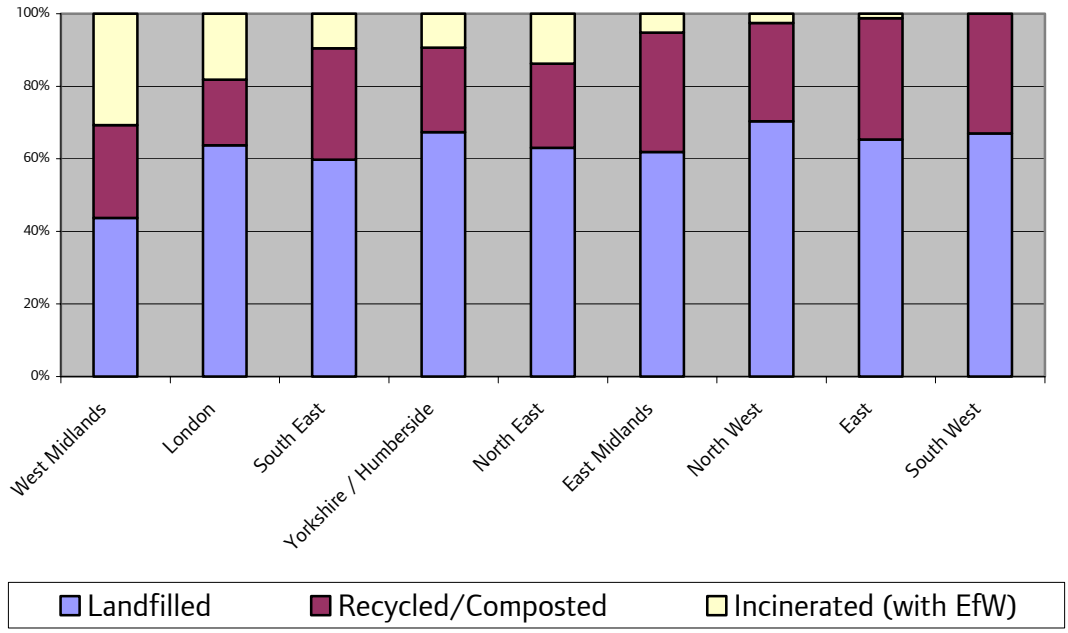
[23] Municipal waste management in the European Union
http://www.defra.gov.uk/environment/statistics/waste/kf/wrkf08.htm [Accessed 4th January 2006]

Landfill Directive targets for the UK
(The maximum amount (tonnes) of biodegradable municipal waste that can be landfilled by English authorities in each target year).

	2009/10	2012/13	2019/20
UK *	13,700,000	9,130,000	6,390,000
England *	11,200,000	7,460,000	5,220,000
London **	1,719,759	1,145,482	801,530

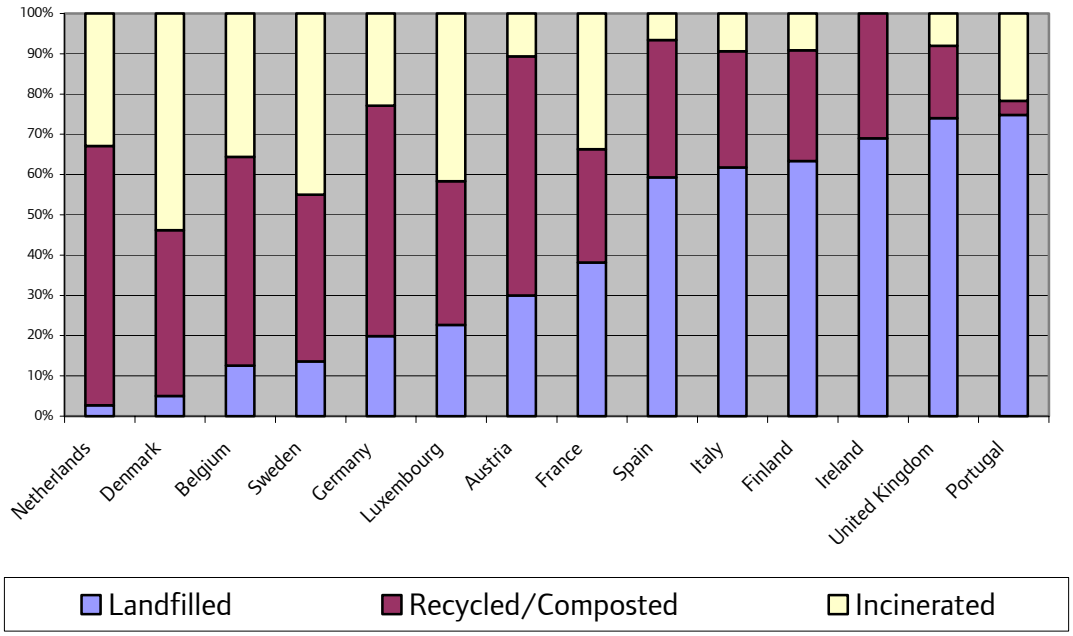
Sources:
* Report on the Landfill Allowances and Trading Scheme 2005/6, Environment Agency, November 2006
** Allocation of landfill allowances to waste disposal authorities, Defra
Further targets are set at an authority level, which are combined to produce the overall figure for London.

Appendix 2.4 – Regional comparison of municipal waste management method 2005/06



Source: Defra National Statistics

Appendix 2.5 - European comparison of municipal waste management method 2003



Source: Eurostat[24]

[24] Municipal waste management in the European Union
http://www.defra.gov.uk/environment/statistics/waste/kf/wrkf08.htm [Accessed 4th January 2006]

Appendix 2.6 – Comparison of recycling performance by borough, against targets

Authority	Statutory target 2003/04 (%)	BV82(a) + BV82(b) 2003/04 (%)	BV82(a) + BV82(b) 2004/05 (%)	Statutory target 2005/06 (%)	BV82(a) + BV82(b) 2005/06 (%)	Met?	Statutory target 2007/08 (%)
Barking and Dagenham	10	6.7	14	18	16.6	No	20
Barnet	18	16.7	19.87	27	27.47	Yes	27
Bexley	33	20.6	30.47	30	37.71	Yes	30
Brent	10	8.5	13.95	18	20.01	Yes	20
Bromley	14	20.1	23.26	21	27.25	Yes	21
Camden	22	19.1	25.21	30	27.14	No	30
City of London	10	19	14.3	18	18.1	Yes	20
City of Westminster	12	13.2	15.3	18	18.29	Yes	20
Croydon	28	14.1	13	30	16.17	No	30
Ealing	20	11.7	15.21	30	19.28	No	30
East London Waste Authority	12	8	12.5	18	15.25	No	20
Enfield	18	15.6	23.63	27	27.29	Yes	27
Greenwich	10	12	19.01	18	21.66	Yes	20
Hackney	10	6.9	12.2	18	16.21	No	20
Hammersmith and Fulham	16	15.3	19.59	24	21.49	No	24
Haringey	10	8.8	14.34	18	19.23	Yes	20
Harrow	16	13.1	18.8	24	26.7	Yes	24
Havering	18	9.6	15.51	27	17.81	No	27
Hillingdon	14	23.9	27.2	21	27.7	Yes	21
Hounslow	28	15.7	17.4	30	19.25	No	30
Islington	10	8.1	11.04	18	18.29	Yes	20
Kensington and Chelsea	22	16.4	18.08	30	19.94	No	30
Kingston upon Thames	30	18.5	18.25	30	23.97	No	30
Lambeth	14	10.5	16.46	21	22.15	Yes	21
Lewisham	10	8.4	10.2	18	12.2	No	20
Merton	18	14.8	20.29	27	22.59	No	27
Newham	10	5.5	6.23	18	10.13	No	20
North London Waste Authority	12	12.71	18.3	18	20.89	Yes	20
Redbridge	14	12.3	15.54	21	17.34	No	21
Richmond upon Thames	28	22	23.8	30	28.59	No	30
Southwark	10	7.1	10.84	18	14.96	No	20
Sutton	33	25.5	27.82	30	29.07	No	30
Tower Hamlets	10	5.1	7.35	18	8.85	No	20
Waltham Forest	12	11.8	18.1	18	21.85	Yes	20
Wandsworth	16	17.5	17.15	24	20.96	No	24
West London Waste Authority	18	17.04	20.06	27	24.59	No	27
Western Riverside Waste Authority	16	14.77	17.6	24	22.03	No	24

Source: Capitalwastefacts

Appendix 2.7: Number of bring banks by Borough

	No of households *	Percentage of high rise flats in dwelling stock **	Number of bring banks	Number households per bank
Barking and Dagenham	67,000	23.9		
Barnet	135,000	29.2	228	592
Bexley	91,000	20.4		
Brent	114,000	29.1	294	388
Bromley	129,000	21.7	254	508
Camden	99,000	51.8	625	158
City of London *	4,000	98.4	1	4,000
City of Westminster	111,000	59.5		
Croydon	142,000	21.5	91	1,560
Ealing	130,000	29.4		
Enfield	116,000	25.9		
Greenwich	96,000	36		
Hackney	92,000	60		
Hammersmith and Fulham	86,000	41		
Haringey	101,000	29		
Harrow	86,000	21		
Havering *	93,000	17	57	1,632
Hillingdon	102,000	22		
Hounslow *	89,000	30	98	908
Islington	85,000	54	480	177
Kensington and Chelsea	91,000	30		
Kingston upon Thames *	64,000	27		
Lambeth	130,000	49		
Lewisham	112,000	33	23	4,870
Merton	84,000	25.3		
Newham	98,000	31	265	370
Redbridge	99,000	20		
Richmond upon Thames	81,000	27	605	134
Southwark	117,000	63	1450	81
Sutton	77,000	29	154	500
Tower Hamlets	90,000	82	468	192
Waltham Forest	96,000	30	1959	49
Wandsworth	130,000	43		
London	**3,237,000**	**37**	**7,052**	

Source: Wastedata Flow

NB. This information is incomplete, as data has not been provided to WasteDataFlow by all London boroughs.

CHAPTER 3: The Local Environment, Litter and Environmental Crime

Appendix 3: The Local Environment, Litter and Environmental Crime

The following data has been compiled from the Defra website and is collected by the Local Environmental Quality division. All local authorities have to report to government the number of fixed penalty notices that they issue, the number of prosecutions taken and the income received for those notices. The following table sets out the data received from London boroughs over the last four years.

Appendix 3.1

	2002-2003			2003-2004			2004-2005			2005-2006		
	NO. OF FIXED PENALTIES ISSUED	NO. OF FIXED PENALTIES PAID	NO. OF CASES OF NON-PAYMENT TAKEN TO COURT	NO. OF FIXED PENALTIES ISSUED	NO. OF FIXED PENALTIES PAID	NO. OF CASES OF NON-PAYMENT TAKEN TO COURT	NO. OF FIXED PENALTIES ISSUED	NO. OF FIXED PENALTIES PAID	NO. OF CASES OF NON-PAYMENT TAKEN TO COURT	NO. OF FIXED PENALTIES ISSUED	NO. OF FIXED PENALTIES PAID	NO. OF CASES OF NON-PAYMENT TAKEN TO COURT
Corporation of London	..	..	..	..	..	..	0	0	0	132	123	2
LB Barking and Dagenham	75	28	3	65	36	3	..	..	..	510	157	6
LB Barnet	..	..	..	86	26	10	219	..	..	71	35	0
LB Bexley	..	..	..	0	0	0	0	0	0	8	8	0
LB Brent	0	0	0	20	14	0	146	72	0	166	103	0
LB Bromley	0	0	0	0	0	0	0	0	0	0	0	0
LB Camden	0	0	0	0	0	0	0	0	0	0	0	0
LB Croydon	..	..	..	..	..	..	270	100	0	473	210	0
LB Ealing	..	..	..	..	..	..	904	182	0	552	124	0
LB Enfield	42	25	4	0	0	0	..	..	..	267	100	0
LB Greenwich	40	33	3	55	35	5	194	107	10	181	135	16
LB Hackney	..	..	..	..	..	..	..	..	..	369	118	0
LB Hammersmith and Fulham	..	..	..	0	0	0	926	278	102	1140	385	0
LB Haringey	152	26	0	135	34	0	..	..	..	525	277	3
LB Harrow	0	0	0	..	..	..	0	0	0	0	0	0
LB Havering	0	0	0	0	0	0	0	0	..	0	0	0
LB Hillingdon	0	0	0	0	0	0	270	107	7	29	25	1
LB Hounslow	0	0	0	0	0	0	0	0	0	0	0	0
LB Islington	14	7	0	67	24	10	256	179	3	678	433	0
RB of Kensington and Chelsea	539	520	15	771	740	7	345	338	4	454	439	0
RB of Kingston Upon Thames	0	0	0	0	0	0	..	..	..	0	0	0

LB Lambeth	..	..	..	..	..	..	..	..	..	43	18	0
LB Lewisham	272	126	41	446	283	5	342	168	5	392	219	9
LB Merton	..	..	..	..	..	..	13	13	0	82	18	0
LB Newham	124	113	2	275	219	0	140	98	9	..	..	..
LB Redbridge	10	10	0	..	..	..	29	29	3	48	32	0
LB Richmond upon Thames	5	3	0	..	..	..	2	1	0	7	5	0
LB Sutton				0	0	0	0	0	0	7	6	1
LB Southwark	258	258	0	156	112	4	1583	1220	110	2066	1419	0
LB Tower Hamlets	65	65	0	..	..	..	1022	649	121	..	..	..
LB Waltham Forest	68	33	0	190	132	0	486	316	0	60	40	0
LB Wandsworth	37	37	0	139	48	3	199	85	4	131	82	2
Westminster CC	8547	2577	0	455	81	0	2347	1259	0	2526	1165	0
TOTAL	**10248**	**3861**	**68**	**2860**	**1784**	**47**	**9693**	**5201**	**378**	**10917**	**5676**	**40**

.. no data available.
Source: Defra

Appendix 3.2

BVPI 199 score by London Borough, 2005-2006

	Local street and environmental cleanliness (graffiti)	Local street and environmental cleanliness (fly-posting)
Barking & Dagenham	18%	1%
Barnet	9%	1%
Bexley	13%	1%
Brent	17%	3%
Bromley	16%	1%
Camden	15%	2%
City of London	0%	2%
Croydon	11%	2%
Ealing	15%	3%
Enfield	9%	1%
Greenwich	14%	1%
Hackney	19%	5%
Hammersmith & Fulham	10%	6%
Haringey	6%	4%
Harrow	15%	1%
Havering	14%	2%
Hillingdon	21%	3%
Hounslow	19%	7%
Islington	11%	13%
Kensington & Chelsea	1%	1%
Kingston-upon-Thames	8%	1%
Lambeth	6%	2%
Lewisham	14%	3%
Merton	12%	3%

Newham	6%	3%
Redbridge	21%	5%
Richmond upon Thames	10%	1%
Southwark	5%	2%
Sutton	4%	0%
Tower Hamlets	11%	7%
Waltham Forest	10%	4%
Wandsworth	7%	7%
Westminster	6%	2%

Appendix 3.3

Local Environmental Quality Survey comparison table.

	LEQ Survey of England 2004/05	Capital Standards 2003/4	Capital Standards 2004/5	Capital Standards 2005/6
Cleansing Issues				
Litter	-1	-2	-2	-2
Detritus	-2	-4	-3	-3
Leaf Fall	+7	+6	+6	+7
Cleansing-Related Issues				
Weed Growth	+3	+3	+4	+4
Staining	-1	-3	-3	-3
Fly-tipping	+8	+8	+8	+8
Waste Placed Out	n/a	n/a	n/a	+8
Fly-posting	+8	+7	+8	+8
Graffiti	+8	+4	+5	+5
Highway Infrastructure				
Paved Area Obstruction	-5*	-5*	-5*	+4*
Paved Area Obstruction - No Upstand	n/a*	n/a*	n/a*	-2*
Channel Obstruction	+4	-1	+1	+1
Paved Area Condition	-2	-3	-2	-2
Channel Condition	-2	-3	-3	-2
Carriageway Condition	-2	-3	-2	-2
Condition of Steps/ Ramps	-3	-2	-1	-2
Road Markings	-2	n/a	-2	-2
Vehicle Flows	+4	+3	+3	+2
Pedestrian Flows	+7	+5	+5	+5
Street Furniture				
Posts and Poles	-1	-1	-1	-1
Public Signs	-1	-2	-1	-1
Other Street Furniture	-2	-2	-2	-1
Buildings/Boundary Structures	-1	-1	-1	-1
Litter Bins				
Cleanliness	-2	-3	-3	-2
Condition	-1	-2	-1	-1
Degree of Fill	+7	+4	+7	+6

Public Transport Infrastructure				
Litter	-1	-2	-2	-2
Condition	-1	-1	-1	-1
Staining	-3	-7	-7	-7
Fly-posting	+8	n/a	+8	+8
Graffiti	+4	-1	-2	-3
Landscaping				
Litter	+1	-1	+1	-1
Maintenance	-2	-3	-2	-2

* Data non-comparable to previous surveys.

Appendix 3.4 BV 199 Comparison Table for 2003/04, 2004/05 and 2005/06

	Litter %			Detritus %			BV 199a (Combined Litter & Detritus)			BV199b (Graffiti)			BV 199c (Fly-posting)		
Land-use	**2003 /04**	**2004 /05**	**2005 /06**	**2003 /04**	**2004 /05**	**2005 /06**	**2003 /04**	**2004 /05**	**2005 /06**	**2003 /04**	**2004 /05**	**2005 /06**	**2003 /04**	**2004 /05**	**2005 /06**
Primary Retail/ Commercial	29	24	**21**	20	8	**10**	24	16	**16**	n/a	n/a	**9**	n/a	n/a	**11**
Secondary Retail/ Commercial	30	25	**22**	28	15	**19**	29	20	**21**	n/a	n/a	**13**	n/a	n/a	**8**
High Density Housing	26	21	**23**	58	45	**54**	42	33	**39**	n/a	n/a	**4**	n/a	n/a	**1**
Low Density Social Housing	22	17	**18**	49	34	**41**	35	26	**30**	n/a	n/a	**7**	n/a	n/a	**0**
Low Density Private Housing	12	9	**12**	59	44	**51**	35	27	**31**	n/a	n/a	**3**	n/a	n/a	**1**
Industry etc.	46	36	**41**	65	55	**63**	55	46	**52**	n/a	n/a	**11**	n/a	n/a	**3**
Main Roads	22	16	**17**	49	35	**35**	35	25	**26**	n/a	n/a	**6**	n/a	n/a	**4**
Rural Roads	38	15	**38**	73	55	**79**	55	35	**58**	n/a	n/a	**1**	n/a	n/a	**0**
Other Highways	33	30	**32**	53	41	**47**	43	36	**39**	n/a	n/a	**38**	n/a	n/a	**1**
Recreation	15	11	**14**	45	30	**39**	27	18	**23**	n/a	n/a	**17**	n/a	n/a	**1**
Overall	**26**	**21**	**22**	**47**	**34**	**39**	**36**	**27**	**30**	n/a	n/a	**12**	n/a	n/a	**3**

CHAPTER 4: Pollution

Appendix 4.1

Pollution Incidents in Greater London during the 12 months up to the end of since the previous State of Environment report and classed as mayor or significant: 08/10/2002 – 27/10/2006

REPORTED	BOROUGH	POLLUTANT	PREMISES	AIR	LAND	WATER
08/10/2002	Barking & Dagenham	Dust	Transfer Station	2	4	4
10/10/2002	Enfield	Suspended Solids		4	3	2
18/10/2002	Bexley	Crude Sewage		4	4	2
30/10/2002	Ealing	Other	Food Processing	4	4	2
01/11/2002	Barking & Dagenham	Smoke		2	4	4
05/11/2002	Bromley	Soils and Clay	Other	4	4	2
14/11/2002	Barnet	Crude Sewage	Recreation and Sports	4	2	2
14/11/2002	Barnet	Crude Sewage		4	4	2
20/11/2002	Barking & Dagenham	Smoke		2	3	4
25/11/2002	Waltham Forest	Crude Sewage	Non-Food	4	4	2
02/12/2002	Barnet	Suspended Solids		4	4	2
12/12/2002	Tower Hamlets	Unidentified Oil		4	4	2
17/12/2002	Hillingdon	Soils and Clay	Construction and Demolition	4	4	2
13/01/2003	Croydon	Rocks and Gravel	Transfer Station	2	2	4
19/01/2003	Redbridge	Other		4	4	2
23/01/2003	Merton	Crude Sewage	Foul Sewer	3	2	2
31/01/2003	Hillingdon	Other Oil or Fuel		3	3	2
11/02/2003	Bromley	Crude Sewage	Foul Sewer	4	2	3
15/02/2003	Brent	Grey Water	Foul Sewer	4	4	2
17/02/2003	Brent	Crude Sewage	Foul Sewer	4	4	2
20/02/2003	Bromley	Construction and Demolition Materials and Wastes	Other Waste Management Source	4	2	4
21/02/2003	Southwark	Dust	Transfer Station	3	3	2
03/03/2003	Bromley	Crude Sewage	Foul Sewer	4	2	3
06/03/2003	Brent	Suspended Solids	Other	4	4	2
17/03/2003	Havering	Crude Sewage	Surface Water Outfall	4	4	2
24/03/2003	Barnet	Crude Sewage	Other	4	2	1
26/03/2003	Waltham Forest	Soils and Clay		4	2	4
03/04/2003	Newham	Soils and Clay		4	2	4
09/04/2003	Greenwich	Soils and Clay	Water Distribution System	4	4	2
17/04/2003	Brent	Dust	Transfer Station	1	3	4
22/04/2003	Greenwich	Crude Sewage		3	3	2
22/04/2003	Bromley	Crude Sewage	Foul Sewer	4	2	3
26/04/2003	Barking & Dagenham	Smoke		2	3	4
28/04/2003	Brent	Suspended Solids	Other	4	4	2

29/04/2003	Barnet	Dust	Other Waste Management Source	2	3	4
06/05/2003	Croydon	Construction and Demolition Materials and Wastes	Transfer Station	2	2	2
08/05/2003	Hillingdon	Not Identified		4	4	2
08/05/2003	Brent	Suspended Solids	Other	4	4	2
09/05/2003	Barnet	Crude Sewage	Pumping Station	3	4	2
09/05/2003	Barnet	Dust	Other	2	3	4
16/05/2003	Waltham Forest	Construction and Demolition Materials and Wastes		4	2	4
27/05/2003	Barnet	Construction and Demolition Materials and Wastes	Other	4	4	2
01/06/2003	Ealing	Not Identified		4	4	2
04/06/2003	Newham	Final Effluent	Sewage Treatment Works	4	4	2
04/06/2003	Bexley	Other General Biodegradable Material or Waste	Other	4	4	2
06/06/2003	Hillingdon	Other Inert Material or Waste	Not Identified	4	1	4
07/06/2003	Ealing	Final Effluent	Surface Water Outfall	4	4	2
08/06/2003	Barking & Dagenham	Microbiological		4	4	2
08/06/2003	Bromley	Slurry and Dilute Slurry	Dairy	4	2	4
12/06/2003	Lambeth	Construction and Demolition Materials and Wastes		4	2	4
14/06/2003	Newham	Final Effluent	Sewage Treatment Works	4	4	2
23/06/2003	Wandsworth	Storm Sewage	Combined Sewer Overflow	4	4	2
25/06/2003	Croydon	Construction and Demolition Materials and Wastes	Transfer Station	3	2	2
25/06/2003	Hounslow	Not Identified		4	4	2
27/06/2003	Hounslow	Other Sewage Material	Surface Water Outfall	4	4	2
29/06/2003	Bexley	Final Effluent	Sewage Treatment Works	4	4	2
02/07/2003	Bexley	Storm Sewage	Storm Tank	4	4	2
03/07/2003	Ealing	Other Oil or Fuel		4	3	2
11/07/2003	Barking & Dagenham	Final Effluent	Sewage Treatment Works	4	4	2
16/07/2003	Ealing	Animal and Vegetable Oil		4	3	2
17/07/2003	Barking & Dagenham	Final Effluent	Sewage Treatment Works	4	4	2

06/08/2003	Brent	Construction and Demolition Materials and Wastes		4	2	2
07/08/2003	Brent	Petrol		4	3	2
07/08/2003	Hillingdon	Firefighting Run-Off		4	4	2
08/08/2003	Hillingdon	Grey Water		3	4	2
08/08/2003	Richmond upon Thames	Microbiological		4	4	2
09/08/2003	Barking & Dagenham	Final Effluent	Sewage Treatment Works	4	4	2
11/08/2003	Hillingdon	Alcohols/Aldehydes		4	4	2
12/08/2003	Barnet	Unidentified Oil		4	4	2
14/08/2003	Richmond upon Thames	Not Identified		4	4	2
14/08/2003	Waltham Forest	Suspended Solids	Water Distribution System	4	4	2
22/08/2003	Barnet	Construction and Demolition Materials and Wastes		4	2	4
23/08/2003	Barking & Dagenham	Microbiological		4	4	2
02/09/2003	Ea	Crude Sewage	Other	4	2	4
13/09/2003	Brent	Crude Sewage	Foul Sewer	3	4	2
16/09/2003	Enfield	Grey Water		4	4	2
16/09/2003	Richmond upon Thames	Other Inorganic Chemical or Product		4	4	2
23/09/2003	Camden	Not Identified		4	4	2
23/09/2003	Hammersmith & Fulham	Storm Sewage	Pumping Station	4	4	2
23/09/2003	Havering	Urban Run-Off		4	4	2
13/10/2003	Haringey	Other Sewage Material	Foul Sewer	4	4	2
19/11/2003	Barnet	Other Inert Material or Waste		4	2	4
21/11/2003	Kensington & Chelsea	Storm Sewage	Combined Sewer Overflow	4	4	1
23/12/2003	Bexley	Lubricating Oils	Other Local Government Premises	4	4	2
08/01/2004	Bexley	Crude Sewage	Sewage Treatment Works	4	2	4
10/01/2004	Harrow	Fumes	Other	1	3	3
13/01/2004	Newham	Process Effluent	Combined Sewer Overflow	4	2	3
16/01/2004	Havering	Firefighting Run-Off	Non-Food	2	3	3
04/02/2004	Enfield	Not Identified		4	4	2
05/02/2004	Waltham Forest	Mixed/Waste Oils	Metal Recycling	4	2	4
12/02/2004	Brent	Other	Other Manufacturing Sector Source	4	4	2
03/03/2004	Hackney	Construction and Demolition Materials and Wastes		4	1	4

30/03/2004	Barnet	Construction and Demolition Materials and Wastes		4	2	4
01/04/2004	Newham	Soils and Clay		4	2	4
02/04/2004	Waltham Forest	Not Identified		4	4	2
02/04/2004	Hillingdon	Diesel		4	4	2
10/04/2004	Hillingdon	Diesel		3	4	2
18/04/2004	Enfield	Microbiological	Other Natural Source	4	4	2
30/04/2004	Brent	Firefighting Run-Off	Other Manufacturing Sector Source	2	3	2
03/05/2004	Bexley	Other Sewage Material	Combined Sewer Overflow	4	4	2
20/05/2004	Barking & Dagenham	Other Inert Material or Waste		4	4	2
22/05/2004	Havering	Not Identified		4	4	2
24/05/2004	Waltham Forest	Smoke	Not Identified	2	3	3
23/06/2004	Westminster	Storm Sewage	Combined Sewer Overflow	4	4	2
30/06/2004	Richmond upon Thames	Not Identified		4	4	2
22/07/2004	Camden	Algae		4	4	2
22/07/2004	Southwark	Other		4	4	2
27/07/2004	Newham	Dust	Transfer Station	2	4	4
27/07/2004	Newham	Dust	Transfer Station	2	4	4
03/08/2004	Kensington & Chelsea	Storm Sewage	Storm Tank	4	4	1
03/08/2004	Southwark	Microbiological		3	4	2
10/08/2004	Westminster	Storm Sewage	Combined Sewer Overflow	4	4	2
10/08/2004	Hammersmith & Fulham	Construction and Demolition Materials and Wastes		4	2	4
11/08/2004	Greenwich	Storm Sewage	Storm Tank	4	4	2
24/08/2004	Greenwich	Storm Sewage	Storm Tank	4	4	2
31/08/2004	Kensington & Chelsea	Animal and Vegetable Oil		4	4	2
02/09/2004	Greenwich	Final Effluent	Sewage Treatment Works	4	4	2
23/09/2004	Barking & Dagenham	Unidentified Oil		4	2	3
07/10/2004	Kingston upon Thames	Construction and Demolition Materials and Wastes		4	2	2
14/10/2004	Richmond upon Thames	Storm Sewage	Sewage Treatment Works	4	4	2
17/10/2004	Hounslow	Construction and Demolition Materials and Wastes	Other Waste Management Source	4	3	2
01/11/2004	Havering	Smoke	Non-Inert Landfill	2	4	4
07/11/2004	Harrow	Crude Sewage	Combined Sewer Overflow	3	4	2
22/11/2004	Ealing	Crude Sewage	Surface Water Outfall	4	4	2

29/11/2004	Brent	Crude Sewage	Sewage Treatment Works	4	4	2
02/12/2004	Newham	Mixed/Waste Oils	Oil Refining and Petrochemicals	4	3	2
06/01/2005	Hillingdon	Suspended Solids	Rising Main	4	2	2
08/01/2005	Barnet	Firefighting Run-Off	Transfer Station	2	2	4
17/01/2005	Merton	Not Identified		4	4	2
04/02/2005	Havering	Soils and Clay	Minerals Processing	4	4	2
07/02/2005	Bromley	Diesel		4	4	2
03/03/2005	Sutton	Other Sewage Material	Combined Sewer Overflow	4	4	2
07/03/2005	Merton	Diesel	Other	3	3	2
16/03/2005	Harrow	Diesel		3	4	2
21/03/2005	Newham	Surfactants and Detergents	Other Manufacturing Sector Source	2	4	2
25/03/2005	Barnet	Grey Water	Foul Sewer	4	4	2
30/03/2005	Bexley	Storm Sewage	Storm Tank	4	4	2
11/04/2005	Barnet	Crude Sewage	Surface Water Outfall	3	4	2
15/04/2005	Bexley	Storm Sewage	Storm Tank	4	4	2
15/04/2005	Bexley	Other Organic Chemical or Product	Food Processing	4	4	2
21/04/2005	Bexley	Storm Sewage	Sewage Treatment Works	4	4	2
23/04/2005	Barking & Dagenham	Storm Sewage	Storm Tank	4	4	1
27/05/2005	Newham	Final Effluent	Sewage Treatment Works	4	4	2
04/06/2005	Hounslow	Storm Sewage	Storm Tank	4	4	2
04/06/2005	Tower Hamlets	Not Identified		4	4	2
09/06/2005	Newham	Final Effluent	Sewage Treatment Works	4	4	2
13/06/2005	Tower Hamlets	Smoke	Metal Recycling	2	2	3
15/06/2005	Bromley	Other Organic Chemical or Product		4	4	1
21/06/2005	Bexley	Final Effluent	Sewage Treatment Works	4	4	1
24/06/2005	Tower Hamlets	Storm Sewage	Combined Sewer Overflow	4	4	1
25/06/2005	Hounslow	Storm Sewage	Storm Tank	4	4	2
28/06/2005	Bexley	Firefighting Run-Off		2	3	3
29/06/2005	Hounslow	Storm Sewage	Sewage Treatment Works	4	4	1
12/07/2005	Enfield	Crude Sewage	Healthcare	4	4	2
14/07/2005	Brent	Heavy Metals	Other Manufacturing Sector Source	2	2	2
28/07/2005	Barking & Dagenham	Storm Sewage	Sewage Treatment Works	4	4	2
09/08/2005	Waltham Forest	Crude Sewage	Storm Tank	4	4	2
10/08/2005	Hillingdon	Effects on Humans	Composting Facility	2	4	4
24/08/2005	Brent	Noise	Household Waste Site	2	4	4
24/08/2005	Newham	Smoke	Transfer Station	2	2	4

25/08/2005	Bexley	Storm Sewage	Sewage Treatment Works	4	4	2
09/09/2005	Newham	Dyes and Inks	Other Waste Management Source	4	4	2
09/09/2005	Kingston upon Thames	Other Sewage Material	Sewage Treatment Works	4	4	2
09/09/2005	Hounslow	Storm Sewage	Sewage Treatment Works	4	4	2
04/10/2005	Southwark	Gas and Fuel Oils	Other Transport Source	2	4	1
10/10/2005	Havering	Crude Sewage	Foul Sewer	4	4	2
12/10/2005	Westminster	Storm Sewage	Pumping Station	4	4	2
19/10/2005	Hounslow	Not Identified		4	4	2
19/10/2005	Richmond upon Thames	Storm Sewage	Storm Tank	4	4	2
22/10/2005	Greenwich	Storm Sewage	Storm Tank	4	4	2
05/01/2006	Barnet	Gas and Fuel Oils	Road	3	2	4
09/01/2006	Newham	Smoke	Transfer Station	2	3	4
11/01/2006	Bexley	Not Identified		4	4	2
02/02/2006	Tower Hamlets	Smoke	Metal Recycling	3	2	4
21/02/2006	Waltham Forest	Crude Sewage	Other Manufacturing Sector Source	4	3	2
23/02/2006	Hounslow	Other General Biodegradable Material or Waste	Air	4	4	2
02/03/2006	Enfield	Smoke	Not Identified	2	3	4
08/03/2006	Brent	Animal and Vegetable Oil		4	4	2
03/04/2006	Hillingdon	Noise	Other	2	4	4
03/04/2006	Hillingdon	Noise	Other	2	4	4
11/04/2006	Ealing	Unidentified Oil	Not Identified	4	2	4
20/04/2006	Barnet	Grey Water	Other	4	2	3
21/04/2006	Hillingdon	Contaminated Construction & Demolition Material & Waste		4	2	4
03/05/2006	Waltham Forest	Smoke	Other Domestic/Residential Source	2	3	4
11/05/2006	Hounslow	Diesel		4	2	2
11/05/2006	Enfield	Other General Biodegradable Material or Waste	Transfer Station	3	2	4
08/06/2006	Hounslow	Diesel	Not Identified	3	3	2
08/06/2006	Waltham Forest	Grey Water		4	3	2
13/06/2006	Richmond upon Thames	Not Identified		4	4	2
13/06/2006	Tower Hamlets	Storm Sewage	Combined Sewer Overflow	4	4	2
12/07/2006	Barnet	Smoke	Private Dwellings	2	3	4
22/07/2006	Wandsworth			4	4	2

23/07/2006	Richmond upon Thames	Not Identified		4	4	2
27/07/2006	Richmond upon Thames	Storm Sewage	Storm Tank	4	4	2
02/08/2006	Hillingdon	Smoke	Waste Incinerator	2	4	4
02/08/2006	Hillingdon	Smoke	Waste Incinerator	2	4	4
19/08/2006	Enfield	Smoke	Transfer Station	2	2	4
19/08/2006	Enfield	Soils and Clay	Transfer Station	2	2	4
13/09/2006	Richmond upon Thames	Storm Sewage	Sewage Treatment Works	4	4	1
26/09/2006	Hillingdon	Crude Sewage	Foul Sewer	2	2	4
29/09/2006	Hackney	Microbiological		4	4	2
30/09/2006	Richmond upon Thames	Storm Sewage	Storm Tank	4	4	2
23/10/2006	Tower Hamlets	Construction and Demolition Materials and Wastes		4	2	2
23/10/2006	Tower Hamlets	Vehicles and Vehicle Parts	Metal Recycling	4	2	2
23/10/2006	Newham	Vehicles and Vehicle Parts	Metal Recycling	4	2	3
23/10/2006	Tower Hamlets	Vehicles and Vehicle Parts	Metal Recycling	4	2	3
23/10/2006	Newham	Vehicles and Vehicle Parts		4	2	3
24/10/2006	Waltham Forest	Mixed/Waste Oils	Metal Recycling	4	2	3
27/10/2006	Hounslow			4	4	2

Source: Environment Agency

Appendix 4.2

Some typical noise examples

Noise source/situation	Sound pressure level in dB(A)	Typical subjective description
30m from military jet at take-off	140	Painful, intolerable
Pop concert, near stage	105	
Night club	100	Extremely noisy
Pneumatic drill at 7m	95	
Powered lawnmower at operator's ear; older diesel lorry from footway	90	Very noisy
Ringing alarm clock at 1m	80	
Car or light van at 60km/h from 7m	75	
Domestic vacuum cleaner at 3m; Telephone ringing at 2m	70	Noisy
Busy general office	60	
Normal conversation at 1m	55-60	
Boiling kettle at 0.5m	50	
Refrigerator humming at 2m	40	
British Museum Reading Room	35	
Bedroom in quiet area with windows shut	20-30	Very quiet
Remote rural location with no specifically identifiable sound	20	
Threshold of hearing	0	Uncanny silence

source: various, including Environment Agency and DEFRA

note: 'B' refers to decibels, which is a scale for quantifying noise. The 'A' in dB(A) (and in L_{Aeq} in Figure 20 below) refers to the 'A' scale of 'weighting' sound pressure levels. The weighting allows for the fact that the sensitivity of the human ear varies at different frequencies – generally the ear is more sensitive to mid-range frequencies than it is to high or low frequency sounds.

CHAPTER 5: Road Traffic Levels

Appendix 5.1a

Outer London Boundary Cordon Thousands of vehicles

Year		Pedal Cycles	Motor-cycles	Cars	Taxis	All Goods Vehicles	Buses & Coaches	All motor vehicles
1992		12	33	1983	10	384	19	2430
1995		13	37	2023	10	427	22	2519
1998		10	38	2049	12	433	24	2555
2001		9	42	2048	14	440	22	2567
2004		9	35	2053	16	440	22	2566
	% change 2001-2004	0.00%	-16.7%	0.2%	14.3%	0.0%	0.0%	-0.0%

Appendix 5.1b

Inner London Cordon Thousands of vehicles

Year		Pedal Cycles	Motor-cycles	Cars	Taxis	All Goods Vehicles	Buses & Coaches	All motor vehicles
1990		25	60	1652	49	375	36	2173
1993		27	53	1606	39	343	39	2080
1996		30	60	1644	47	356	44	2150
1999		31	70	1635	60	357	47	2168
2002		25	70	1593	52	368	46	2129
2004		31	69	1553	53	348	53	2078
2005		34	64	1510	44	318	52	1988
% change	2002-04	24.0%	-1.4%	-2.5%	1.9%	-5.4%	15.2%	-2.4%
	2004-05	9.7%	-7.3%	-2.8%	-17.0%	-8.6%	-1.9%	-4.3%
	Overall	36.0%	-8.6%	-5.2%	-15.4%	-13.6%	13.0%	-6.6%

Appendix 5.1c

Vehicles crossing the Central Cordon, by type (24 hours combined directions)

Thousand vehicles

	Pedal cycles	Motorcycles	Cars	Taxis	Goods vehicles	Buses and Coaches	All motor vehicles
1991	37	68	1,094	162	281	39	1,644
1993	35	65	1,017	161	259	39	1,541
1995	45	72	1,061	159	279	41	1,612
1997	51	82	1,030	162	266	45	1,585
1999	56	85	997	169	265	44	1,559
2001	51	92	942	172	261	45	1,512
2002	61	91	895	166	245	46	1,442
2003	65	92	791	182	240	53	1,359
2004	72	93	764	168	230	55	1,310
2005	87	88	743	177	237	56	1,300
2006	98	91	707	184	229	58	1,269
Percentage change							
2001-02	*19.6*	*-1.1*	*-5.0*	*-3.5*	*-6.1*	*2.2*	*-4.6*
2001-03	*27.5*	*0.0*	*-16.0*	*5.8*	*-8.0*	*17.8*	*-10.1*
2001-04	*41.2*	*1.1*	*-18.9*	*-2.3*	*-11.9*	*22.2*	*-13.4*
2001-05	*70.6*	*-4.3*	*-21.1*	*2.9*	*-9.2*	*24.4*	*-14.0*

Source: TfL Surface Transport (Road Network Performance)

Appendix 5.2:

Table 27: Public Transport Use (million passenger journeys)

	1991/2	1995/6	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	% change 2000/06
Bus	1149	1198	1354	1430	1536	1702	1793	1816	34%
London Underground	751	784	970	953	942	948	976	971	0%
Docklands Light Railway	8.0	14.5	38.4	41.3	45.7	48.5	50.1	53.0	38%
Croydon Tramlink	-	-	-	18.6	19.2	19.8	21.8	22.5	21%

Table 27
Source: London Travel Report, 2006

Comments: Tramlink percentage change from 2001-06 –(Use of statistics are not as reported in last SOER). Croydon Tramlink services began in 2000/01 and 2001/02 was the first full year of operation. Initial estimates of passenger journeys were revised in 2005 following improvements in monitoring

Appendix 6: Land Quality and Land Use

Appendix 6.1

Gains and losses in recreational open space from 1998 to 2000 by borough

	Average gain 1998-2000	Average loss 1998-2000	Average net change
Barking and Dagenham	6	7	-1
Barnet	1	-	1
Bexley	-	2	-2
Brent	1	6	-5
Bromley	-	1	-1
Camden	-	-	-
City of London	-	-	-
Croydon	1	3	-2
Ealing	3	2	1
Enfield	1	1	-
Greenwich	4	1	3
Hackney	-	3	-3
Hammersmith and Fulham	-	-	-
Haringey	-	-	-
Harrow	-	-	-
Havering	-	1	-1
Hillingdon	14	1	13
Hounslow	-	1	-1
Islington	-	-	-
Kensington and Chelsea	-	-	-
Kingston upon Thames	-	-	-
Lambeth	1	-	-
Lewisham	9	9	-
Merton	1	2	-1
Newham	5	1	4
Redbridge	1	2	-1
Richmond upon Thames	7	-	7
Southwark	-	-	-
Sutton	1	3	-2
Tower Hamlets	-	1	-1
Waltham Forest	-	1	-1
Wandsworth	1	1	-
Westminster (City of)	-	-	-
Total	**57**	**51**	**6**

Source Communities and Local Government
Note All figures are in hectares
- Indicates a figure less than 0.5 hectare

Appendix 6.2: (NJTLC Landscape Consultants: *SAUL Project – London Borough Open Space Strategy Audit,* May 2006

London Borough	Stage in Process	Date
Barking and Dagenham	Complete	2003
Barnet	Not started	-
Bexley	Other strategy	Various
Brent	Complete	2003/04
Bromley	Other strategy	1990
Camden	Complete	2004
City of London	Draft	-
Croydon	Complete	2004/05
Ealing	-	-
Enfield	Other strategy	2001
Greenwich	Other strategy	2006
Hackney	Other strategy	2004
Hammersmith and Fulham	Not started	-
Haringey	Completed	2004/05
Harrow	Other strategy	2004/05
Havering	Draft	-
Hillingdon	Complete	2002
Hounslow	Other strategy	2005
Islington	Not started	-
Kensington and Chelsea	Complete	2006
Kingston upon Thames	Not started	-
Lambeth	Complete	2004
Lewisham	Complete	2004/05
Merton	Complete	2002-05
Newham	Other strategy	1995/2005
Redbridge	Auditing	-
Richmond upon Thames	Other strategy	2003
Southwark	Draft	-
Sutton	Draft	-
Tower Hamlets	Complete	2005/06
Waltham Forest	Complete	2005/06
Wandsworth	Draft	-
Westminster (City of)	Draft	-

Source: NJTLC Landscape Consultants: SAUL Project – London Borough Open Space Strategy Audit, May 2006

Appendix 6.3: City farms in London

Barking and Dagenham
Thameside Park City Farm, Barking – closed May 14th 2007
Wellgate Community Farm, Collier Row

Bexley and Greenwich
Woodlands Farm, Shooters Hill

Camden
Coram's Fields, St Pancras
Kentish Town City Farm, Kentish Town

Hackney
Hackney City Farm, Haggerston

Hillingdon
Heathrow Special Needs Farm, Longford

Hounslow
Hounslow Urban Farm, Hatton

Islington
Freightliners Farm, Barnsbury

Lambeth
Vauxhall City Farm, Vauxhall

Merton
Deen City Farm, Morden

Newham
Newham City Farm, Beckton

Southwark
Surrey Docks Farm, Rotherhithe

Tower Hamlets
Mudchute Park and Farm, Isle of Dogs
Spitalfields City Farm, Spitalfields
Stepping Stones Farm, Stepney

Waltham Forest
Brooks Farm, Leyton

Chapter 7: Biodiversity Appendix

Appendix 7.1:

Total Area of Wildlife Sites identified in each borough

The final line in the table for each borough (in bold print) gives the total area of each grade of site at the end of February 2007.

Borough		Area of sites of importance for nature conservation (hectares)				
		Metropolitan	Borough grade I	Borough Grade II	Local	Total
London total	Revised 2003 baseline	15646	7495	4550	1736	29426
	Re-evaluation	257	174	434	146	1011
	Actual change since 2003	0	12	5	-24	-7
	Current area	**15903**	**7680**	**4989**	**1858**	**30430**
Barking & Dagenham	Revised 2003 baseline	312	167	69	32	580
	Re-evaluation	0	-7	0	0	-7
	Actual change since 2003	0	0	0	-3	-3
	Current area	**312**	**160**	**69**	**29**	**570**
Barnet	Revised 2003 baseline	310	239	447	164	1160
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	0	0	0	0
	Current area	**310**	**239**	**447**	**164**	**1160**
Bexley	Revised 2003 baseline	892	230	200	79	1400
	Re-evaluation	42	58	161	-3	258
	Actual change since 2003	0	0	0	0	0
	Current area	**934**	**288**	**361**	**75**	**1658**
Brent	Revised 2003 baseline	173	114	102	40	429
	Re-evaluation	5	6	15	6	32
	Actual change since 2003	0	4	-6	0	-3
	Current area	**178**	**124**	**110**	**46**	**458**
Bromley	Revised 2003 baseline	1764	471	409	45	2689
	Re-evaluation	0	0	20	0	20
	Actual change since 2003	0	0	0	0	0
	Current area	**1764**	**471**	**429**	**45**	**2708**
Camden	Revised 2003 baseline	323	37	27	13	400
	Re-evaluation	0	1	2	4	7
	Actual change since 2003	0	1	2	2	5
	Current area	**323**	**39**	**32**	**18**	**412**
City of London	Revised 2003 baseline	26	0	5	2	33
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	0	0	0	0
	Current area	**26**	**0**	**5**	**2**	**33**
Croydon	Revised 2003 baseline	739	420	291	114	1563
	Re-evaluation	0	0	-2	0	-2
	Actual change since 2003	0	0	0	0	0
	Current area	**739**	**420**	**288**	**113**	**1560**
Ealing	Revised 2003 baseline	246	455	212	54	967
	Re-evaluation	13	8	38	44	102

Borough		Area of sites of importance for nature conservation (hectares)				
		Metropolitan	Borough grade I	Borough Grade II	Local	Total
	Actual change since 2003	0	0	-1	0	-1
	Current area	**259**	**463**	**249**	**97**	**1068**
Enfield	Revised 2003 baseline	612	448	187	80	1327
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	0	0	0	0
	Current area	**612**	**448**	**187**	**80**	**1327**
Greenwich	Revised 2003 baseline	530	337	130	18	1015
	Re-evaluation	0	0	-2	4	2
	Actual change since 2003	0	0	6	0	6
	Current area	**530**	**337**	**133**	**22**	**1023**
Hackney	Revised 2003 baseline	100	48	33	47	228
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	-5.19	0	0	-5
	Current area	**100**	**43**	**33**	**47**	**223**
Hammersmith & Fulham	Revised 2003 baseline	89	101	25	47	261
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	-1	0	0	-1
	Current area	**89**	**100**	**25**	**47**	**260**
Haringey	Revised 2003 baseline	94	189	156	113	552
	Re-evaluation	0	0	0	6	6
	Actual change since 2003	0	0	0	0	0
	Current area	**95**	**189**	**156**	**119**	**558**
Harrow	Revised 2003 baseline	278	260	107	22	667
	Re-evaluation	7	0	83	47	138
	Actual change since 2003	0	-4	0	0	-4
	Current area	**285**	**257**	**190**	**69**	**801**
Havering	Revised 2003 baseline	1209	466	401	73	2148
	Re-evaluation	2	7	0	4	13
	Actual change since 2003	0	0	0	0	0
	Current area	**1211**	**473**	**401**	**77**	**2162**
Hillingdon	Revised 2003 baseline	1140	291	322	62	1815
	Re-evaluation	50	177	97	-1	323
	Actual change since 2003	0	0	-2	0	-2
	Current area	**1190**	**468**	**417**	**61**	**2136**
Hounslow	Revised 2003 baseline	620	294	132	82	1128
	Re-evaluation	0	0	0	0	0
	Actual change	0	0	0	0	0
	Current area	**620**	**294**	**132**	**82**	**1128**
Islington	Revised 2003 baseline	10	35	13	22	80
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	0	0	0	0
	Current area	**10**	**35**	**13**	**22**	**80**
Kensington & Chelsea	Revised 2003 baseline	81	20	24	3	128
	Re-evaluation	0	3	0	5	9
	Actual change since 2003	0	0	0	0	0
	Current area	**81**	**23**	**24**	**8**	**136**

Borough		Area of sites of importance for nature conservation (hectares)				
		Metropolitan	Borough grade I	Borough Grade II	Local	Total
Kingston upon Thames	Revised 2003 baseline	98	192	86	26	402
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	0	0	0	0
	Current area	**98**	**192**	**86**	**26**	**402**
Lambeth	Revised 2003 baseline	43	115	71	28	257
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	0	0	0	0
	Current area	**43**	**115**	**71**	**28**	**257**
Lewisham	Revised 2003 baseline	216	70	120	81	486
	Re-evaluation	0	3	20	6	29
	Actual change since 2003	0	16	-3	-13	0
	Current area	**216**	**89**	**137**	**74**	**515**
Merton	Revised 2003 baseline	521	150	117	22	810
	Re-evaluation	0	51	-38	3	16
	Actual change since 2003	0	1	11	-6	6
	Current area	**522**	**202**	**90**	**19**	**832**
Newham	Revised 2003 baseline	269	352	64	84	769
	Re-evaluation	0	-4	8	0	4
	Actual change since 2003	0	0	0	0	0
	Current area	**269**	**348**	**72**	**84**	**773**
Redbridge	Revised 2003 baseline	482	934	134	54	1604
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	0	0	0	0
	Current area	**482**	**934**	**134**	**54**	**1604**
Richmond upon Thames	Revised 2003 baseline	2153	278	168	156	2755
	Re-evaluation	137	-131	-1	-2	3
	Actual change since 2003	0	0	0	-2	-2
	Current area	**2290**	**147**	**167**	**152**	**2756**
Southwark	Revised 2003 baseline	152	142	156	21	472
	Re-evaluation	0	2	0	7	8
	Actual change since 2003	0	0	0	-1	-1
	Current area	**152**	**144**	**156**	**27**	**479**
Sutton	Revised 2003 baseline	313	250	77	38	677
	Re-evaluation	1	0	0	-2	-1
	Actual change since 2003	0	0	0	0	0
	Current area	**314**	**250**	**77**	**36**	**676**
Tower Hamlets	Revised 2003 baseline	231	121	44	23	420
	Re-evaluation	0	0	0	21	21
	Actual change since 2003	0	0	-2	0	-2
	Current area	**231**	**121**	**43**	**44**	**439**
Waltham Forest	Revised 2003 baseline	736	84	10	41	871
	Re-evaluation	0	0	28	-3	25
	Actual change since 2003	0	0	0	0	0
	Current area	**736**	**84**	**38**	**37**	**896**

Borough		Area of sites of importance for nature conservation (hectares)				
		Metropolitan	Borough grade I	Borough Grade II	Local	Total
Wandsworth	Revised 2003 baseline	424	164	199	26	814
	Re-evaluation	0	0	4	2	5
	Actual change since 2003	0	0	0	0	0
	Current area	**424**	**164**	**203**	**28**	**819**
Westminster	Revised 2003 baseline	459	21	14	26	520
	Re-evaluation	0	0	0	0	0
	Actual change since 2003	0	0	0	0	0
	Current area	**459**	**21**	**14**	**26**	**520**

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भाषा में चाहते हैं, तो कृपया निम्नलिखित
नंबर पर फोन करें अथवा नीचे दिये गये
पते पर संपर्क करें

Vietnamese

Nếu bạn muốn có văn bản tài liệu
này bằng ngôn ngữ của mình, hãy
liên hệ theo số điện thoại hoặc địa
chỉ dưới đây.

Bengali

আপনি যদি আপনার ভাষায় এই দলিলের প্রতিলিপি
(কপি) চান, তা হলে নীচের ফোন্ নম্বরে
বা ঠিকানায় অনুগ্রহ করে যোগাযোগ করুন।

Greek

Αν θέλετε να αποκτήσετε αντίγραφο του παρόντος
εγγράφου στη δική σας γλώσσα, παρακαλείστε να
επικοινωνήσετε τηλεφωνικά στον αριθμό αυτό ή ταχυ-
δρομικά στην παρακάτω διεύθυνση.

Urdu

اگر آپ اِس دستاویز کی نقل اپنی زبان میں
چاھتے ھیں، تو براہ کرم نیچے دئے گئے نمبر
پر فون کریں یا دیئے گئے پتے پر رابطہ کریں

Turkish

Bu belgenin kendi dilinizde
hazırlanmış bir nüshasını
edinmek için, lütfen aşağıdaki
telefon numarasını arayınız
veya adrese başvurunuz.

Arabic

إذا أردت نسخة من هذه الوثيقة بلغتك، يرجى
الاتصال برقم الهاتف أو مراسلة العنوان
أدناه

Punjabi

ਜੇ ਤੁਹਾਨੂੰ ਇਸ ਦਸਤਾਵੇਜ਼ ਦੀ ਕਾਪੀ ਤੁਹਾਡੀ ਆਪਣੀ ਭਾਸ਼ਾ
ਵਿਚ ਚਾਹੀਦੀ ਹੈ, ਤਾਂ ਹੇਠ ਲਿਖੇ ਨੰਬਰ 'ਤੇ ਫ਼ੋਨ ਕਰੋ ਜਾਂ ਹੇਠ
ਲਿਖੇ ਪਤੇ 'ਤੇ ਰਾਬਤਾ ਕਰੋ:

Gujarati

જો તમને આ દસ્તાવેજની નકલ તમારી ભાષામાં
જોઇતી હોય તો, કૃપા કરી આપેલ નંબર ઉપર
ફોન કરો અથવા નીચેના સરનામે સંપર્ક સાધો.

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